

Report

Land East of Pirton

Air Quality Assessment

For Gladman Developments Ltd

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Executive Summary

The air quality impacts associated with the proposed residential development of land east of Pirton have been assessed.

Holwell Road is a quiet road, and the assessment has demonstrated that future residents of the proposed development will experience acceptable air quality, with pollutant concentrations well below the air quality objectives.

The proposed development will generate additional traffic on the local road network, but the assessment has shown that there will be no significant effects at any existing, sensitive receptor.

Overall, the air quality effects of the proposed development are judged to be 'not significant'.

1 Introduction

- 1.1 This report describes the potential air quality impacts associated with the proposed residential development of land off Holwell Road, Pirton. The proposed development will consist of up to 130 dwellings. The proposed development lies within the administrative boundary of North Herts Council (NHC).
- 1.2 The location of the proposed development is shown in Figure 1-1.

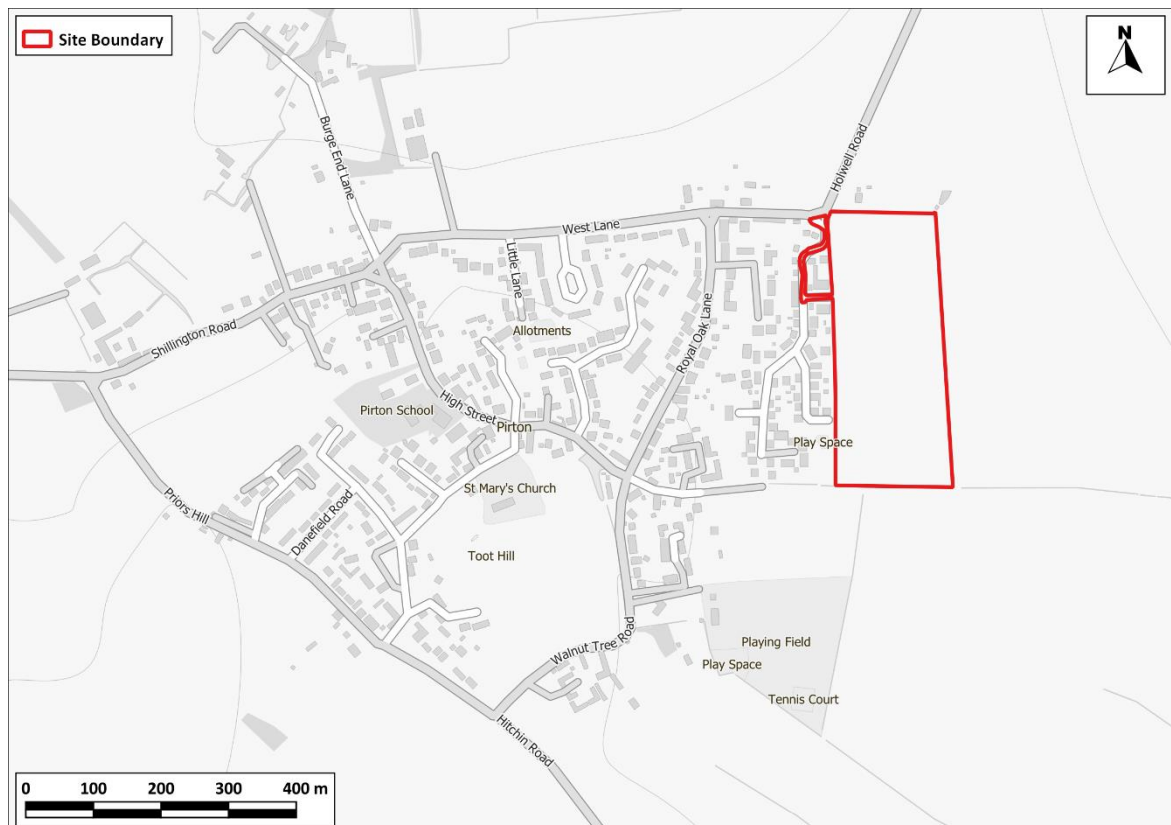


Figure 1-1: Proposed Development Location

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 1.3 The proposed development will generate additional traffic on local roads, which may impact on air quality at existing residential properties along the affected road network, as well as new residential properties introduced as part of the proposed development itself. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}).
- 1.4 There will be no centralised combustion plant and thus no significant point sources of emissions within the proposed development.
- 1.5 This report describes existing local air quality conditions (base year 2023), and the predicted air quality in the future assuming that the proposed development does, or does not proceed. The assessment of traffic-related impacts focuses on 2029, which is the anticipated year of first occupation of any of the new homes.

- 1.6 This report has been prepared taking into account all relevant local and national guidance and regulations.

2 Policy Context

- 2.1 All European legislation referred to in this report is written into UK law and remains in place.

Air Quality Strategy 2007

- 2.2 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Strategy 2023

- 2.3 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities.

Clean Air Strategy 2019

- 2.4 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

- 2.5 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.
- 2.6 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government's 'Zero Emission Vehicle' (ZEV) mandate requires that 80% of new cars and 70% of new vans sold in Great Britain must be zero exhaust emission by 2030, increasing to 100% by 2035. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the

coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Environment Act 2021

- 2.7 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the Government to account and ensuring compliance with these targets.
- 2.8 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (SI 2023 No. 96) sets two new targets for future concentrations of PM_{2.5}. These targets are described in Paragraph 3.4.

Environmental Improvement Plan 2023

- 2.9 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018a). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 (Defra, 2023b) is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.
- 2.10 The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of PM_{2.5}. These targets, which are described in more detail in Paragraph 3.4, include the long-term targets in the Statutory Instrument described in Paragraph 2.8, and interim targets to be achieved by 2028.
- 2.11 The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It also outlines the respective roles of industry, agricultural sectors, and the DfT in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

- 2.12 The National Planning Policy Framework (NPPF) (2024) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"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".

- 2.13 To prevent unacceptable risks from air pollution, Paragraph 187 of the NPPF states 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, taking into account relevant information such as river basin management plans".

- 2.14 Paragraph 198 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

2.15 More specifically on air quality, Paragraph 199 makes clear 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".

2.16 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified".

2.17 Regarding plan-making, the PPG states:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

2.18 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan *"identifies measures that will be introduced in pursuit of the objectives and can have implications for planning"*.

2.19 Regarding the need for an air quality assessment, the PPG states that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity".

2.20 The PPG sets out the information that may be required in an air quality assessment, making clear that:

"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".

2.21 The PPG also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented".

Local Policies

- 2.22 The North Hertfordshire Local Plan 2011 - 2031 (North Herts Council, 2022) was adopted in November 2022. Within this, Policy D4: Air Quality sets out expectations for air quality considerations in planning applications and states:

"Planning permission will be granted provided that development proposals:

- 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."

- 2.23 In support of the Local Plan, NHC has published an Air Quality Planning Guidance Document (North Hertfordshire District Council, 2018a), which sets out the expectations of air quality assessment for planning applications with the aim to *"facilitate sustainable development by helping to achieve the best possible public health protection outcomes, in relation to air quality"*.

Building Standards

- 2.24 Part F(1) of Schedule 1 of the Building Regulations 2010 as amended June 2022 (Ministry of Housing, Communities & Local Government, 2022) places a duty on building owners, or those responsible for relevant building work¹, to ensure adequate ventilation is provided to building occupants.
- 2.25 Approved Document F (HM Government, 2021a), which accompanies the Building Regulations, explains that care should be taken to minimise entry of external air pollutants. Specific steps should be taken to manage ventilation intakes where the building is near to a significant source of emissions, or if local ambient concentrations exceed values set in the Air Quality Standards Regulations 2010 (see Paragraph 3.9, later). These steps include maximising the distance between emission source and air intake, considering likely dispersion patterns, and considering the timing of pollution releases when designing the ventilation system.
- 2.26 Part S(1) of Schedule 1, and Regulation 44D, of the Building Regulations 2010 (Ministry of Housing, Communities & Local Government, 2022) define a requirement for the provision of infrastructure for charging electric vehicles. Precise requirements are explained further within Approved Document S

¹ Building work is a legal term for work covered by the Building Regulations. With limited exemptions, the Regulations apply to all significant building work, including erecting or extending a building.

