



Land at Junction 22 of the M1, Cliffe Hill Farm

Proposed B2 / B8 Development

Caddick Developments Ltd

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Basis of Report

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1.0 Introduction

SLR Consulting Ltd (SLR) has been commissioned by Caddick Developments Ltd (Caddick) to undertake an Air Quality Assessment to accompany the full planning application for a storage and distribution warehouse (B2 / B8 use-class) (the 'Proposed Development'), on Land at Junction 22 of the M1, Cliffe Hill Farm (the 'Site').

The Site currently comprises vacant agricultural land with a number of mature hedgerows and trees. At the south-western extent of the Site are a limited number of agricultural buildings and associated dwellings. The Site is located at the approximate National Grid Reference (NGR): x448200, y311200, and the surrounding area comprises:

- The M1 and associated Junction 22 slip roads immediately to the west, beyond which is agricultural land and existing dwellings located off Little Shaw Lane;
- Further agricultural land and associated agricultural buildings and associated dwellings, accessed off Old House Lane, bordering the northern boundary;
- Whitwick Road, which runs north-south, adjacent to the eastern Site boundary. This boundary also borders with three existing dwellings (Weavers Cottage, Forest Edge, and White Hill) as it moves inward from Whitwick Road;
- The A50 running adjacent to the southern boundary, beyond which is further agricultural land; and
- The Junction 22 roundabout, joining the M1 and A50, is situated adjacent to the south-western periphery of the Site.

Primary vehicular access to the Site will be via a new entrance to be created off the A50. The Site access will operate as a left turn in off the A50, whilst egress will be via Whitwick Road.

1.1 Scope of Assessment

Consultation with the Environmental Health Officer (EHO) at Hinckley and Bosworth Borough Council (HBBC) was undertaken to agree on the scope and methodology of the assessment¹. As agreed, the following scope of works has been undertaken as part of this Air Quality Assessment in accordance with best practice and national guidance:

- Baseline Evaluation – Assessment of existing air quality in the local area;
- Construction Phase – Identification and assessment of potential air quality impacts associated with the construction phase of the Proposed Development;
- Operational Phase – Identification and assessment of potential air quality impacts associated with the operational phase of the Proposed Development; and
- Mitigation Measures – Identification of mitigation measures, as appropriate.

¹ Email sent from SLR Consulting Ltd to giles.rawdon@hinckley-bosworth.gov.uk, dated 5th August 2025. Response received 5th August 2025.



2.0 Background Context

2.1 Legislation

A dual set of regulations, applicable to National and Local Government separately are currently operable within the UK.

2.1.1 National Obligations

2.1.1.1 Air Quality Standards

The Air Quality Standards Regulations 2010² (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC), and the Fourth Daughter Directive (2004/107/EC) within UK legislation, in order to align and mirror European obligations. The AQSR includes Limit Values which are legally binding ambient concentration thresholds which, however, are only applicable at specific locations (Schedule 1: AQSR)³. Carriageways or central reservations of roads, and any location where the public do not have access (e.g. industrial sites), are exempt. On this basis, if a sampling point does not comply with the siting locations, then strict comparison to the AQSR Limit Values cannot be made.

Following the UK's withdrawal from the EU, the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020⁴ was introduced to mirror revisions to supporting EU legislation. As a result, the fine particulate matter (as PM_{2.5}) Limit Value is 20µg/m³ (to be met by 2020).

The responsibility of achieving the AQSR (and European equivalent Directives) is a national obligation for Central Government who undertake assessments on an annual basis. Local Authorities have no statutory obligation to achieve the AQSR or the European equivalent Directives, unless otherwise instructed to assist Central Government under Ministerial Direction.

In response to persistent exceedances, the Government published its 2017 plan⁵ for reducing roadside nitrogen dioxide (NO₂) concentrations in order to achieve compliance in the shortest time possible. This has resulted in the introduction of Clean Air Zones across England. HBBC was not identified as required to conduct a feasibility study to achieve compliance.

2.1.1.2 Environment Targets (Fine Particulate Matter) Regulations

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023⁶ introduced an annual mean concentration target of 10µg/m³ to be met across England by 2040. Central Government and Devolved Administrations is responsible for meeting this target, however not until 2040. Local Authorities have no responsibility to achieve this target.

² The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.

³ Schedule 1 of the 2010 AQSR provides the locations of the sampling points where the AQSR Limits Values can be assessed.

⁴ The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument No. 1313, The Stationary Office Limited.

⁵ UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations, 2017.

⁶ The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. UK Statutory Instruments 2023 No. 96.



2.1.2 Local Obligations

Part IV of the Environment Act 1995 (as amended by the Environment Act 2021) requires the Secretary of State to review the national Air Quality Strategy (AQS) every five years and modify this as necessary. It also established the system of Local Air Quality Management (LAQM) for Local Authorities to regularly review and assess air quality within their administrative area.

The Air Quality (England) Regulations 2000 (as amended) ('the Regulations') provide the statutory basis for the Air Quality Objectives Local Authorities must adhere to under LAQM in England. PM_{2.5} is not currently cited within the Regulations, however in line with the AQS and the '*PM_{2.5} Targets: Interim Planning Guidance*⁷' issued by the Department for Environment, Food and Rural Affairs (Defra) in November 2024, Local Authorities are required to work towards reducing PM_{2.5}.

The Air Quality Objectives apply at locations where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period (referred to as 'relevant exposure'). Table B provides an indication of those locations. Where any of the prescribed Air Quality Objectives are not likely to be achieved, the authority must designate an Air Quality Management Area (AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality and achieve compliance.

The latest AQS for England was published in 2023⁸. The AQS provides the delivery framework for air quality management across England for local authorities and summarises the air quality standards and objectives operable within England for the protection of public health and the environment.

The ambient air quality standards of relevance this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table A. These are primarily based upon the Air Quality Objectives Local Authorities are responsible for achieving – reflective of the Local Planning Authority's duties. The PM_{2.5} AQSR AQAL has, however, also been included for completeness.

⁷ Defra, PM_{2.5} Targets: Interim Planning Guidance, (2024).

⁸ Defra, Air Quality Strategy: Framework for Local Authority Delivery, (2023).



Table A: Relevant Ambient AQALs

Pollutant	AQAL ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean (not to be exceeded on more than 18 occasions per annum)
Particles (as PM ₁₀)	40	Annual mean
	50	24-hour mean (not to be exceeded on more than 35 occasions per annum)
Particles (as PM _{2.5})	20	Annual mean
Note: The PM_{2.5} AQAL is not prescribed within the Air Quality (England) Regulations 2000 / 2002 and there is no requirement for local authorities to meet it. Exceedances are only valid at specific siting locations (Schedule 1: AQSR).		

Table B: Human Health Relevant Exposure

AQAL Averaging Period	AQALs should apply at	AQALs should not apply at
Annual Mean	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

2.1.3 Environmental Protection Act 1990

The Environmental Protection Act 1990⁹ sets out provisions for the regulation of statutory nuisances. Section 79 sets out this statutory nuisance as, *'any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance'*.

Section 79 requires that, where a complaint of a statutory nuisance is made to it by a person living within its area, a Local Authority must take steps as are reasonably practicable to investigate the complaint.

Fractions of dust greater than 10 μm (i.e. greater than PM₁₀) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.1.4 Ecological Habitats

Ecological habitats vary in terms of their sensitivity, perceived ecological value, geographic importance, and level of protection. Within the UK, there are three types of nature conservation designations: international, national and local designations, which are all

⁹ UK Government, The Environmental Protection Act 1990, (1990). Available at: <http://www.legislation.gov.uk/ukpga/1990/43/contents>.



provided environmental protection from developments, including from atmospheric emissions, with a greater level of protection afforded to the former, relative to the latter.

The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations')¹⁰ introduces the precautionary principle for protected European sites, i.e. that projects can only be permitted to proceed; having ascertained that there will be no adverse effect on the integrity of the designation. European sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). These regulations were subsequently amended in 2019 to make them operable from 1st January 2021 despite the UK's withdrawal from the EU¹¹.

Other sites of international significance are Ramsar sites, which are wetlands protected under the 1971 Ramsar Convention¹². Many of these sites in the UK were initially selected on the basis of their importance to waterbirds and are therefore also classified as SPAs.

The Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way (CROW) Act 2000)¹³ provides protection to Sites of Special Scientific Interest (SSSI) to ensure that developments are not likely to cause damage. The Act also provides a protection to local nature conservation sites, which can be particularly important in providing 'buffers' to SSSIs and European sites.

The Environment Act 1995 and the Natural Environment and Rural Communities Act (NERC) 2006¹⁴ provides an extension to the biodiversity duty set out in the CROW Act to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity (i.e. ecological designations of local status).

Sites of ecological importance are provided environmental protection with respect to air quality, through the application of standards known as Critical Levels (CL_e) and Critical Loads (CL_o). The level of protection afforded to an international / European designation is greater than that afforded to a local designation (e.g. Local Nature Reserves (LNR)); reflecting the relative sensitivity of the sites as well as their perceived ecological value.