(HM Government, 2021b) and depend on the overall number of parking spaces provided and the average financial cost of installation.

- 2.27 Compliance with the Building Regulations is not required for planning approval, but it is assumed that the Regulations will be complied with in the completed development.

Air Quality Action Plans

National Air Quality Plan

- 2.28 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018b) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ). There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

- 2.29 NHC's Air Quality Action Plan (North Hertfordshire District Council, 2018b) sets out a series of measures by which they will seek to achieve the air quality objectives in their AQMAs. None of the policies are especially relevant to this assessment, being either general in nature, or focussed on the AQMAs, which are located in Hitchin, approximately 3.5 km southeast of the proposed development.

3 Assessment Criteria

- 3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are based on assessment of the effects of each pollutant on human health, including the effects on sensitive sub-groups. The 'objectives' set out the extent to which the Government expects the standards to be achieved *taking account of practical considerations*. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).
- 3.2 The UK-wide objectives for nitrogen dioxide and PM₁₀ were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour mean nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m³ (Defra, 2025a). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM₁₀ objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m³ (Defra, 2025a). The predicted annual mean PM₁₀ concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM₁₀ objective. Where predicted annual mean concentrations are below 32 µg/m³ it is unlikely that the 24-hour mean objective will be exceeded.
- 3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2025a). The annual mean objectives for nitrogen dioxide and PM₁₀ are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at hotels. The 24-hour mean objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.
- 3.4 For PM_{2.5}, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value (see Paragraph 3.9), originally set at 25 µg/m³ and currently set at 20 µg/m³.
- 3.5 Defra has also set two new targets, and two new interim targets, for PM_{2.5} concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean PM_{2.5} concentration of 10 µg/m³ by the end of 2040 (referred to as the annual mean concentration target or AMCT), with the interim target being a value of 12 µg/m³ by the start of 2028². The second set of targets relate to reducing overall population exposure to PM_{2.5}. By the end of 2040, overall population exposure to PM_{2.5} should be reduced by 35% compared with 2018 levels (referred to as the population exposure reduction target or PERT), with the interim target being a reduction of 22% by the start of 2028 (Table 3-1).

Table 3-1: Environment Act PM_{2.5} Targets

Metric	Target	Target year
AMCT	Interim target: 12 µg/m ³	2028

² Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m³ would not exceed the 10 µg/m³ target.

Metric	Target	Target year
	Legally binding target: 10 µg/m ³	2040
PERT	Interim target: 22% reduction in exposure compared to 2018	2028
	Legally binding target: 35% reduction in exposure compared to 2018	2040

3.6 In 2024 Defra published Interim Planning Guidance on the PM_{2.5} targets (Defra, 2024). This states that:

“The purpose of the targets is to improve air quality by reducing levels of PM_{2.5} across the country, therefore improving public health. While achievement of the targets will be assessed at relevant monitoring sites, the targets apply to ambient (outdoor) air throughout England. Applicants and Local Planning Authorities should therefore consider the impact of developments on air quality in all ambient air, whether a monitor is present or not.”

3.7 In order to address the new targets it is not sufficient to assess solely whether a scheme is likely to lead to an exceedance of a legal limit. Instead, developments need to implement appropriate mitigation measures from the design stage, ensuring the minimum amount of pollution is emitted and that exposure is minimised.

3.8 Pending publication of the new guidance, Defra advises applicants to provide evidence that they have identified key sources of air pollution within the scheme and taken appropriate action to minimise emissions of PM_{2.5} and its precursors as far as possible. More detailed assessment is expected for development closer to populations and/or having higher emissions. Defra has posed two questions to be used as prompts to support the interim assessment process:

“How has exposure to PM_{2.5} been considered when selecting the development site?; and

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?”

3.9 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM₁₀ and PM_{2.5}, and is implemented in UK law through the Air Quality Standards Regulations (2010)³. The limit values for nitrogen dioxide and PM₁₀ are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.10 The relevant air quality criteria for this assessment are provided in Table 3-2.

Table 3-2: Air Quality Criteria for Nitrogen Dioxide, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Value
Nitrogen Dioxide	1-hour Mean	200 µg/m ³ not to be exceeded more than 18 times a year

³ As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

Pollutant	Time Period	Value
PM ₁₀	Annual Mean	40 µg/m ³
	24-hour Mean	50 µg/m ³ not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³ ^a
PM _{2.5}	Annual Mean	20 µg/m ³ ^b

^a A proxy value of 32 µg/m³ as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM₁₀ objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM₁₀ objective are possible (Defra, 2025a).

^b There is no numerical PM_{2.5} objective for local authorities (see Paragraph 3.4). Convention is to assess against the UK limit value which is currently 20 µg/m³.

Screening Criteria

- 3.11 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)⁴ recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A1, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m² of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment.
- 3.12 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A1) inside an AQMA are a change in flows of more than 25 Heavy Duty Vehicles (HDVs) or 100 Light Duty Vehicles (LDVs) per day; outside of an AQMA the thresholds are 100 HDVs or 500 LDVs. Where these criteria are exceeded, a detailed assessment is likely to be required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.
- 3.13 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

⁴ The IAQM is the professional body for air quality practitioners in the UK.

4 Assessment Approach

Study Area

- 4.1 The study area for the assessment has been identified using professional judgement, focussing on the areas where impacts are anticipated to be greatest. It includes the application site itself and all of the roads along which the development will lead to a potentially significant change in traffic flows. Specifically, the assessment has focussed on Drovers Way, Holwell Road west of Drovers Way, Royal Oak Lane and Walnut Tree Road. Figure 1-1 in Section 1 of this report effectively shows the study area.

Receptors

- 4.2 Concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been predicted at a number of locations both within, and close to, the proposed development. Receptors have been identified to represent a range of exposure, including worst-case locations (these being at the façades of the residential properties closest to the sources). When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the proposed development will be greatest.
- 4.3 Eleven existing residential properties have been identified as receptors for the assessment. Three additional receptor locations have been identified within the new development, which represent exposure to existing sources. These locations are described in Table 4-1 and shown in Figure 4-1. In addition, concentrations have been modelled at the diffusion tube monitoring site located at Nightingale Road, Hitchin, in order to verify the model outputs (see Appendix 0 for verification method).

Table 4-1: Description of Receptor Locations

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) ^a
Existing properties				
1	Residential	515145.5	231975.7	1.5
2	Residential	515131.9	231975.2	1.5
3	Residential	515163.3	232061.6	1.5
4	Residential	515095.5	232089.4	1.5
5	Residential	515076.8	232090.6	1.5
6	Residential	515013.5	232102.6	1.5
7	Residential	515016.1	232067.8	1.5
8	Residential	514990.3	231995.1	1.5
9	Residential	515001.2	231937.6	1.5
10	Residential	514951.3	231831.5	1.5
11	Residential	514882.2	231725.1	1.5
New properties				

Receptor	Type	X coordinate	Y coordinate	Heights Modelled (m) ^a
N1	Residential	515207.4	231976.8	1.5
N2	Residential	515209.0	231963.6	1.5
N3	Residential	515199.2	232070.4	1.5

^a A height of 1.5 m is used to represent ground-floor level exposure.

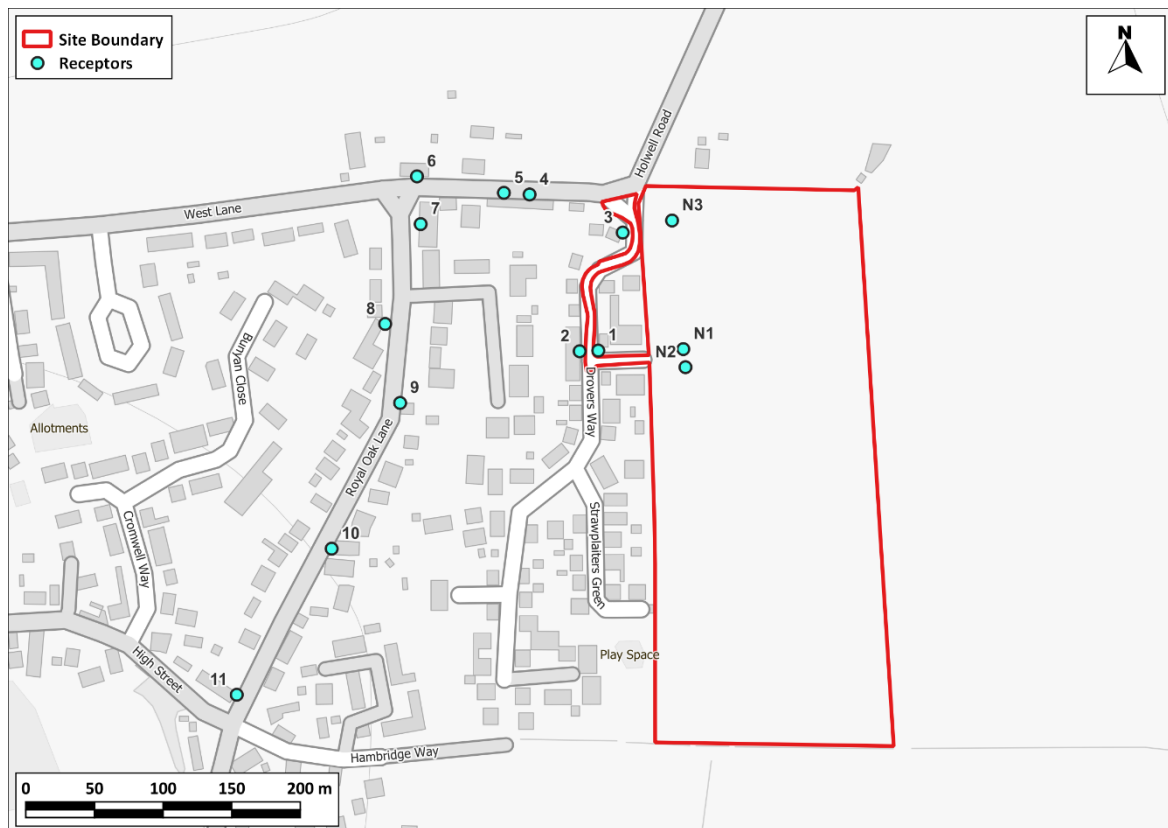


Figure 4-1: Receptor Locations

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 4.4 Selected receptors may be representative of air quality conditions at a number of properties; consideration has been given to how many sensitive locations each modelled receptor represents when considering the impacts of the proposed development and the overall significance of effects.

Existing Conditions

- 4.5 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2025b);
- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;

- information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority;
- background concentrations have been defined using Defra's 2021-based background maps (Defra, 2025c). These cover the whole of the UK on a 1x1 km grid. The background annual mean nitrogen dioxide maps have been calibrated against concurrent measurements (AQC, 2025). The calibration factor has also been applied to future year backgrounds. Mapped background concentrations of PM₁₀ and PM_{2.5} have not been adjusted; and
- whether or not there are any exceedances of the annual mean limit value for nitrogen dioxide, PM₁₀ and PM_{2.5} in the study area has been identified using Defra's Compliance data (2025d).

Road Traffic Impacts

Screening

- 4.6 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 3.11 and detailed further in Appendix A1. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Modelling Methodology

- 4.7 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emissions Factors Toolkit (EFT) (v13.1) (Defra, 2025c). Details of the model inputs and the model verification are provided in Appendix A3.

Assessment Scenarios

- 4.8 Nitrogen dioxide, PM₁₀ and PM_{2.5} concentrations have been predicted for the following scenarios:
- base year 2023;
 - the proposed year of first occupation of the proposed development (2029) without the development; and
 - 2029 with the development.
- 4.9 Predictions for 2029 are based on post-pandemic activity levels and assume that a 'new normal' has been reached following the Covid-19 pandemic.

Impact Description

- 4.10 The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has been used in describing the modelled impacts. The approach identifies impacts at individual receptors based on the percentage change in concentrations relative to the relevant air quality objective, rounded to the nearest whole number, and the absolute concentration relative to the objective. Table 4-2 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table 4-2: Air Quality Impact Descriptors for Individual Receptors for All Pollutants ^a

Long-Term Average Concentration At Receptor In Assessment Year ^b	Change in concentration relative to AQAL ^c				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

^a Values are rounded to the nearest whole number.

^b This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

^c AQAL = Air Quality Assessment Level, which may be an air quality objective, limit or target value, GLA target or an Environment Agency 'Environmental Assessment Level (EAL)'.

Uncertainty

- 4.11 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.
- 4.12 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A3). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2023) concentrations.
- 4.13 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the more recent versions of Defra's EFT carried out by AQC (2020a; 2020b) suggest that, on balance, these versions are unlikely to over-state the rate at which NO_x emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NO_x concentrations are most likely to decline more quickly in the future, on average, than predicted by previous versions of the EFT, especially against a base year of 2016 or later. Whilst such an analysis has not been undertaken by AQC for EFT v13.1, it is considered that using EFT v13.1 for future-year forecasts in this report provides a robust assessment, given that the model has been verified against measurements made in 2023.
- 4.14 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc. In early 2020, activity in the UK was disrupted by the Covid-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably in the short term (Defra Air Quality Expert Group, 2020). Forecasts in this assessment have been based on post-pandemic years and are therefore considered to be representative of the 'new normal'.

Assumptions

- 4.15 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include:
- the assumption that the proposed development is complete and fully occupied in 2029. This will have overestimated the traffic emissions and hence the 2029 concentrations and impacts; and
 - that the Luton meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A3).

Assessment of Significance

- 4.16 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors; the experience of the consultants preparing the report is set out in Appendix A2. Full details of the EPUK/IAQM approach are provided in Appendix A1.

5 Baseline Conditions

Relevant Features

- 5.1 The proposed development is located on the eastern edge of Pirton village. The application site is bounded by homes adjacent to Drovers Way to the west, 32 Holwell Road to the north and farmland to the east and south. It currently consists of agricultural land.
- 5.2 The closest AQMA to the proposed development is located over 3.5 km to the southeast, in Hitchin.

Industrial Sources

- 5.3 No significant industrial sources have been identified that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

- 5.4 NHC operates two automatic monitoring stations within its area, however, neither of these are located close to the proposed development. The Council also operate a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by SOCOTEC Didcot (using the 50% TEA in acetone method). The closest and most representative of these monitors is located adjacent to Turnpike Lane in Ickleford, approximately 3 km to the east of the proposed development. There are also a number of monitoring sites within Hitchin. Annual mean results for the years 2019 to 2023 are summarised in Table 5-1. The monitoring locations are shown in Figure 5-1. The monitoring data have been taken from NHC's 2024 Air Quality Annual Status Report (North Herts Council, 2024).