2.2 Policy

2.2.1 National Policy

2.2.1.1 Clean Air Strategy

The 2019 Clean Air Strategy¹⁵ sets out the Government's proposals aimed at delivering cleaner air in England and indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

2.2.1.2 Environmental Improvement Plan 2023

The 2023 Environmental Improvement Plan¹⁶ is the first revision of the UK Government's 25 Year Environmental Plan (25YEP) – planned on a five-year rolling cycle. This document sets out the 5-year delivery plan to improve the natural environment. The 2023 Environmental Improvement Plan builds on the 2019 Clean Air Strategy by setting environmental targets

¹⁰ UK Government, Statutory Instrument No. 490, The Conservation of Habitats and Species Regulations, (2017).

¹¹ UK Government, The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations, (2019).

¹² Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, (1971).

¹³ UK Government, Wildlife and Countryside Act, (1981).

¹⁴ UK Government, Natural Environment and Rural Communities Act, (2006).

¹⁵ Defra, The Clean Air Strategy, (2019).

¹⁶ Defra, Environmental Improvement Plan 2023, (2023).



and commitments to reduce air pollution. Goal 2 of the 25YEP is Clean Air – which relates to improving air quality.

2.2.1.3 National Planning Policy Framework

The December 2024 update to the National Planning Policy Framework¹⁷ (NPPF) sets out planning policy for England. The NPPF states that the planning system should contribute to and enhance the natural and local environment, by preventing new development from contributing to or being adversely affected by unacceptable concentrations of air pollution and development should, wherever possible, help to improve local environmental conditions such as air quality.

In specific relation to air quality policy, the document states:

“Chapter 15 – Conserving and Enhancing the Natural Environment

Ground Conditions and Pollution

Para 199. 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.”

The NPPF is accompanied by web based supporting Planning Practice Guidance (PPG)¹⁸ which includes guiding principles on how planning can take account of the impacts of new development on air quality. In regard to air quality, the PPG states:

“The Department for Environment, Food and Rural Affairs carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with relevant 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.”

“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.”

The PPG sets out the information that may be required within the context of a supporting air quality assessment, stating 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 [...] Mitigation*

¹⁷ Ministry of Housing, Communities & Local Government, National Planning Policy Framework, (2024).

¹⁸ Ministry of Housing, Communities and Local Government, Planning Practice Guidance: Air Quality, (2019).



options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact”.

2.2.2 Local Policy

2.2.2.1 Local Plan

The HBBC Core Strategy¹⁹ was adopted in December 2009 and is the currently adopted strategic local plan for the borough. It sets out the spatial vision through to 2026, and a range of strategy objectives and policies.

Within the HBBC Core Strategy, the following policy relates to air quality:

“Policy 8: Key Rural Centres Relating to Leicester

[...]

Markfield

[...]

Support measures to reduce the noise and air pollution currently experienced by the village due to its proximity to the M1.

[...]”

The above policy has been considered as part of this assessment.

HBBC are currently in the process of preparing a new Local Plan to guide future development in Hinckley and Bosworth up to and over the period 2024 – 2045²⁰. The new Local Plan is yet to be adopted and therefore the policies contained within do not carry any material weight in the planning process. However, the policies relating to air quality within the draft Local Plan are presented below:

“PMD01 High Quality Design

The Borough Council will require the highest standards of design, architecture, inclusivity and place-making.

Development will be supported where it positively takes into consideration the adopted Hinckley & Bosworth Good Design Guide (SPD), the National Design Guide and National Model Design Code, any Design Guide contained in a made Neighbourhood Plan, and any other relevant national design guidance.

Development will be supported where the following requirements are met:

[...]

b) The amenity and privacy of nearby residents are not adversely affected, including by matters of lighting, air quality, odour, noise, vibration and visual intrusion;

[...]”

“PMD03 Preventing Pollution

Adverse impacts from pollution will be prevented and ensuring that development proposals demonstrate that:

[...]

¹⁹ Hinckley & Bosworth Borough Council, Local Development Framework Core Strategy, December 2009.

²⁰ Hinckley & Bosworth Borough Council, Local Development Scheme 2024 – 2045, March 2025.



f) it will not adversely impact air quality;

[...]

“NAT01 Green Infrastructure

Development proposal will be supported which contribute to the growth and enhancement of the Borough’s multi-functional green infrastructure network in line with the following requirements:

[...]

c) Proposals should ensure that green infrastructure is resilient to climate change; minimises the scheme’s environmental impact with respect to air, soil, light, noise, and water; and enhances the quality of air, soil and water.

[...]

2.3 Assessment Guidance

This assessment has been carried out in accordance with the following principles contained within the guidance documents below.

- AEA Energy and Environment: ‘Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance’ (Issue 1a), (2008)²¹;
- Defra: COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021²²;
- Defra: Local Air Quality Management Technical Guidance (LAQM.TG(22))²³;
- Defra: PM_{2.5} Targets, Interim Planning Guidance⁷ (the ‘Defra PM_{2.5} IPG’);
- Environmental Policy Implementation Community (EPIC) (previously Environmental Protection UK (EPUK)) and the Institute of Air Quality Management (IAQM): Land-Use Planning and Development Control: Planning for Air Quality²⁴ (the ‘EPIC & IAQM’ guidance);
- Highways England: Design Manual for Roads and Bridges, LA105 - Air Quality (Vertical Barriers)²⁵ (the ‘DMRB LA 105’ guidance);
- IAQM: Guidance on the Assessment of Dust from Demolition and Construction²⁶ (the ‘IAQM Dust’ guidance);
- IAQM: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites²⁷ (the ‘IAQM Nature’ guidance);
- IAQM: Use of 2020 and 2021 Monitoring Datasets²⁸; and

²¹ AEA Energy and Environment, Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance, Issue 1a, (2008).

²² Defra, COVID-19: Supplementary Guidance Local Air Quality Management Reporting in 2021, 2021.

²³ Defra in partnership with the Scottish Government, Welsh Government and Department of Agriculture, Environment and Rural Affairs Defra, Local Air Quality Management Technical Guidance 22, May 2025.

²⁴ EPIC (previously EPUK) & IAQM, Land-Use Planning and Development Control: Planning for Air Quality v1.2, 2017.

²⁵ Highways England, DMRB, LA 105 – Air Quality (Vertical Barriers), 2024.

²⁶ IAQM, Guidance on the Assessment of Dust from Demolition and Construction v2.2, 2024.

²⁷ IAQM, A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites v1.1, 2020.

²⁸ IAQM, Position Statement: Use of 2020 and 2021 Monitoring Datasets v1.1, 2023.



- Joint Nature Conservation Committee (JNCC): Guidance on Decision-making Thresholds for Air Pollution²⁹ (the 'JNCC guidance').

²⁹ JNCC, Guidance on Decision-Making Thresholds for Air Pollution, JNCC Report No.696 (Main Report), 2021.



3.0 Assessment Methodology

3.1 Construction Phase Dust

A construction dust assessment has been undertaken in accordance with IAQM Dust guidance. The assessment of risk is determined by considering the risk of dust effects arising from four activities in the absence of mitigation:

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

The assessment methodology considers three separate dust impacts with account being taken of the sensitivity of the area that may experience these effects:

- Annoyance due to dust soiling;
- The risk of health effects due to an increase in exposure to PM₁₀; and
- Harm to ecological receptors.

The first stage of the assessment involves a screening review to determine if there are sensitive receptors within threshold distances of the Site activities associated with the construction phase of the scheme. A detailed assessment is required where a:

- Human receptor is located within 250m of the Site, and/or within 50m of routes used by construction vehicles, up to 250m from the Site entrance(s); and/or
- Ecological receptor is located within 50m of the Site, and/or within 50m of routes used by construction vehicles, up to 250m from the Site entrance(s).

The dust emission class (or magnitude) for each activity is determined on the basis of the guidance, indicative thresholds and professional judgement by a technically competent assessor. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area. The risk of impact is then used to determine the appropriate mitigation requirements, whereby through effective application, residual effects are considered to be 'not significant'.

Given the short-term nature of the construction phase and the comparatively low volume of vehicle movements that will likely arise, it is unlikely that significant air quality effects from development related road traffic emissions during the construction phase will arise. Such potential effects have therefore been scoped out from requiring detailed assessment and effects on air quality are considered to be 'insignificant' in accordance with the applied EPIC & IAQM guidance.

3.2 Operational Phase – Human Receptors

In order to appropriately assess road traffic emission impacts associated with the operation of the Proposed Development, detailed dispersion modelling has been undertaken using the Cambridge Environmental Research Consultants (CERC) ADMS-Roads v5 dispersion model, focussing on concentrations of NO₂, PM₁₀ and PM_{2.5} for the following scenarios:

- 2023 Base Case (2023 BC) – Base flows for the year (2023);
- 2026 Do Minimum (2026 DM) – Without development flows for the assumed year of opening (2026), inclusive of any relevant committed development flows; and



- 2026 Do Something (2026 DS) – ‘Do Minimum’ flows, plus all trips associated with the Proposed Development flows for the proposed year of opening (2026).

For the above future year scenarios (2026), concurrent emission factors and background pollutant concentrations have been used.

Details of model inputs are discussed in turn, below. Advanced inputs are discussed in Appendix A.

3.2.1 Traffic Inputs

Traffic data was provided by Hub Transport Planning Limited (Hub) – the appointed transport consultant to the Applicant. Baseline traffic flows for sections of the M1 motorway have been supplemented by data sourced from the National Highways website³⁰.