Table 5-1: Summary of Annual Mean NO₂ Monitoring (2019-2023) (µg/m³)

Site No.	Site Type	Location	2019	2020	2021	2022	2023
S12/NH131	Roadside	Turnpike Lane, Ickleford	-	38.0	28.9	29.1	15.4
S7/NH67	Roadside	Cadwell Court, Hitchin	23.5	20.0	19.3	20.8	16.4
S8/NH127	Roadside	64 Grove Road, Hitchin	21.0	-	17.7	20.6	15.6
S25/NH99	Roadside	Nightingale Road, Hitchin	28.0	18.1	21.4	22.9	18.3
S24/NH98	Roadside	Radcliffe Road, Hitchin	26.6	22.6	18.2	21.9	17.3
Objective			40				

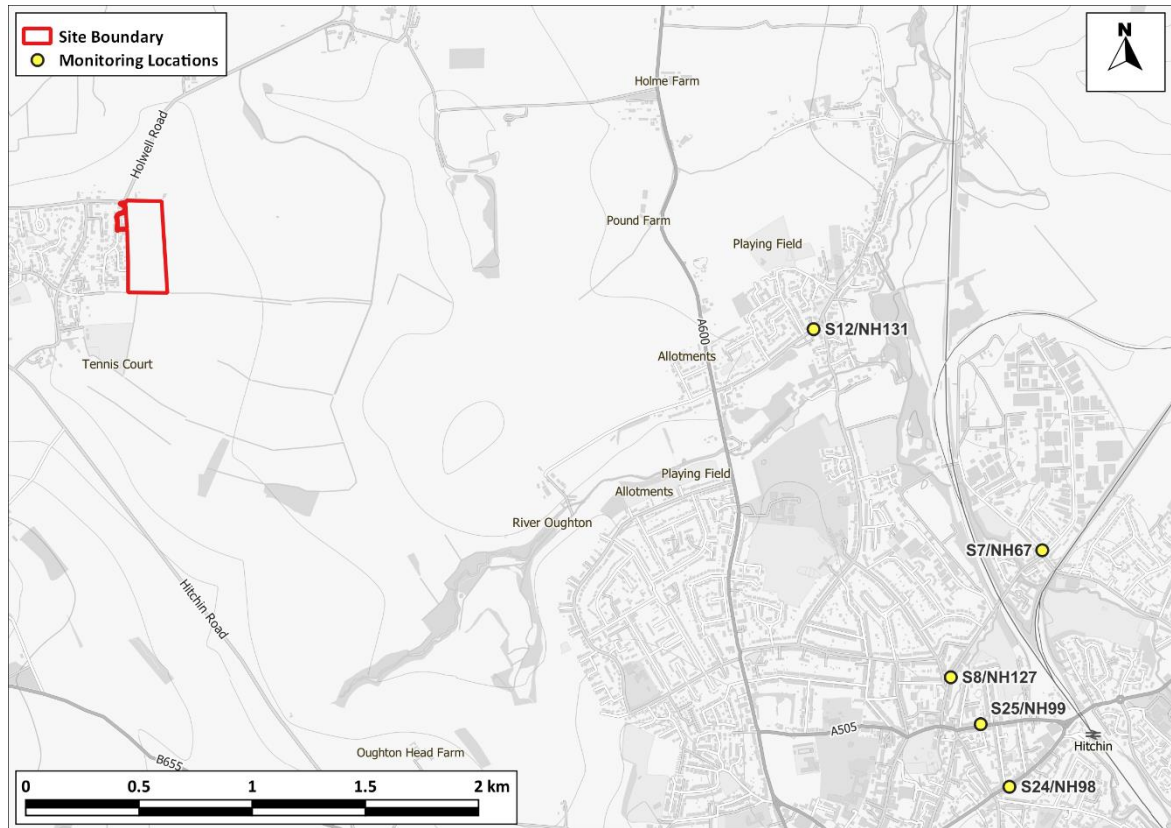


Figure 5-1: Monitoring Location

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

- 5.5 Measured annual mean nitrogen dioxide concentrations were below the objective at all sites between 2019 and 2023; concentrations have been well below the objective at all sites since 2022. Concentrations were also well below $60 \mu\text{g}/\text{m}^3$, indicating that the 1-hour mean objective was not exceeded in any year. A decrease in concentrations is seen across all sites for which five years of data are available between 2019 and 2023.
- 5.6 While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations.
- 5.7 The closest monitor which records PM_{10} and $\text{PM}_{2.5}$ concentrations is located approximately 4.7 km to the southeast of the proposed development, within an AQMA. Concentrations measured in recent years have been well below the objectives for both PM_{10} and $\text{PM}_{2.5}$, with the annual mean $\text{PM}_{2.5}$ concentration also being below the AMCT value of $10 \mu\text{g}/\text{m}^3$.

Exceedances of Limit Value

- 5.8 Defra has not identified any exceedances of the annual mean or 1-hour mean limit values in 2023 in NHC's area (Defra, 2025d). As such, there is not considered to be a risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

Background Concentrations

5.9 Estimated background concentrations in the study area are set out in Table 5-2 and are all well below the objectives. A range of values is presented as the study area covers multiple 1x1 km grid squares.

Table 5-2: Estimated Annual Mean Background Pollutant Concentrations in 2023 and 2029 ($\mu\text{g}/\text{m}^3$)

Year	NO ₂	PM ₁₀	PM _{2.5}
2023	7.9 – 8.0	13.0 – 13.8	7.1 – 7.2
2029	6.2	12.5 – 13.2	6.6 – 6.7
Objective	40	40	20 ^a
AMCT	-	-	10 ^b

^a The 20 $\mu\text{g}/\text{m}^3$ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

^b To be met by 2040

Baseline Dispersion Model Results

5.10 Baseline concentrations of nitrogen dioxide, PM₁₀ and PM_{2.5} have been modelled at each of the existing receptor locations (see Figure 4-1 and Table 4-1 for receptor locations). The results, which cover both the existing (2023) and future year (2029) baseline (Without Scheme), are set out in Table 5-3 for nitrogen dioxide and Table 5-4 for PM₁₀ and PM_{2.5}. The modelled road components of nitrogen oxides have been increased from those predicted by the model based on a comparison with local measurements (see Appendix A3 for the verification methodology).

Table 5-3: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$) at Existing Receptors

Receptor	2023	2029 Without Scheme
1	8.3	6.4
2	8.2	6.3
3	8.7	6.6
4	9.0	6.8
5	9.0	6.8
6	9.3	6.9
7	8.8	6.6
8	8.6	6.5
9	9.0	6.8
10	9.1	6.7
11	9.1	6.8

Receptor	2023	2029 Without Scheme
Objective	40	

Table 5-4: Modelled Annual Mean Baseline Concentrations of PM₁₀ and PM_{2.5} at Existing Receptors (µg/m³)

Receptor	PM ₁₀		PM _{2.5}	
	2023	2029 Without Scheme	2023	2029 Without Scheme
1	13.4	12.8	7.1	6.6
2	13.4	12.8	7.1	6.6
3	13.8	13.3	7.2	6.7
4	13.9	13.3	7.2	6.7
5	13.9	13.3	7.2	6.7
6	13.9	13.3	7.2	6.7
7	13.8	13.3	7.2	6.7
8	13.1	12.5	7.2	6.7
9	13.5	12.9	7.1	6.6
10	13.1	12.5	7.2	6.7
11	13.1	12.5	7.2	6.7
Assessment Criterion	32 ^a		20 ^b	
AMCT	-		10 ^c	

^a While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG22 (Defra, 2025a). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

^b The 20 µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

^c To be met by 2040, and provided here for reference only.

- 5.11 The predicted annual mean concentrations of nitrogen dioxide are well below the objectives in 2023 and 2029 at all receptors. The annual mean nitrogen dioxide concentrations are also well below 60 µg/m³ at every receptor in both 2023 and 2029; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 3.2).
- 5.12 The predicted annual mean concentrations of PM₁₀ and PM_{2.5} are well below the objectives in both 2023 and 2029 at all receptors. The annual mean PM₁₀ concentrations are also well below 32 µg/m³ and it is, therefore, unlikely that the 24-hour mean PM₁₀ objective will be exceeded.

6 Impact Assessment

Impacts at Existing Receptors

Nitrogen Dioxide

- 6.1 Predicted annual mean concentrations of nitrogen dioxide in 2029 for existing receptors are set out in Table 6-1 for both the "Without Scheme" and "With Scheme" scenarios. The impact at each receptor is also described using the impact descriptors given in Table 4-2.

Table 6-1: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2029 ($\mu\text{g}/\text{m}^3$)

Receptor	Without Scheme	With Scheme	% Change ^b	Impact Descriptor
1	6.4	6.9	1	Negligible
2	6.3	6.6	1	Negligible
3	6.6	7.0	1	Negligible
4	6.8	7.0	1	Negligible
5	6.8	7.0	1	Negligible
6	6.9	7.2	1	Negligible
7	6.6	6.8	1	Negligible
8	6.5	6.7	0	Negligible
9	6.8	7.1	1	Negligible
10	6.7	7.0	1	Negligible
11	6.8	7.0	1	Negligible
Objective	40		-	-

^a% changes are relative to the objective and have been rounded to the nearest whole number.

- 6.2 The annual mean nitrogen dioxide concentrations are well below the objective at all receptors. The changes in concentrations are between 0% and 1% at all receptors, and the impacts are described as negligible. Concentrations are also well below $60 \mu\text{g}/\text{m}^3$ at all receptors, with or without the proposed development, indicating that the 1-hour mean objective is unlikely to be exceeded.

PM₁₀ and PM_{2.5}

- 6.3 Predicted annual mean concentrations of PM₁₀ and PM_{2.5} in 2029 for existing receptors are set out in Table 6-2 for both the "Without Scheme" and "With Scheme" scenarios. The impacts at each receptor are also described using the impact descriptors given in Table 4-2.
- 6.4 As explained in Paragraph 3.8, a different assessment approach is required to determine whether the proposed development complies with the requirement to deliver achievement of the AMCT and PERT. This is considered in Section 8, although the AMCT value is provided in Table 6-2 for reference.

Table 6-2: Predicted Impacts on Annual Mean PM₁₀ and PM_{2.5} Concentrations in 2029

Receptor	Annual Mean PM ₁₀ (µg/m ³)				Annual Mean PM _{2.5} (µg/m ³)			
	Without Scheme	With Scheme	% Change ^a	Impact Descriptor	Without Scheme	With Scheme	% Change ^a	Impact Descriptor
1	12.8	12.9	0	Negligible	6.6	6.6	0	Negligible
2	12.8	12.9	0	Negligible	6.6	6.6	0	Negligible
3	13.3	13.3	0	Negligible	6.7	6.7	0	Negligible
4	13.3	13.3	0	Negligible	6.7	6.7	0	Negligible
5	13.3	13.3	0	Negligible	6.7	6.7	0	Negligible
6	13.3	13.3	0	Negligible	6.7	6.7	0	Negligible
7	13.3	13.3	0	Negligible	6.7	6.7	0	Negligible
8	12.5	12.5	0	Negligible	6.7	6.7	0	Negligible
9	12.9	12.9	0	Negligible	6.6	6.6	0	Negligible
10	12.5	12.6	0	Negligible	6.7	6.7	0	Negligible
11	12.5	12.5	0	Negligible	6.7	6.7	0	Negligible
Criterion	32 ^b		-	-	20 ^c		-	-
AMCT	-		-	-	10 ^d		-	-

^a % changes are relative to the criterion and have been rounded to the nearest whole number.

^b While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG22 (Defra, 2025a). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

^c The PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

^d To be met by 2040, and provided here for reference only.

- 6.5 The annual mean PM₁₀ and PM_{2.5} concentrations are well below the relevant criteria at all receptors, with or without the proposed development. Furthermore, as the annual mean PM₁₀ concentrations are below 32 µg/m³, it is unlikely that the 24-hour mean PM₁₀ objective will be exceeded at any of the receptors. The changes in concentrations are all 0% when rounded, and impacts are thus all described as negligible.

Impacts of Existing Sources on Future Residents of the Development

- 6.6 Predicted air quality conditions for future residents of the proposed development, taking account of emissions from the adjacent road network, are set out in Table 6-3 for Receptors N1 to N3 (see Table 4-1 and Figure 4-1 for receptor locations). All of the values are well below the objectives.

Table 6-3: Predicted Annual Mean Concentrations of Nitrogen Dioxide (NO₂), PM₁₀ and PM_{2.5} in 2029 for New Receptors in the Proposed Development (µg/m³)

Receptor	NO ₂	PM ₁₀	PM _{2.5}
N1	6.6	12.9	6.6
N2	6.5	12.9	6.6
N3	6.6	13.3	6.7
Objective / Criterion	40	32 ^a	20 ^b
AMCT	-	-	10 ^c

^a While the annual mean PM₁₀ objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM₁₀ objective is possible, as outlined in LAQM.TG22 (Defra, 2025a). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM₁₀ objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

^b The 20 µg/m³ PM_{2.5} objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

^c To be met by 2040, and provided here for reference only. As set out in Paragraph 3.8, the assessment to determine whether the proposed development complies with the requirement to deliver achievement of the AMCT and PERT is considered in Section 8.

Significance of Operational Air Quality Effects

6.7 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A1 and takes account of the assessment that:

- pollutant concentrations at worst-case locations within the proposed development will all be well below the objectives, thus future residents will experience acceptable air quality; and
- pollutant concentrations at all of the selected worst-case existing receptors along the local road network will be well below the air quality objectives, and all of the impacts are predicted to be negligible.

7 Mitigation

Good Design and Best Practice

- 7.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.
- 7.2 The proposed development incorporates the following good design and best practice measures:
- provision of electric vehicle charging points for every new home;
 - provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public transport, cycling and walking); and
 - provision of pedestrian and cycle access to the new development, including cycle parking.

Recommended Mitigation

- 7.3 The assessment has demonstrated that the overall air quality effect of the proposed development will be 'not significant'; it will not introduce new exposure into areas of unacceptable air quality, nor will the development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.
- 7.4 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law).

8 Achieving Compliance with the PM_{2.5} Targets

- 8.1 Defra have set out in their Interim Planning Guidance (2024) two questions designed to consider whether a development supports the AMCT and PERT PM_{2.5} targets. The first question is “How has exposure to PM_{2.5} been considered when selecting the development site?”, whilst the second question is “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?”.
- 8.2 The annual mean PM_{2.5} concentrations are well below the AMCT target to be met by 2040 at all receptors, with or without the Proposed Development (Table 6-2 and Table 6-3).
- 8.3 Exposure to PM_{2.5} and ways to minimise PM_{2.5} emissions have been considered in the following ways:
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public transport, cycling and walking) with the aim of reducing the number of private car trips;
 - provision of pedestrian and cycle access to the new development, including cycle parking. This will increase the number of non-car trips; and
 - no on-site combustion for energy generation.
- 8.4 It is considered that the development complies with the requirements to deliver achievement of the AMCT and PERT by 2040 as appropriate action has been taken to minimise emissions of PM_{2.5} and its precursors as far as is reasonably practicable.

9 Conclusions

- 9.1 The assessment has considered the impacts of the proposed development on local air quality in terms of emissions from road traffic generated by the completed and occupied development. It has also identified the air quality conditions that future residents will experience. The assessment has been based on measurements made during 2023, and post-pandemic activity and emissions forecasts.
- 9.2 Air quality conditions for future residents of the proposed development have been shown to be acceptable, with concentrations well below the air quality objectives throughout the site
- 9.3 The assessment has demonstrated that pollutant concentrations will be well below the objectives at all existing receptors in 2029, with or without the proposed development, and that the emissions from the additional traffic generated by the proposed development will have a negligible impact on air quality conditions at all existing receptors along the local road network.
- 9.4 The overall operational air quality effects of the proposed development are judged to be 'not significant'.
- 9.5 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 198 of the NPPF, being appropriate for its location both in terms of its effects on the local air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 199, as it will not affect compliance with relevant limit values or national objectives. It is considered that the development complies with the requirements to deliver achievement of the AMCT and PERT by 2040 as appropriate action has been taken to minimise emissions of PM_{2.5} and its precursors.
- 9.6 The proposed development is also consistent with Policy D4 of NHC's Local Plan, as it will not have an unacceptable effect on air quality.

10 References

AQC (2020a) *Performance of Defra's Emission Factor Toolkit 2013-2019*, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=7fba769d-f1df-49c4-a2e7-f3dd6f316ec1>.

AQC (2020b) *Comparison of EFT v10 with EFT v9*, Available: <https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=9d6b50e1-3897-46cf-90f1-3669c6814f1d>.

AQC (2025) *Calibrating Defra's 2021-based Background Maps against 2022, 2023 & 2024 Measurements*.

Defra (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*, Defra.