Traffic speeds were modelled at the relevant speed limit for each road. However, where appropriate, the speeds have been reduced to simulate queues at junctions, traffic lights and other locations where queues or slower traffic are known to be an issue, in accordance with LAQM.TG(22). Traffic speeds have been assumed to be consistent across all the modelled scenarios.

The Emissions Factors Toolkit (EFT) version 13.1 developed by Defra³¹ has been used to determine vehicle emission factors for input into the ADMS-Roads dispersion model.

To initially inform the spatial extent of the model, changes in traffic volumes on the local road network were compared to the ‘indicative criteria for assessment’ provided within EPIC & IAQM guidance (see Section 2.3). Where available, neighbouring road links were also included within the dispersion model to facilitate a robust assessment, rather than rely on their individual contributions being represented within the appropriate background datasets. For those links where distributed operational phase Proposed Development trips fall below the EPIC & IAQM indicative criteria for assessment, it can be concluded that at adjacent receptor locations trips will result in an ‘insignificant’ effect on air quality.

Details of the traffic flows used in this assessment are provided in Appendix A, whilst the modelled roads in relation to the Site are presented in Figure 2.

3.2.2 Meteorological Data

To calculate pollutant concentrations at identified sensitive receptor locations the dispersion model uses sequential hourly meteorological data, including wind direction, wind speed, temperature, cloud cover and stability, which exert significant influence over atmospheric dispersion.

The dispersion modelling has been undertaken using Numerical Weather Prediction (NWP) data for the 2023 period. The NWP dataset has been centred around the NGR: x448200, y311200 (i.e. that of the Site).

In respect of using NWP data for dispersion modelling, LAQM.TG(22) states:

“NWP data may be a useful alternative to OBS [standard meteorological observations data] data where there are no suitable meteorological data available, or where OBS data are unlikely to represent local meteorological conditions around the modelled source.”

A surface roughness value of 0.5m was used to represent the Site locale and meteorological station setting (corresponding to ‘parkland and open suburbia’).

³⁰ <https://webtris.highwaysengland.co.uk/>, accessed August 2025.

³¹ Defra, EFT v13.1 (2025). <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>.



A wind rose for the NWP dataset is presented in Figure 1.

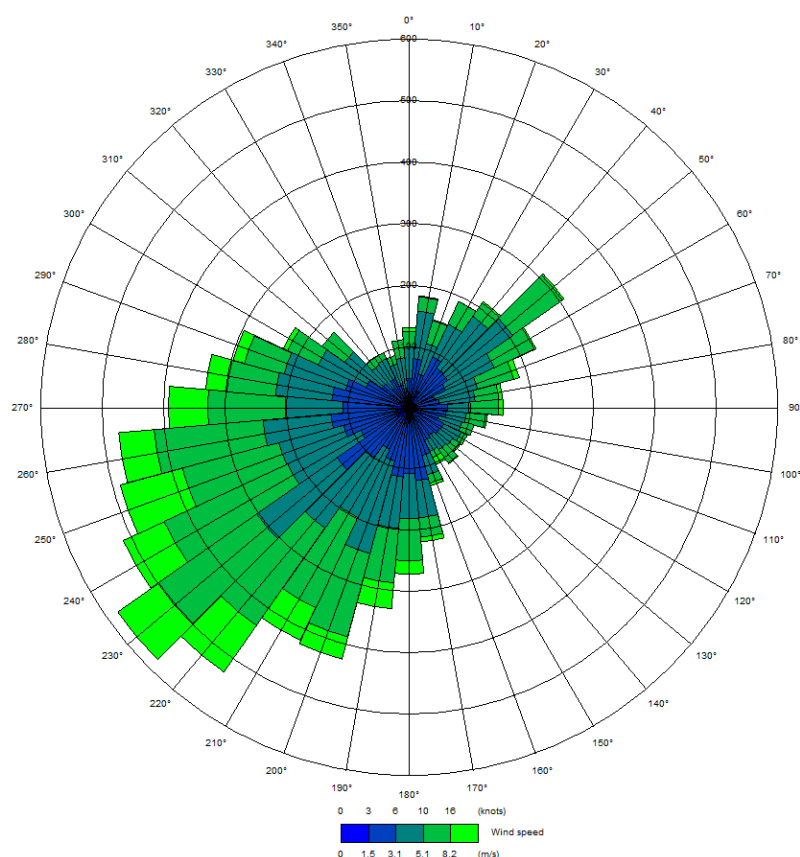


Figure 1: Wind Rose for NWP Data (2023)

3.2.3 Background Concentrations

In the absence of available locally representative background monitoring sites, annual mean background concentrations used for the purposes of the assessment have been obtained from the Defra supplied background maps (2021 reference year)³², based on the 1km grid squares which cover the modelled area. Further detail on these datasets can be found in Section 4.0.

3.2.4 Baseline Air Quality Monitoring

In the absence of suitable local air quality monitoring undertaken by HBBC within close proximity to the Site (see Section 4.3 / Appendix B), site-specific baseline NO₂ monitoring was completed at roadside locations surrounding the Site to support the verification of the operational phase road traffic emissions assessment.

As per LAQM.TG(22) guidance, NO₂ concentrations alone can be used to verify road-traffic related pollutants. As such, monitoring of NO₂ using passive diffusion tubes has solely been undertaken using passive diffusion tubes.

The scope, methodology and results of the NO₂ diffusion tube monitoring survey can be found in the supporting Appendix B. The location of the monitors is shown in Figure 3.

³² Defra Background Maps (2021-Reference) <http://uk-air.defra.gov.uk/data/laqm-background-home>.



3.2.5 Sensitive Receptors

3.2.5.1 Human Receptors

Human receptors considered in the assessment of emissions from road traffic are shown Table C, whilst their locations are illustrated in Figure 2.

Receptors R1 – R16 are representative of worst-case exposure locations at existing receptors within the Site locale, relative to the affected road network discussed.

All receptors were considered in relation to exposure at breathing height relative to the adjacent modelled road, at ground level, i.e. 1.5m height. Receptor locations represent relevant exposure to the annual mean AQAL – in accordance with LAQM.TG(22) presented in Table B.

Table C: Receptor Locations Considered

Receptor	NGR X (m)	NGR Y (m)	Height (m)
R1	448164	311091	1.5
R2	448034	310851	1.5
R3	447599	311384	1.5
R4	447344	311571	1.5
R5	447266	311576	1.5
R6	447121	311656	1.5
R7	446226	311791	1.5
R8	448414	311164	1.5
R9	449234	310430	1.5
R10	449633	310076	1.5
R11	449934	309724	1.5
R12	450062	309567	1.5
R13	447916	312510	1.5
R14	448067	312937	1.5
R15	448092	310108	1.5
R16	451533	306319	1.5

3.2.6 Model Outputs

The background pollutant concentrations discussed in Section 4.4 have been used in conjunction with the concentrations predicted by the ADMS-Roads model to calculate predicted total annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} for each respective scenario.

For the prediction of annual mean NO₂ concentrations for all modelled scenarios at receptor locations, the road oxides of nitrogen (NO_x) contributions (adjusted as per Appendix A) have been converted to total NO₂ following the methodology in LAQM.TG(22) using the latest version of Defra's NO_x to NO₂ conversion tool (v9.1)³³. The traffic mix within the calculator

³³ Defra NO_x to NO₂ Calculator v9.1 (2024), available at <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/no2-adjustment-for-nox-sector-removal-tool/>.



was set to “All Other Urban UK traffic” and “Hinckley and Bosworth” was selected as the local authority. The modelled NO₂ road contribution was then added to the appropriate NO₂ background concentration value to obtain an overall total annual mean NO₂ concentration.

For the prediction of short-term NO₂ impacts, LAQM.TG(22) advises that it is valid to assume that exceedences of the 1-hour mean NO₂ AQAL are unlikely to occur where the annual mean NO₂ concentration is <60µg/m³. This approach has thus been adopted for the purposes of this assessment, at relevant receptor locations with an applicable exposure period.

For the prediction of short-term PM₁₀, LAQM.TG(22) provides an empirical relationship between the annual mean and the number of exceedences of the 24-hour mean AQAL for PM₁₀ that can be calculated as follows:

$$\text{“No. 24-hour mean exceedences”} = -18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$$

This relationship has thus been adopted to determine whether exceedences of the short-term PM₁₀ AQAL are likely in this assessment.

Verification of the ADMS-Roads assessment has been undertaken as per Appendix A.1.1. All results presented in the assessment are calculated following the process of model verification.

3.2.7 Assessing Significance

Guidance for determining operational phase effects associated with air quality is provided by EPIC & IAQM.

When describing the developmental impact at a specific existing receptor, the resultant total concentration as well as the magnitude of change in relation to respective AQALs are both considered – using the approach detailed in Table D.

Table D: Impact Descriptor Matrix for Receptors

Long Term Average Concentration at Receptor in Assessment Year	Change in Concentration relative to AQAL			
	1% ^(A)	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial
Note: (A) Changes <0.5% will be described as Negligible.				

Following derivation of impacts at all receptor locations assessed, the overall significance of the developmental ‘effect’ is determined based upon consideration, as necessary, of the following factors:

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



- The extent to which the Proposed Development has adopted best practice to eliminate and minimise emissions.

3.2.8 Uncertainty

Dispersion modelling is inherently uncertain and is principally reliant on the accuracy and representativity of its inputs. In acknowledgement of this, the ADMS-Roads dispersion model has been verified with the site-specific monitoring survey data undertaken as part of this assessment (see Appendix B). Details of the verification exercise are shown in Appendix A.

In addition, there is a widely acknowledged disparity between emission factors and ambient monitoring data³⁴. To help minimise any associated uncertainty when forming conclusions from the results, this assessment has utilised the latest EFT version 13.1 utilising COPERT v5.8 emission factors, and associated tools/datasets published by Defra.

The IAQM published a Position Statement on ‘*Dealing with Uncertainty in Vehicle NOx Emissions Within Air Quality Assessments*’ in July 2018³⁵ within which it was suggested to include a sensitivity test to account for predicted large reductions in NOx emissions that were not borne out in measured roadside concentrations. However, the latest iterations of the EFT (from version 9 onwards), reflect the real-world NOx emissions more accurately. As such, the IAQM has withdrawn its position statement saying as such and including:

“It is judged that an exclusively vehicle emissions-based sensitivity test is no longer necessary.

On this basis, the EFT may be used for future year modelling with greater confidence when considering the per vehicle emission, provided that the assessment is verified against measurements made in the year 2016 or later.”

Given the above and application of EFT v13.1, use of further sensitivity modelling is not considered relevant or appropriate (i.e. too pessimistic). Furthermore, the assessment applies a 2026 completed development year scenario which is considered to be precautionary in terms of predicted impacts and absolute assessment against the respective AQAL. In reality, the completed development year is likely to be further in the future than 2026, when associated emission factors and background concentrations are predicted to be lower than those assessed.

3.3 Operational Phase – Ecological Receptors

The assessment procedure outlined within the IAQM Nature guidance has been used in relation to the assessment of sensitive ecological receptors, in conjunction with the DMRB LA 105 guidance and the JNCC guidance. This initially comprises a screening assessment irrespective of current baseline rates to indicate whether:

- Any sensitive qualifying features are located within 200m of a road link projected to experience developmental-generated vehicle movements; and
- The Proposed Development (alone and/or in-combination with other projects and plans) is likely to generate either >1,000 AADT on a road link (and/or >200 HDVs) within 200m of the ecological receptor, or result in >1% of CLe / CLo.

The outcomes of the above will determine whether impacts associated with the Proposed Development could result in a ‘*likely significant effect*’ on the assessed ecological feature (either ‘project-alone’, or ‘in-combination’ for European sites) – providing the location of the screened ecological receptor can be validated. If the above conditions are not met, then

³⁴ Carslaw, et al., Trends in NOx and NO₂ emissions and ambient measurements in the UK, (2011).

³⁵ IAQM, Dealing with Uncertainty in Vehicle NOx Emissions Within Air Quality Assessments, (2018).



impacts on ecological designations are likely to be imperceptible, whereby resultant effects can be classed as 'insignificant'.

See Figure 5 for the setting of the ecological receptors considered within this assessment, relative to the Site.



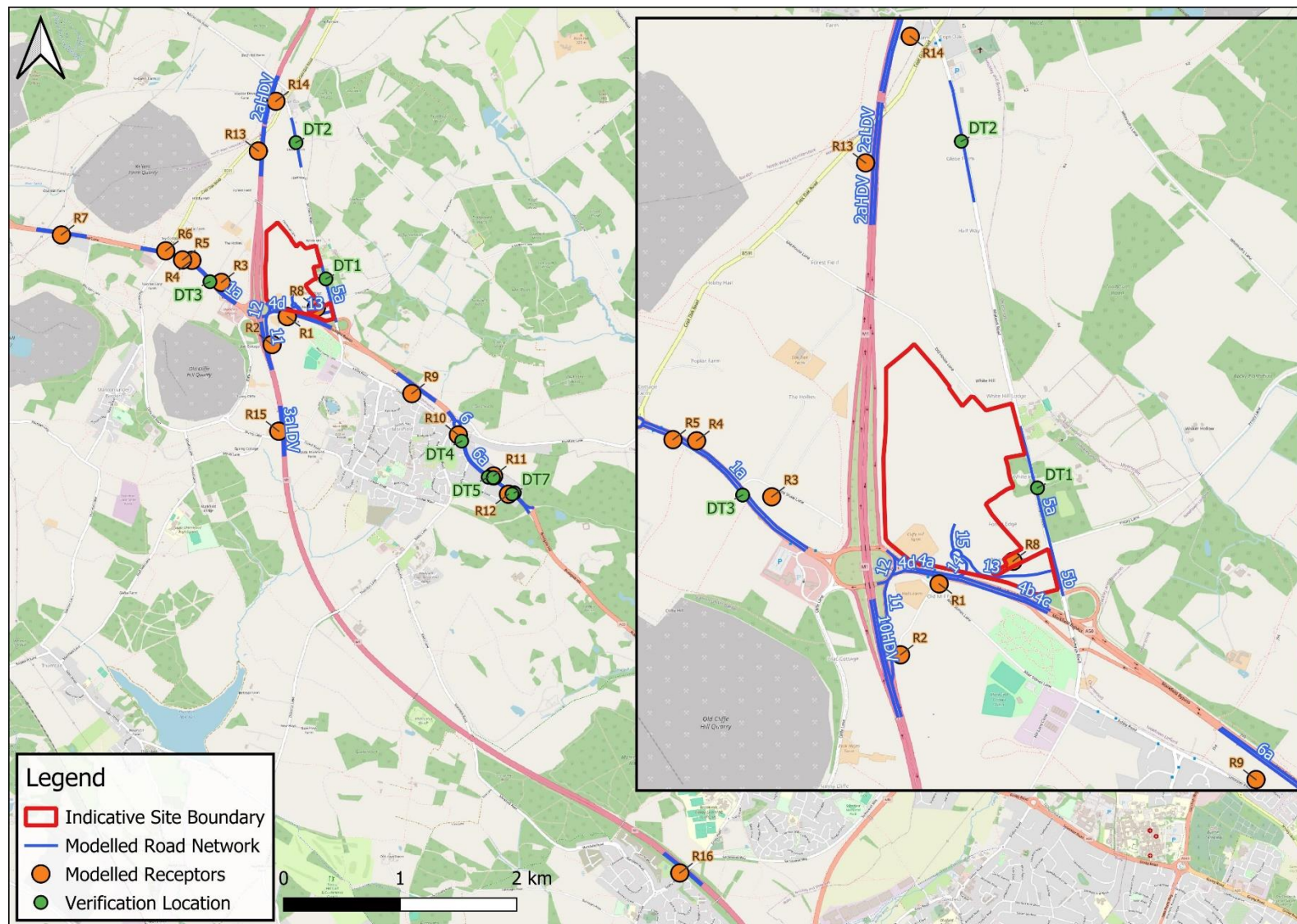


Figure 2: Site Setting, Modelled Road Network, Receptors and Verification



4.0 Baseline Environment

4.1 LAQM Review and Assessment

HBBC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within its administrative area. For the purposes of this assessment, the HBBC 2025 Annual Status Report (ASR)³⁶ (inclusive of 2020 – 2025 monitoring datasets) was provided by the EHO and has been reviewed.

HBBC do not presently have any declared AQMAs within its administrative area.

4.2 Review of Air Quality Monitoring

4.2.1 Automatic Air Quality Monitoring

HBBC does not operate any automatic monitoring sites within its administrative area.

The nearest automatic monitor affiliated with the Automatic Urban and Rural Network (AURN) is situated approximately 12.3km to the south-east and within the centre of Leicester. Given the separation distance and differences in site characteristics, comparable pollutant concentrations are not anticipated, and no further consideration has been given to the AURN in this assessment.

4.2.2 Passive Diffusion Tube Monitoring

Passive NO₂ diffusion tube monitoring was undertaken by HBBC at 16 locations during 2024. A review of neighbouring North West Leicestershire District Council's (NWLDC) 2024 ASR³⁷ shows that it undertook passive NO₂ diffusion tube monitoring at 35 sites during 2023.

The details and results of the monitoring locations of relevance to the Site (i.e. within 2km) are presented in Table E and Table F, respectively.

Table E: Local NO₂ Diffusion Tube Monitoring Sites: Details

Site ID	Site Type	NGR (m)		Height (m)	Within AQMA?	Distance and Direction to Site (km)
		X	Y			
10 12, 14 ^(D)	Rural ^(A)	447113	311660	1.7	No	0.87, W
64N ^(E)	Roadside ^(B)	448081	313098	2.0	No	0.99, N
08N ^(E)	Rural ^(A)	448138	131012	2.0	No	1.08, N
32N ^(E)	Other ^(C)	448082	131100	2.0	No	1.17, N
Notes: (A) Rural site classification defined by LAQM.TG(22) as: "An open countryside location, in an area of low population density distanced as far as possible from roads, populated and industrial areas" (B) Roadside site classification defined by LAQM.TG(22) as: "A site sampling typically within one to five metres of the kerb of a busy road". (C) Other site classification defined by LAQM.TG(22) as: "Any special source-orientated or location category covering monitoring undertaken in relation to specific emission sources such as power stations, car-parks, airports or tunnels".						