Defra (2017) *Air quality plan for nitrogen dioxide (NO2) in the UK*, Available: <https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017>.

Defra (2018a) *A Green Future: Our 25 Year Plan to Improve the Environment*, [Online], Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf.

Defra (2018b) *Supplement to the UK plan for tackling roadside nitrogen dioxide concentrations*, Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/746100/air-quality-no2-plan-supplement.pdf.

Defra (2019) *Clean Air Strategy 2019*, Available: <https://www.gov.uk/government/publications/clean-air-strategy-2019>.

Defra (2023a) *Air Quality Strategy: Framework for Local Authority Delivery*, [Online], Available: <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england/air-quality-strategy-framework-for-local-authority-delivery>.

Defra (2023b) *Environmental Improvement Plan 2023*, [Online], Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1133967/environmental-improvement-plan-2023.pdf.

Defra (2024) *PM2.5 Targets: Interim Planning Guidance*, [Online], Available: <https://uk-air.defra.gov.uk/pm25targets/planning>.

Defra (2025a) *Review & Assessment: Technical Guidance LAQM.TG22 May 2025 Version*, [Online], Available: <https://laqm.defra.gov.uk/wp-content/uploads/2025/05/LAQM-TG22-May-25-v2.0.pdf>.

Defra (2025b) *UK Pollutant Release and Transfer Register*, [Online], Available: <http://prtr.defra.gov.uk/map-search>.

Defra (2025c) *Local Air Quality Management (LAQM) Support Website*, [Online], Available: <http://laqm.defra.gov.uk/>.

Defra (2025d) *UK Air Compliance Data*, [Online], Available: <https://uk-air.defra.gov.uk/compliance-data>.

Defra Air Quality Expert Group (2020) *Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK- Rapid evidence review*, Available: https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2007010844_Estimation_of_Changes_in_Air_Pollution_During_COVID-19_outbreak_in_the_UK.pdf.

DfT (2018) *The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy*.

DfT (2024) *DfT Road traffic statistics (TRA03)*, Available: <https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra>.

DfT (2025) *Road traffic statistics*, [Online], Available: <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>.

Environment Act 2021 (2021).

HM Government (2021a) *Ventilation - Approved Document F*, [Online], Available: <https://www.gov.uk/government/publications/ventilation-approved-document-f>.

HM Government (2021b) *Infrastructure for the charging of electric vehicles - Approved Document S*, [Online], Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1057375/AD_S.pdf.

Ministry of Housing, Communities & Local Government (2019) *Planning Practice Guidance*, Available: <https://www.gov.uk/government/collections/planning-practice-guidance>.

Ministry of Housing, Communities & Local Government (2022) 'The Building Regulations 2010 Schedule 1', Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/899279/Single_stitched_together_pdf_of_all_ADs__Jun20_.pdf.

Ministry of Housing, Communities & Local Government (2024) *National Planning Policy Framework*, [Online], Available: <https://assets.publishing.service.gov.uk/media/675abd214cbda57cacd3476e/NPPF-December-2024.pdf>.

Moorcroft and Barrowcliffe et al (2017) *Land-Use Planning & Development Control: Planning For Air Quality v1.2*, IAQM, London, Available: <http://iaqm.co.uk/guidance/>.

North Hertfordshire District Council (2018a) *Air Quality Planning Guidance Document (to Support the NHDC Local Plan 2011-2031)*, Available: <https://www.north-herts.gov.uk/sites/default/files/North%20Herts%20Air%20Quality%20Planning%20Guidance%20Doc%20October%202018%20final%20version.pdf>.

North Hertfordshire District Council (2018b) *Air Quality Action Plan for the Stevenage Road, Hitchin Air Quality Management Area and the Payne's Park, Hitchin Air Quality Management Area*, Available: <https://www.north-herts.gov.uk/sites/default/files/Joint%20Action%20Plan%20Hitchin%20AQMA%20FINAL.pdf#:~:text=It%20outlines%20the%20action%20we%20will%20take%20to,AQMA%20and%20which%20ran%20from%202013%20to%202016>.

North Herts Council (2022) *North Hertfordshire Local Plan 2011 - 2031*, Available: <https://www.north-herts.gov.uk/sites/default/files/2022-12/North%20Hertfordshire%20Local%20Plan%202011-2031.pdf>.

North Herts Council (2024) *2024 Air Quality Annual Status Report*.

The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002), HMSO, Available: <https://www.legislation.gov.uk/ukSI/2002/3043/contents/made>.

The Air Quality (England) Regulations 2000 Statutory Instrument 928 (2000), HMSO, Available: <https://www.legislation.gov.uk/ukSI/2000/928/contents/made>.

The Air Quality Standards Regulations 2010 Statutory Instrument 1001 (2010), HMSO, Available: http://www.legislation.gov.uk/ukSI/2010/1001/pdfs/ukSI_20101001_en.pdf.

The European Parliament and the Council of the European Union (2008) *Directive 2008/50/EC of the European Parliament and of the Council*, Available: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0050>.

11 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AMCT	Annual Mean Concentration Target (for PM _{2.5})
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emissions Factors Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kph	Kilometres Per hour
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
µg/m ³	Microgrammes per cubic metre
NO	Nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides (taken to be NO ₂ + NO)
NPPF	National Planning Policy Framework
OEP	Office for Environmental Protection
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards

	should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PERT	Population Exposure Reduction Target (for PM _{2.5})
PM ₁₀	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
PM _{2.5}	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
RDE	Real Driving Emissions
Standards	A nationally defined set of concentrations for nine pollutants based on assessment of the effects of each pollutant on human health, including the effects on sensitive sub-groups
TEA	Triethanolamine – used to absorb nitrogen dioxide

12 Appendices

A1 EPUK & IAQM Planning for Air Quality Guidance

- A1.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

“Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations”.*

Recommended Best Practice

- A1.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

“The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions”.

- A1.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m² of commercial floorspace;
- are carried out on land of 1 ha or more.

- A1.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new “street canyon”, as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;

- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNO_x/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
 - Spark ignition engine: 250 mgNO_x/Nm³;
 - Compression ignition engine: 400 mgNO_x/Nm³;
 - Gas turbine: 50 mgNO_x/Nm³.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNO_x/Nm³ and 25 mgPM/Nm³.

A1.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A1.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

A1.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m² of floor space for all other uses or a site area greater than 1 ha.

A1.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A1.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;

- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A1.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A1.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NO_x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NO_x gas boiler or a 30kW CHP unit operating at <95mg/Nm³."

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

A1.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A1.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A1.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

- A1.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:
- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
 - a judgement on the overall significance of the effects of any impacts.
- A1.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:
- the existing and future air quality in the absence of the development;
 - the extent of current and future population exposure to the impacts;
 - the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
 - the potential for cumulative impacts and, in such circumstances, several impacts that are described as 'slight' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a 'moderate' or 'substantial' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
 - the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.
- A1.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.
- A1.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A2.

A2 Professional Experience

Dr Denise Evans, BSc (Hons) PhD MEnvSc MIAQM

Dr Evans is a Technical Director with AQC, with more than 25 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Isabel Stanley, MSci (Hons)

Miss Stanley is a Senior Consultant with AQC, having joined the company in October 2019. Prior to joining AQC she completed an MSci degree in Geology at the University of Bristol, where her studies included modules focusing on GIS, dispersion modelling and environmental geochemistry. She has undertaken numerous air quality assessments, including road traffic and plant emissions modelling, as well as indoor air quality plans and construction dust risk assessments.

A3 Modelling Methodology

Model Inputs

- A3.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 13.1) published by Defra (2025c). Model input parameters are summarised in Table A3-1 and, where considered necessary, discussed further below.

Table A3-1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	No
Advanced Street Canyons Modelled?	No
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Luton
Meteorological Data Year	2023
Dispersion Site Surface Roughness Length (m)	0.3
Dispersion Site Minimum MO Length (m)	10
Met Site Surface Roughness Length (m)	0.5
Met Site Minimum MO Length (m)	30
Gradients?	No

- A3.2 AADT flows and the proportions of HDVs have been provided by Icen, who have undertaken the transport assessment work for the proposed development. Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A3-2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2024).

Table A3-2: Summary of Traffic Data used in the Assessment

Road Link	2023		2029 (Without Scheme)		2029 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
Site Access	0	0.0	0	0.0	690	4.0
Drovers Way	401	4.8	417	4.8	1,107	4.1
Holwell Road (east of Drovers Way)	1,417	3.1	1,475	3.1	1,574	3.1

Road Link	2023		2029 (Without Scheme)		2029 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV
Holwell Road (west of Drovers Way)	1,518	2.8	1,580	2.8	2,170	3.1
West Lane	894	1.6	930	1.6	959	1.7
Royal Oak Lane	1,062	2.7	1,105	2.7	1,665	3.1
Hambridge Way	144	6.7	150	6.7	150	6.7
High Street	923	3.1	960	3.1	960	3.1
Walnut Tree Road	1,014	3.8	1,055	3.8	1,615	3.8

A3.3 Figure A3-1 shows the road network included within the model, along with the speed at which each link was modelled.

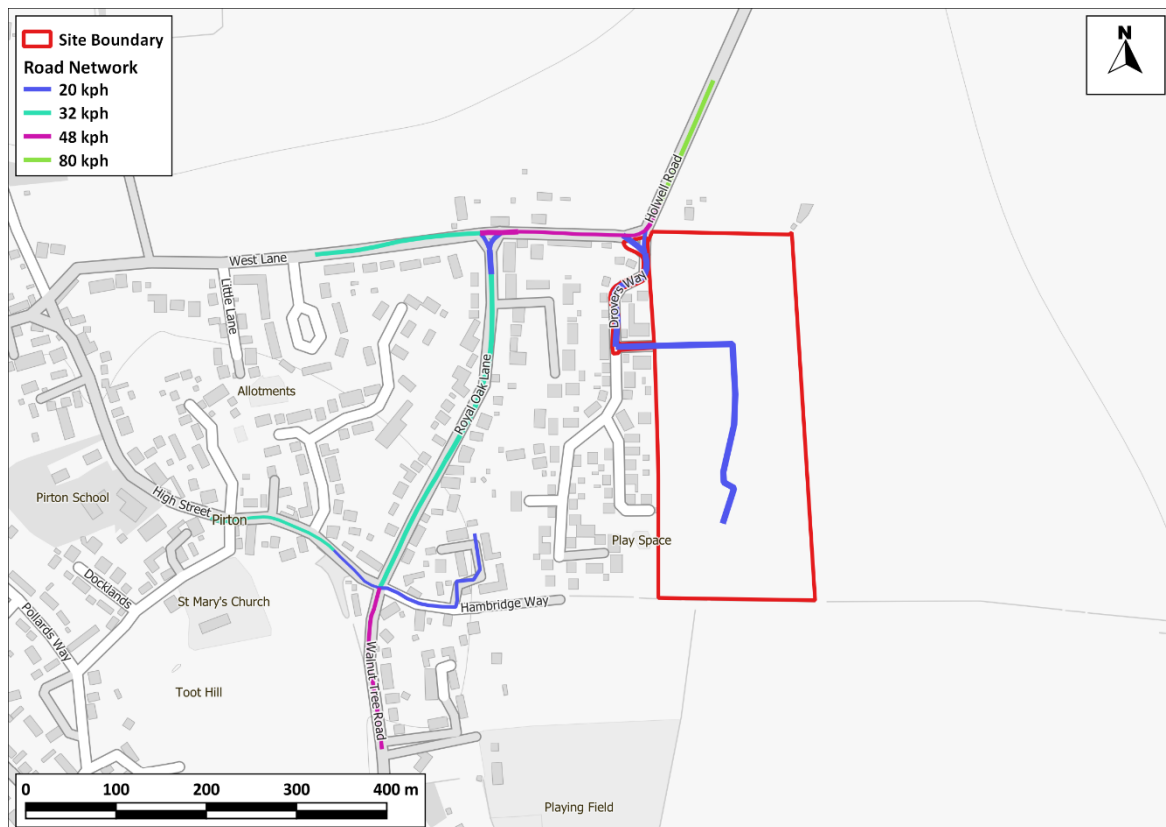


Figure A3-1: Modelled Road Network & Speed

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

A3.4 Hourly sequential meteorological data in sectors of 10 degrees from Luton for 2023 have been used in the model. The Luton meteorological monitoring station is located at Luton Airfield, approximately 10 km to the southwest of the proposed development. Both the application site and the Luton meteorological monitoring station are located in the East of England where they will be influenced by the effects of inland meteorology over flat-lying topography. The topography of the model domain is similar to that around the meteorological monitoring station and measurements from this

site are considered to provide the most robust basis to predict meteorology within the model domain. A wind rose for the site for the year 2023 is provided in Figure A6-5. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

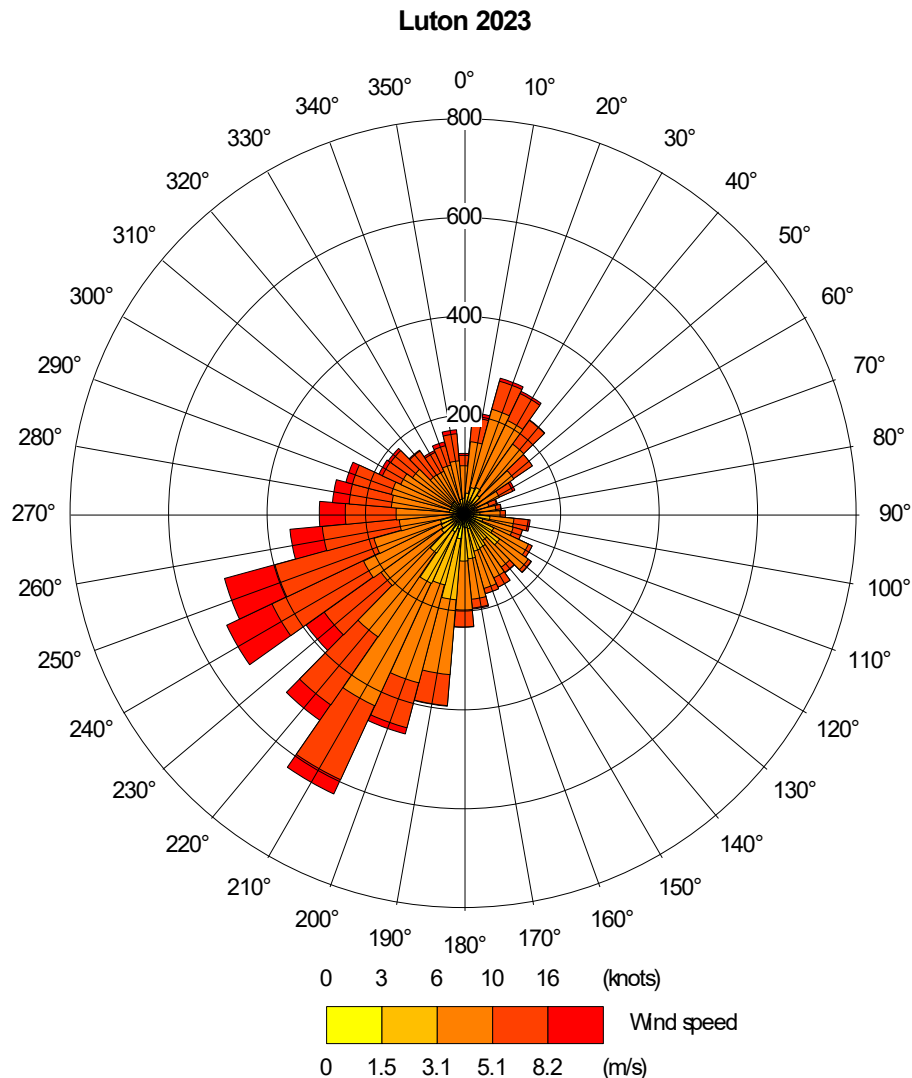


Figure A3-2: Wind Rose

Model Verification

- A3.5 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to systematically under-predict roadside nitrogen dioxide concentrations. To account for this, it is necessary to adjust the model against local measurements. The model has been run to predict annual mean nitrogen dioxide concentrations during 2023 at the S25/NH99 diffusion tube monitoring site. This site has been selected because it is in a roadside location outside of any AQMAs or street canyons, adjacent to a road for which traffic data are available.