³⁶ Hinckley and Bosworth Borough Council, 2025 Air Quality Annual Status Report, June 2025.

³⁷ North West Leicestershire District Council, 2024 Air Quality Annual Status Report, June 2024.



Site ID	Site Type	NGR (m)		Height (m)	Within AQMA?	Distance and Direction to Site (km)
		X	Y			
(D) HBBC monitoring location.						
(E) NWLDC monitoring locations.						

Table F: Local NO₂ Diffusion Tube Monitoring Sites: Results

Site ID	2023 / 2024 Data Capture %	Annual Mean NO ₂ Concentration (µg/m ³)					
		2019	2020 (A)	2021 (A)	2022	2023	2024
10, 12, 14	100	-	26.8	28.8	27.1	26.1	24.2
64N	75	-	-	21.1	15.5	27.3	- (B)
08N	100	22.4	16.9	18.8	13.2	15.1	- (B)
32N	100	53.9	39.3	39.9	23.6	38.8	- (B)
Notes: (A) As per guidance published by Defra ²² and the IAQM's position statement ²⁸ , monitoring results obtained in 2020 and 2021 are likely to be atypical due to the impacts of the COVID-19 pandemic. (B) At the time of writing, the NWLDC 2024 datasets were not publicly available.							

As shown in Table F, none of the considered monitoring locations exceeded the annual mean NO₂ AQAL (i.e. 40µg/m³) during 2023 / 2024.

The monitor nearest to the Site ('10, 12, 14') recorded a 2024 annual mean NO₂ concentration of 24.2µg/m³, representing 60.5% of the AQAL (i.e. 'well-below' (<75% of the AQAL)).

During 2019, NWLDC monitoring location '32N' recorded an exceedence of the annual mean NO₂ AQAL. However, in the intervening period there has been a reduction in monitored concentrations at '32N' with no exceedences recorded since 2019.

Overall, there appears to be a downward trend in annual mean NO₂ concentrations at each of the considered monitoring locations with the exception of '64N', which recorded a greater concentration in 2023 than it did when first commissioned in 2021. Despite this, the 2023 annual mean NO₂ concentration at this location was considered to be 'well-below' the AQAL.

The empirical relationship given in LAQM.TG(22) states that exceedences of the 1-hour mean NO₂ AQAL are unlikely to occur where annual mean concentrations are <60µg/m³. This indicates that an exceedence of the 1-hour mean AQAL was unlikely to have occurred at the above locations in between 2019 – 2024.

4.3 Site-Specific NO₂ Diffusion Tube Monitoring

As referenced in Section 3.2.4, Site specific passive NO₂ diffusion tube monitoring was completed at roadside locations in proximity to the Site to support the verification of the road traffic emissions dispersion modelling assessment.

Despite the proximity of the existing HBBC and NWLDC monitoring locations discussed above, it is considered that these are situated such that they would not provide a robust dataset for model verification, given their positioning relative to the affected road network.

All monitoring data presented has been annualised and bias adjusted in accordance with LAQM.TG(22). The scope, methodology and results of the NO₂ diffusion tube monitoring survey can be found in the supporting Appendix B.



The details and results of the monitoring are presented in Table G, whilst monitoring locations are shown in Figure 3.

Table G: Site-Specific NO₂ Diffusion Tube Monitoring: Details & Results

Site ID	LAQM Site Type	NGR (m)		2023 Annual Mean NO ₂ Concentration (µg/m ³)	Percentage of Annual Mean AQAL (%)
		X	Y		
DT1	Roadside ^(A)	448496	311414	17.0	42.4
DT2	Roadside ^(A)	448239	312583	15.1	37.8
DT3	Roadside ^(A)	447501	311390	28.2	70.5
DT4	Roadside ^(A)	449661	310023	17.1	42.7
DT5	Roadside ^(A)	449889	309714	23.2	58.1
DT6	Roadside ^(A)	449933	309710	19.8	49.5
DT7	Roadside ^(A)	450112	309579	21.5	53.9
DT8	Roadside ^(A)	450093	309569	24.0	60.1
Note: ^(A) 'Roadside' site classification defined by LAQM.TG(22) as: "A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)".					

In reference to the site-specific monitoring data presented in Table G, there were no concentrations above the annual mean NO₂ AQAL (i.e. 40µg/m³) recorded at any of the monitoring locations. However, as discussed above, it is noted that monitoring was completed at roadside locations to provide a concentration dataset to verify the road traffic emissions dispersion modelling assessment. Monitoring was not completed to determine annual mean concentrations at locations of relevant exposure (i.e. dwellings).

The highest annualised NO₂ concentration of 24.0µg/m³ (i.e. 60.1% of the annual mean AQAL; 'well-below' the AQAL) was recorded at monitoring location DT8. Monitoring location DT is located adjacent to the A50 Leicester Road approximately 2.2km to the south-east of the Site.

The empirical relationship given in LAQM.TG(22) states that exceedences of the 1-hour mean NO₂ AQAL are unlikely to occur where annual mean concentrations are <60µg/m³. This indicates that an exceedence of the 1-hour mean AQAL was unlikely to have occurred at the diffusion tube monitoring locations.

4.4 Defra Mapped Background Concentrations

Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution which is routinely used to support LAQM requirements and air quality assessments. The data sets include annual average concentration estimates for NO₂, PM₁₀ and PM_{2.5} using a base year of 2021 (the year in which comparisons between modelled and monitoring are made).

The Defra mapped background concentrations for the base year (2023) and the earliest anticipated opening year of the Proposed Development (2026) are presented in Table H.

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



Table H: Defra Mapped Background Pollutant Concentrations

Grid Square (X, Y) (m)	Year	Annual Mean Concentration (µg/m³)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
448500, 311500	2023	11.2	8.7	12.8	7.0
	2026	10.0	7.8	12.6	6.8
448500, 310500	2023	12.6	9.7	14.3	7.4
	2026	10.9	8.5	14.0	7.2
447500, 311500	2023	15.0	11.3	14.4	7.5
	2026	12.8	9.8	14.1	7.3
446500, 311500	2023	11.5	8.9	13.7	7.3
	2026	10.4	8.1	13.4	7.1
449500, 310500	2023	10.9	8.4	13.2	7.3
	2026	9.6	7.5	12.9	7.1
449500, 309500	2023	10.8	8.4	13.7	7.5
	2026	9.6	7.5	13.5	7.2
450500, 309500	2023	10.8	8.4	12.4	7.0
	2026	9.6	7.5	12.2	6.8
447500, 312500	2023	16.4	12.3	16.9	9.2
	2026	14.7	11.1	16.6	8.9
448500, 312500	2023	12.1	9.3	12.9	7.2
	2026	10.9	8.5	12.6	7.0
451500, 306500	2023	14.5	11.0	14.9	7.8
	2026	12.4	9.6	14.7	7.5
AQAL		-	40	40	20