Background Concentrations

- A3.6 The background annual mean nitrogen dioxide concentration used in the model verification was $11.3 \mu\text{g}/\text{m}^3$, having been derived from the national maps using the same approach as described in Paragraph 4.5

Traffic Data

- A3.7 AADT flows, and the proportions of HDVs, for Nightingale Road adjacent to the monitoring site, have been determined from the interactive web-based map provided by the DfT (DfT, 2025). The traffic flows used in the verification are presented in Table A3-4 and the modelled roads presented in Figure A3-1.

Table A3-3: 2023 AADT Traffic Data used in the Model Verification

Road Link	AADT	%HDV
Nightingale Road, Hitchin	11,502	1.4

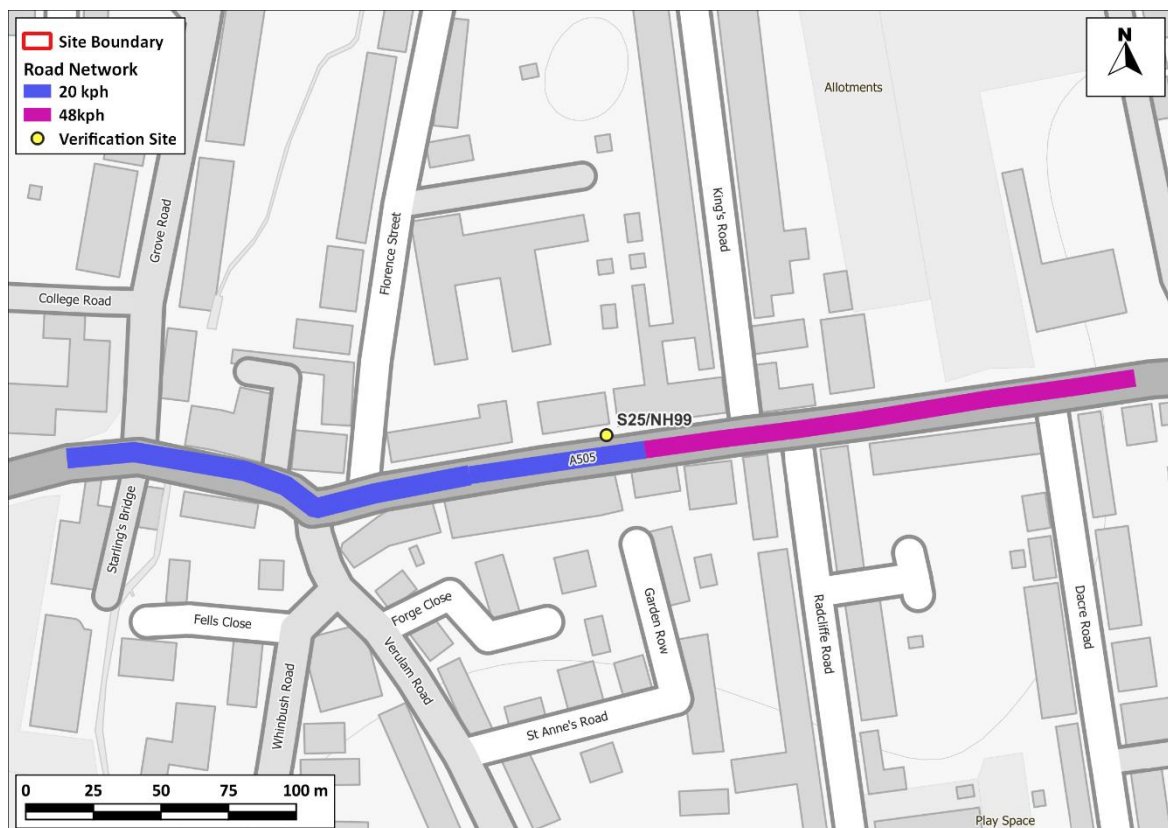


Figure A3-3: Modelled Road Network & Speed used within Verification

Additional data sourced from third parties, including public sector information licensed under the Open Government Licence v3.0.

Nitrogen Dioxide

- A3.8 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 of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the annual mean NO_x concentrations during 2023 at diffusion tube monitoring site S25/NH99. Concentrations have been modelled at 2.5 m, the height of the monitor.
- A3.9 The model output of road-NO_x (i.e. the component of total NO_x coming from road traffic) has been compared with the 'measured' road-NO_x. Measured road-NO_x has been calculated from the

measured NO₂ concentration and the predicted background NO₂ concentration using the NO_x from NO₂ calculator (Version 9.1) available on the Defra LAQM Support website (Defra, 2025c).

- A3.10 An adjustment factor has been determined as the ratio of the 'measured' road contribution and the model derived road contribution. This factor has then been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations. The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NO_x concentrations with the predicted background NO₂ concentration within the NO_x to NO₂ calculator (Defra, 2025c).
- A3.11 The data used to calculate the adjustment factor are provided below:
- Measured NO₂: 18.3 µg/m³
 - Background NO₂: 11.3 µg/m³
 - 'Measured' road-NO_x (using NO_x from NO₂ calculator): 15.2 µg/m³
 - Modelled road-NO_x: 3.4 µg/m³
 - Road-NO_x adjustment factor: $15.2/3.4 = 4.422^5$
- A3.12 The factor implies that the unadjusted model is under-predicting the road-NO_x contribution. This is a common experience with this and most other road traffic emissions dispersion models.

PM₁₀ and PM_{2.5}

- A3.13 The approach described above for NO_x and nitrogen dioxide determines the road increment of concentrations by subtracting the predicted local background from the roadside measurements. This works well for NO_x because the differences between roadside and background concentrations typically represent a large proportion of the total measured value. The same is not true for PM₁₀ and PM_{2.5} concentrations, which are dominated by non-road emissions, even at the roadside. In practice, the influence of a local road on concentrations can often be smaller than the uncertainty in the mapped background concentration. As an example of this, 31% of all roadside and kerbside sites in London which measured PM_{2.5} in 2019 with >75% data capture, recorded an annual mean concentration lower than the equivalent Defra mapped background value. Using measured background concentrations does not provide any significant benefit, owing largely to the spatial resolution of available measurements, but also because of measurement uncertainty. For example, hourly-mean PM_{2.5} concentrations measured at roadside sites are often lower than those measured at nearby urban background sites, while concentrations at urban background sites are often lower than those measured at rural sites.
- A3.14 For these reasons, it is not appropriate to calculate the annual mean road-increment to PM₁₀ and PM_{2.5} concentrations by subtracting either the mapped background or a local measured background concentration. This, in turn, means that the approach to model adjustment which is described for NO_x and NO₂ is not appropriate for PM₁₀ and PM_{2.5}. Historically, many studies have derived a model adjustment factor for NO_x and applied this to PM₁₀ and PM_{2.5}. This is also not appropriate, since there is no reason to expect the same bias in emissions of NO_x, PM₁₀ and PM_{2.5}.
- A3.15 While there is very strong evidence that EFT-based models have consistently under-predicted road-NO_x concentrations in urban areas, there is no equivalent evidence for PM₁₀ and PM_{2.5}. There is

⁵ Based on un-rounded values.

currently no strong basis for applying any adjustment to the model outputs. Predicted concentrations of PM₁₀ and PM_{2.5} have thus not been adjusted.

Post-processing

- A3.16 The model predicts road-NO_x concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO₂, has been processed through the NO_x to NO₂ calculator available on the Defra LAQM Support website (Defra, 2025c). The traffic mix within the calculator has been set to "All UK traffic", which is considered suitable for the study area. The calculator predicts the component of NO₂ based on the adjusted road-NO_x and the background NO₂.



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