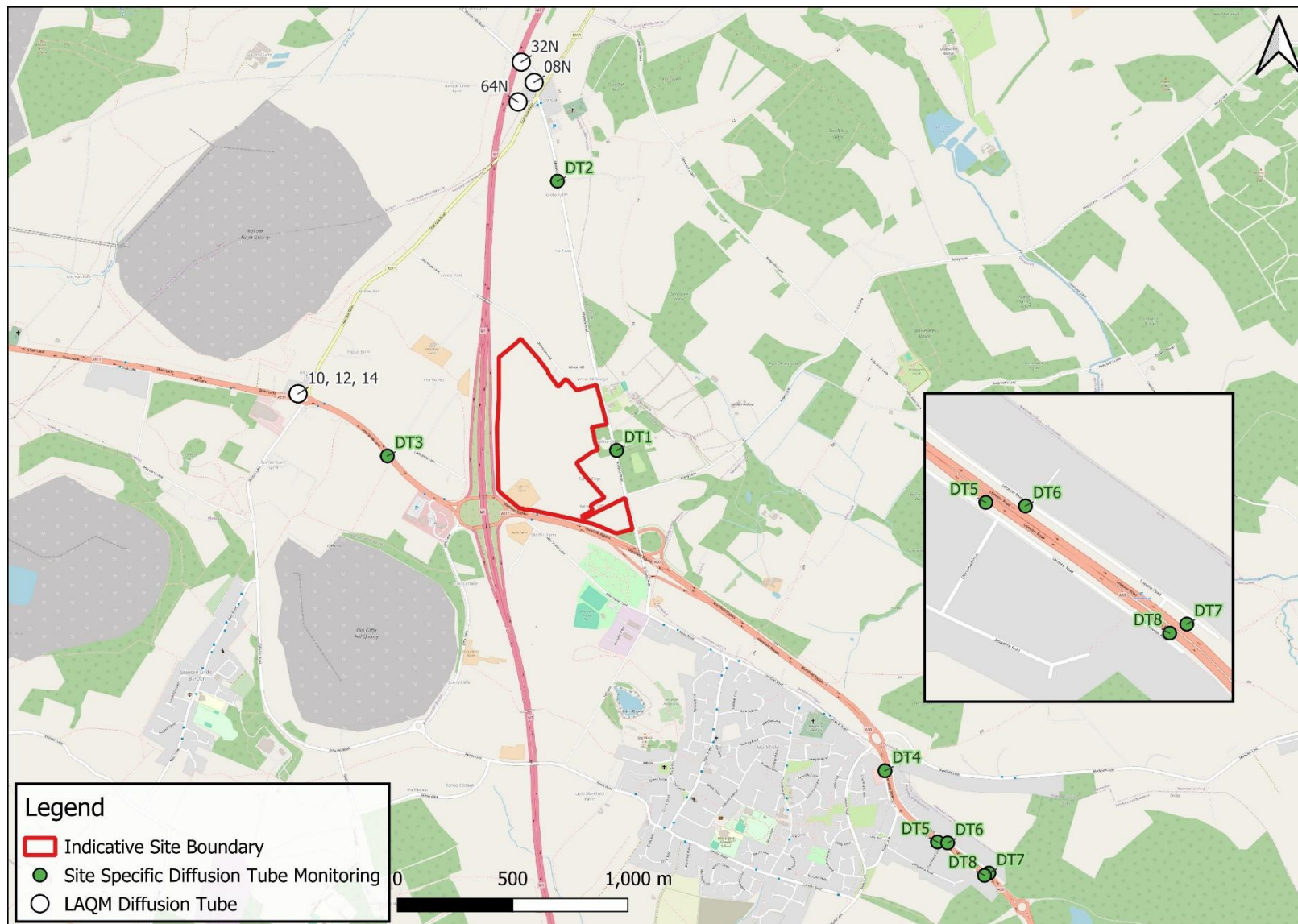


Figure 3: Site Setting and Air Quality Monitoring



5.0 Construction Phase Assessment

This section presents the potential air quality impacts and effects associated with the construction of the Proposed Development.

5.1 Construction Dust Assessment

Where figures relating to area and volume of the Site, approximate number of construction vehicles or distances to receptors are given, these relate to thresholds as defined in the IAQM Dust guidance to guide the assessor to define the dust emissions magnitude and sensitivity of the area.

5.1.1 Assessment Screening

There are 'human receptors' within 250m of the Site but no designated habitat sites within 50m of the Site boundary or up to 250m of the Site entrance / 50m of the roads anticipated to witness construction traffic movements. Therefore, an assessment of construction dust on human receptors, only, is required.

Furthermore, there are no receptors within 50m of the roads anticipated to witness construction traffic movements, up to 250m from the Site entrance. Therefore, an assessment of construction dust generated from trackout is not required and the associated risk of impact will be negligible.

5.1.2 Potential Dust Emissions Magnitude

5.1.2.1 Demolition

The Site currently comprises predominantly vacant agricultural land. In the south-western extent of the Site is a farmyard with associated buildings and farmhouse which will require demolition. The total building / structure volume is estimated to be <12,000m³. A review of street view photography indicates that the farm buildings comprise of a steel frame and metal cladding (i.e. a low potential for dust generation). The farmhouse is of standard brick masonry, but of a relatively small scale.

The dust emission magnitude for demolition is therefore considered to be 'small'.

5.1.2.2 Earthworks

The total Site area is approximately 280,800m². As such, it is considered that earthworks will be required over an area >110,000m² at any given time. According to Magic³⁸, the main surface texture class of the underlying soil is regarded to be 'loamy', which is considered to have a moderate dust generating potential.

The dust emission magnitude for earthworks is therefore considered to be 'large'.

5.1.2.3 Construction

The proposals constitute the construction of six warehouse units, totalling an area of approximately 143,000m². The total building volume associated with the Proposed Development is therefore predicted to be >75,000m³. However, given the nature of the Proposed Development, construction materials are likely to be of low dust generating potential (i.e. steel frame, metal cladding), other than internal and external concrete slabs.

³⁸ <https://magic.defra.gov.uk/MagicMap.aspx>.



As such, the dust emission magnitude for construction is therefore initially considered to be 'medium'.

5.1.2.4 Summary

A summary of the potential dust emission magnitude for each of the activities is displayed in Table I.

Table I: Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Medium

5.1.3 Sensitivity of the Area

5.1.3.1 Dust Soiling Impacts

Overall, there are anticipated to be 1 – 10 existing residential dwellings (receptors of 'high' sensitivity) within 20m of the Site boundary. However, with regard to demolition, there are considered to be 1 – 10 existing residential dwellings within 250m of buildings / structures requiring demolition.

The sensitivity of the area with respect to dust soiling effects on people and property in relation to demolition is therefore considered to be 'low'. In relation to earthworks and construction it is therefore considered to be 'medium'. The area is not considered to be sensitive to trackout.

5.1.3.2 Human Health Impacts

The maximum background PM₁₀ concentration of the 1km² grid squares which cover the development is estimated to be 12.8µg/m³ (x448500, y311500), based upon 2023 mapped background estimates (i.e. falls into the <24µg/m³ class).

Given the above information regarding the number and nature of surrounding receptors, the sensitivity of the area with respect to human health impacts in relation to demolition, earthworks and construction is considered to be 'low'.

5.1.3.3 Summary

A summary of the sensitivity of the area defined for each potential impact is displayed in Table J, whereas the spatial densities of receptors discussed in relation to the Site boundary are illustrated in Figure 4.

It should be noted that the number of receptors within 20m of the Site boundary is low and in reality, may be at a distance greater than 20m from specific activities associated with the identified dust sources. As such, the sensitivity of the area is likely to be much lower than has been identified by following the IAQM Dust guidance methodology. The assessment, and commensurate mitigation measures (Table O) are therefore considered to be conservative.



Table J: Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Medium	Medium	N/A
Human Health	Low	Low	Low	N/A

5.1.4 Risk of Impacts (Unmitigated)

The outcome of the assessment of the potential ‘magnitude of dust emissions’, and the ‘sensitivity of the area’ are combined in Table K below to determine the risk of impact which is used to inform the selection of appropriate mitigation.

It is stressed that the identified Risk of Dust Impacts is calculated in the absence of mitigation. With the appropriate application of the identified mitigation measures (Table O), any risk will be rendered as ‘not significant’.

Table K: Risk of Dust Impacts (Unmitigated)

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Medium Risk	Medium Risk	N/A
Human Health	Negligible	Low Risk	Low Risk	N/A

5.1.5 Mitigation

Following the construction dust assessment, the Site is found to be at worst ‘medium risk’ in relation to dust soiling effects on people and property and ‘low risk’ in relation to human health impacts (Table K). However, potential dust effects during the construction phase are considered to be temporary in nature and may only arise at particular times (i.e. certain activities and / or meteorological conditions).

Nonetheless, commensurate with the above designation of dust risk, mitigation measures as identified by IAQM Dust guidance are required to ensure that any potential impacts arising from the construction phase of the Proposed Development are reduced and, where possible, completely removed. In accordance with IAQM Dust guidance, providing effective mitigation measures are implemented, such as those outlined in Section 7.1, construction dust effects are considered to be ‘not significant’.





Figure 4: Construction Dust Buffers



6.0 Operational Phase Assessment

This section presents the potential air quality impacts and effects associated with the operational phase of the Proposed Development.

6.1 NO₂ Modelling Results

Table L presents the annual mean NO₂ concentrations predicted at all assessed receptor locations for the 2023 BC, 2026 DM and 2026 DS scenarios.

Table L: Predicted Annual Mean NO₂ Concentrations – 2026 Development Opening Year

Receptor	Predicted Annual Mean NO ₂ Concentration (µg/m ³)			% Change of AQAL	% of 2026 DS Relative to AQAL	EPIC & IAQM Impact Descriptor
	2023 BC	2026 DM	2026 DS			
R1	17.9	14.9	15.4	+1.2	38.5	Negligible
R2	28.1	23.3	23.6	+0.6	59.0	Negligible
R3	16.8	14.0	14.1	+0.3	35.3	Negligible
R4	24.3	20.0	20.3	+0.6	50.8	Negligible
R5	24.5	19.9	20.2	+0.6	50.5	Negligible
R6	32.5	26.2	26.5	+0.9	66.3	Negligible
R7	18.9	15.8	16.0	+0.6	40.0	Negligible
R8	12.8	10.9	11.3	+0.9	28.3	Negligible
R9	11.4	9.8	9.8	+<0.1	24.5	Negligible
R10	17.3	14.2	14.3	+0.2	35.8	Negligible
R11	18.0	15.0	15.1	+0.2	37.8	Negligible
R12	13.7	11.6	11.6	+<0.1	29.0	Negligible
R13	31.3	26.1	26.2	+0.1	65.5	Negligible
R14	28.8	23.7	23.8	+0.2	59.5	Negligible
R15	33.5	27.6	27.7	+0.2	69.3	Negligible
R16	27.5	22.7	22.8	+0.2	57.0	Negligible

The maximum predicted annual mean NO₂ concentration at all receptors during the 2023 BC scenario was at Receptor R15 with a predicted concentration of 33.5µg/m³, representing 83.8% of the AQAL. Receptor R15 is a residential farmhouse situated adjacent to the M1 motorway south of junction 22 (J22), which is associated with a very high volume of traffic, resulting in a correspondingly high emission contribution. With reference to Appendix A / Table P, the 2023 baseline traffic flow on the M1 (south of J22) (i.e. Link 3) was 139,216 total AADT, of which 22,692 / 16.3% are HDVs. Whilst Receptor R16 is also located adjacent to this Link, R15 is located approximately 10m closer to the roadside than R16.

The maximum predicted annual mean NO₂ concentration at assessed receptors with the Proposed Development in place (2026 DS) was at Receptor R15 with a predicted concentration of 27.7µg/m³, representing 69.3% of the AQAL (i.e. 'well-below'). The change in the annual mean NO₂ concentrations at this location, due to the Proposed Development (2026 DS vs. 2026 DM) relative to the AQAL was +0.2% (i.e. 0.1µg/m³).



The maximum observed increase in annual mean NO₂ concentrations at all assessed receptors as a result of the Proposed Development (2026 DS vs. 2026 DM) was +1.2% (i.e. 0.5µg/m³) at Receptor R1. Receptor R1 is located on the façade of a residential property approximately 20m to the south of the A50 Markfield Bypass (i.e. Link 4d). This link is expected to witness the greatest increase in distributed operational phase trips associated with the Proposed Development, as vehicles distribute to / from the M1 and A511. The resultant concentration at R1 with the Proposed Development in place (2026 DS) is 15.4µg/m³, representing 38.5% of the AQAL (i.e. 'well-below').

In accordance with EPIC & IAQM guidance, the impact of the Proposed Development on annual mean NO₂ concentrations at all assessed receptors (of relevant exposure) is considered to be 'negligible'. Given the marginal increase in annual mean NO₂ concentrations associated with the Proposed Development, and that there are no predicted exceedences of the annual mean NO₂ AQAL, unmitigated effects associated with annual mean NO₂ concentrations at all existing assessed receptor locations are therefore considered to be 'not significant'.

It is unlikely that an exceedence of the 1-hour mean NO₂ AQAL will occur in reference to the empirical relationship given in LAQM.TG(22) and predicted maximum absolute annual mean NO₂ concentrations. Effects associated with likely 1-hour mean NO₂ concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

6.2 PM₁₀ Modelling Results

Table M presents the annual mean PM₁₀ concentrations predicted at all assessed receptor locations for the 2023 BC, 2026 DM and 2026 DS scenarios.

Table M: Predicted Annual Mean PM₁₀ Concentrations – 2026 Development Opening Year

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)			% Change of AQAL	% of 2026 DS Relative to AQAL	EPIC & IAQM Impact Descriptor
	2023 BC	2026 DM	2026 DS			
R1	14.8	14.5	14.7	+0.4	36.8	Negligible
R2	18.1	17.7	17.8	+0.2	44.5	Negligible
R3	15.6	15.3	15.4	+<0.1	38.5	Negligible
R4	17.9	17.6	17.7	+0.2	44.3	Negligible
R5	18.1	17.7	17.8	+0.2	44.5	Negligible
R6	20.6	20.2	20.3	+0.4	50.8	Negligible
R7	15.6	15.3	15.3	+0.1	38.3	Negligible
R8	13.6	13.3	13.4	+0.3	33.5	Negligible
R9	13.6	13.4	13.4	+<0.1	33.5	Negligible
R10	15.6	15.3	15.3	+<0.1	38.3	Negligible
R11	16.4	16.1	16.1	+<0.1	40.3	Negligible
R12	13.9	13.6	13.6	+<0.1	34.0	Negligible
R13	20.6	20.2	20.2	+<0.1	50.5	Negligible
R14	16.6	16.2	16.3	+<0.1	40.8	Negligible



Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)			% Change of AQAL	% of 2026 DS Relative to AQAL	EPIC & IAQM Impact Descriptor
	2023 BC	2026 DM	2026 DS			
R15	18.6	18.2	18.3	+<0.1	45.8	Negligible
R16	17.8	17.4	17.5	+<0.1	43.8	Negligible

The maximum predicted annual mean PM₁₀ concentration at all existing receptors during the 2023 BC scenario was at Receptor R6 with a predicted concentration of 20.63µg/m³ (verses 20.61µg/m³ at Receptor R13), representing 51.5% of the AQAL (i.e. 'well-below'). Receptor R6 is situated adjacent to the A511 / B591 / Stanton Lane roundabout, where slow moving or queuing traffic is expected to occur, resulting in an increase in the associated road traffic emission contribution.

The maximum predicted annual mean PM₁₀ concentration at assessed receptors with the Proposed Development in place (2026 DS) was at Receptor R6 with a predicted concentration of 20.3µg/m³, representing 50.8% of the AQAL. The change in the annual mean PM₁₀ concentrations at this location, due to the Proposed Development (2026 DS vs. 2026 DM) relative to the AQAL was +0.4% (i.e. 0.1µg/m³).

The maximum observed increase in annual mean PM₁₀ concentrations at all assessed receptors as a result of the Proposed Development (2026 DS vs. 2026 DM) was +0.4% (i.e. 0.2µg/m³) at Receptor R1 (verses 0.37% at Receptor R6). The resultant concentration predicted at R1 with the Proposed Development in place (2026 DS) is 14.7µg/m³, representing 36.8% of the AQAL.

In accordance with EPIC & IAQM guidance, the impact of the Proposed Development on annual mean PM₁₀ concentrations at all assessed receptors (of relevant exposure) is considered to be 'negligible'. Given the marginal increase in annual mean PM₁₀ concentrations associated with the Proposed Development, and that there are no predicted exceedences of the annual mean PM₁₀ AQAL, unmitigated effects associated with annual mean PM₁₀ concentrations at all existing assessed receptor locations are therefore considered to be 'not significant'.

Based upon the maximum predicted annual mean PM₁₀ concentration of 20.3µg/m³ (predicted at Receptor R6 – 2026 DS), this equates to 3 days where 24-hour mean PM₁₀ concentrations are predicted to be greater than 50µg/m³. This is below the 35 24-hour mean concentrations in excess of 50µg/m³ prescribed within the 24-hour mean AQAL. Effects associated with likely 24-hour mean PM₁₀ concentrations at all assessed receptor locations (including those on Site) are therefore considered to be 'not significant'.

6.3 PM_{2.5} Modelling Results

Table N presents the annual mean PM_{2.5} concentrations predicted at all assessed receptor locations for the 2023 BC, 2026 DM and 2026 DS scenarios.

Table N: Predicted Annual Mean PM_{2.5} Concentrations – 2026 Development Opening Year

Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)			% Change of AQAL	% of 2026 DS Relative to AQAL	EPIC & IAQM Impact Descriptor
	2023 BC	2026 DM	2026 DS			
R1	8.2	8.0	8.1	+0.5	40.5	Negligible
R2	9.8	9.5	9.5	+0.3	47.5	Negligible
R3	8.2	8.0	8.0	+<0.1	40.0	Negligible



Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)			% Change of AQAL	% of 2026 DS Relative to AQAL	EPIC & IAQM Impact Descriptor
	2023 BC	2026 DM	2026 DS			
R4	9.6	9.2	9.3	+0.2	46.5	Negligible
R5	9.6	9.3	9.3	+0.2	46.5	Negligible
R6	11.0	10.6	10.6	+0.4	53.0	Negligible
R7	8.6	8.2	8.3	+0.1	41.5	Negligible
R8	7.5	7.3	7.3	+0.4	36.5	Negligible
R9	7.6	7.3	7.3	+<0.1	36.5	Negligible
R10	8.6	8.3	8.3	+<0.1	41.5	Negligible
R11	9.0	8.7	8.7	+0.1	43.5	Negligible
R12	7.8	7.6	7.6	+<0.1	38.0	Negligible
R13	11.6	11.1	11.1	+<0.1	55.5	Negligible
R14	9.6	9.2	9.2	+<0.1	46.0	Negligible
R15	10.2	9.8	9.8	+<0.1	49.0	Negligible
R16	9.6	9.2	9.2	+<0.1	46.0	Negligible

The maximum predicted annual mean PM_{2.5} concentration at existing receptors during the 2023 BC scenario was at Receptor R13 with a predicted concentration of 11.6µg/m³, representing 58.0% of the AQAL (i.e. 'well-below'). Receptor R13 is a mobile home park situated adjacent to the M1 motorway north of J22, which is associated with a very high volume of traffic, resulting in a correspondingly high emission contribution. Unlike Receptor R15, discussed above in Section 6.1, R13 is located to the north of J22. With reference to Appendix A / Table P, the 2023 baseline traffic flow on the M1 (north of J22) (i.e. Link 2) was 107,182 total AADT, of which 16,935 / 15.8% are HDVs. Whilst Receptor R14 is also located adjacent to this Link, R13 is located approximately 17m closer to the roadside than R14 and on the opposite side of the carriageway. Moreover, the predicted annual mean PM_{2.5} background concentration for the grid square containing R13 is 2µg/m³ greater than that containing R14 (see Table H).

The maximum predicted annual mean PM_{2.5} concentration at assessed receptors with the Proposed Development in place (2026 DS) was at Receptor R13 with a predicted concentration of 11.1µg/m³, representing 55.5% of the AQAL. The change in the annual mean PM_{2.5} concentrations at this location, due to the Proposed Development (2026 DS vs. 2026 DM) relative to the AQAL was +<0.1%.

The maximum observed increase in annual mean PM_{2.5} concentrations as a result of the Proposed Development at all assessed receptors (2026 DS vs. 2026 DM) was +0.5% (i.e. 0.1µg/m³) at Receptor R1. The resultant concentrations predicted at Receptor R1 with the Proposed Development in place (2026 DS) was 8.1µg/m³, representing 40.5% of the AQAL.

In accordance with EPIC & IAQM guidance, the impact of the Proposed Development on annual mean PM_{2.5} concentrations at all assessed receptors is considered to be 'negligible'. Given the marginal increase in annual mean PM_{2.5} concentrations associated with the Proposed Development, and that there are no predicted exceedences of the annual mean PM_{2.5} AQAL, unmitigated effects associated with annual mean PM_{2.5} concentrations at all existing assessed receptor locations are therefore considered to be 'not significant'.



6.4 Ecological Assessment

In accordance with the methodology outlined in Section 3.3, and using the available distributed development trip data provided by Hub, a review of designated ecological sites has been undertaken to determine whether the Proposed Development's operational phase trips are predicted to occur within 200m, in order to establish the appropriate level of assessment required.

This review has identified the Groby Pool and Woods SSSI, only.

Given the national designation status (i.e. SSSI) assessment of 'project alone' trips, only, is required. Where reference has been made to link numbers, refer to Appendix A / Table P.

It is noted that the Bardon Hill Quarry SSSI is located within 200m of the affected road network. However, the Bardon Hill Quarry SSSI has been designated due to its geological features and can, therefore, be scoped out of this assessment in accordance with the stated IAQM Nature guidance due to lack of air quality sensitivity.

Reference should be made to Figure 5 for the setting of the considered ecological receptor relative to the Site and the road network.

Groby Pool and Woods SSSI

The Groby Pool and Woods SSSI is situated within 200m from the A50 Markfield Road. However, the distributed development trips provided by Hub extend only up to the A50 Leicester Road / A50 Bradgate Hill roundabout. Notwithstanding, the operational phase development trips on Link 6 are predicted to be +232 AADT as LDVs and +81 AADT as HDVs. There are a number of junctions and settlements between this link and the Groby Pool and Woods SSSI, so it is likely that LDV development trips would further distribute prior to occurring within 200m of the designation. The presented figure is therefore considered to be conservative. As development trips are below the 1,000 AADT / 200 HDV screening criterion defined within the IAQM Nature guidance, the resultant impacts can be classed as having 'no likely significant effect' at habitats within the Groby Pool and Woods SSSI. As such, no further detailed assessment is required.



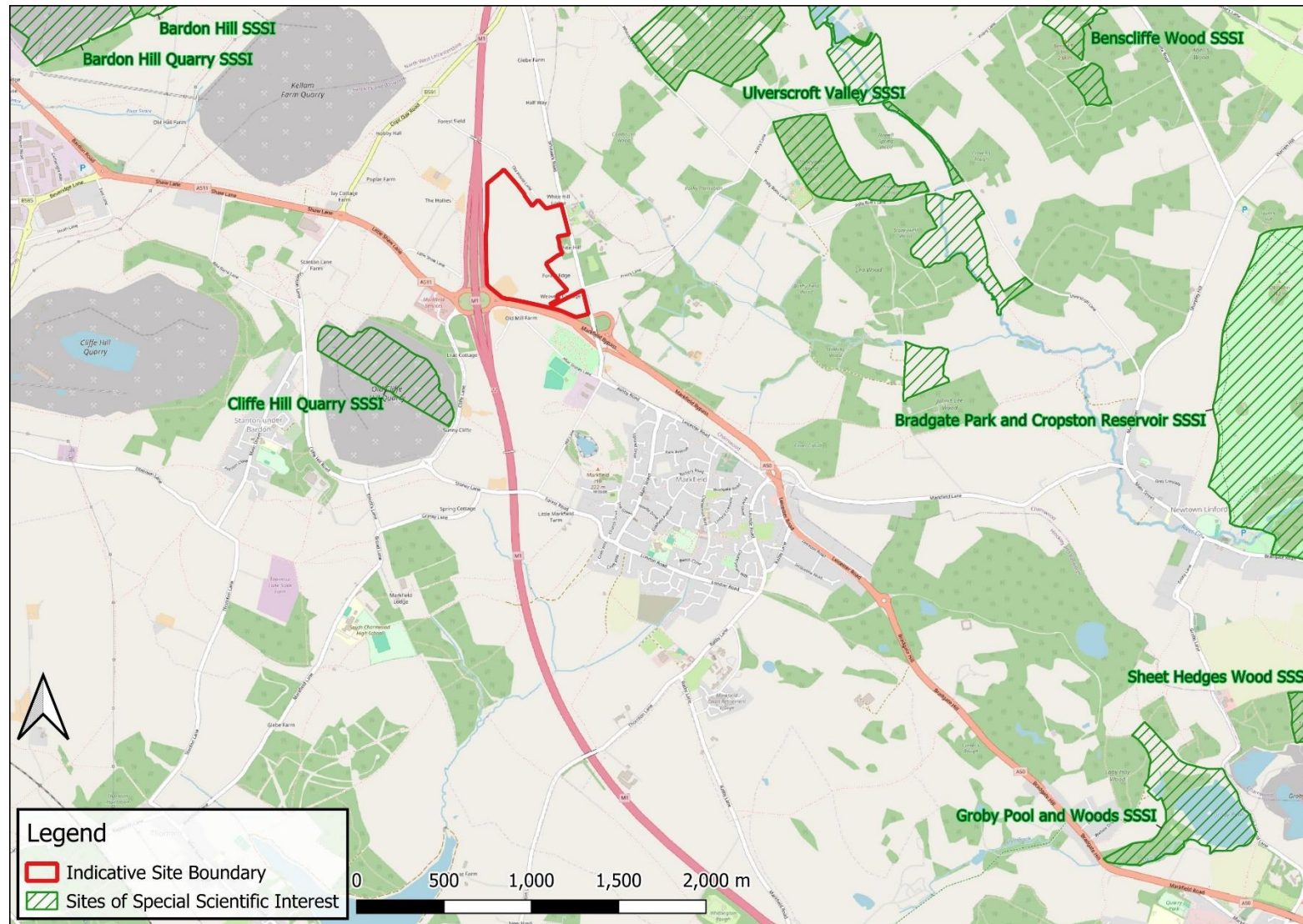


Figure 5: Identified Ecological Receptors – Road Traffic Emissions Assessment



7.0 Mitigation Measures

This section presents any proportionate mitigation measures required during the construction and operational phases of the Proposed Development.

7.1 Construction Dust

As discussed in Section 5.0, construction impacts associated to the Proposed Development would result in the generation of dust and PM₁₀.

In order to control potential impacts, Table O presents a range of mitigation measures which could be applied and align with the IAQM Dust guidance. With the effective application of the dust mitigation measures, residual effects will be 'not significant'. The construction dust mitigation measures referenced in Table O can be secured through planning condition, and transposed into the Construction Environmental Management Plan (CEMP) to be submitted by the Applicant.

It is noted that the IAQM Dust guidance refers to *"for construction as a whole, it is recommended that the average PM_{2.5} content of PM₁₀ should be assumed to be 10%"*. Therefore, it is considered that the application of mitigation measures which are targeted specifically in relation to PM₁₀ and dust soiling would also result in a consequential and beneficial reduction in PM_{2.5} emissions and impacts.

Table O: Construction Dust Mitigation Measures

Site Application	Mitigation Measures
Highly Recommended	
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
	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.
Construction	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.
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Operating Vehicle/Machinery and Sustainable Travel	Ensure all vehicles switch off engines when stationary - no idling vehicles.



Site Application	Mitigation Measures
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	Ensure an adequate water supply on the 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.
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active 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 they are being re-used on-site cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	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 offsite, and the action taken to resolve the situation in the log book.
Waste Management	Avoid bonfires and burning of waste materials.
Desirable	
Construction	Avoid scabbling (roughening of concrete surfaces) if possible.
	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 power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
	Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable
	Only remove the cover in small areas during work and not all at once.



Site Application	Mitigation Measures
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
Operating Vehicle/Machinery and Sustainable Travel	Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

7.2 Operational Phase

In accordance with the EPIC & IAQM guidance, road traffic impacts associated with the operation of the Site can be considered as having an ‘not significant’ effect on local air quality at human receptors, and ‘*no likely significant effect*’ at ecological receptors. As such, long-term scheme-specific mitigation measures in relation to operational effects arising from road traffic emissions are therefore not considered to be necessary.

Nonetheless, a Framework Travel Plan³⁹ has been produced by the appointed transport consultant to the Applicant. Within the Framework Travel Plan there are a number of measures aimed to encourage the occupants to use more sustainable modes of transport to and from the Site. These measures would subsequently have a knock-on beneficial effect in terms of reducing road traffic emissions from personal car use. The measures within the Framework Travel Plan are as follows:

- Encouraging sustainable car journeys to/from the Site;
- Encouraging cycling (whether as a whole journey or as part of a multi-modal commute) to/from the Site;
- Promoting the use of public transport;
- Encouraging walking to/from the development;
- Promoting the Travel Plan and its measures; and
- Motoring and Targets.

Reference should be made to the submitted Framework Travel Plan for further information.

Furthermore, electric vehicle (EV) will be provided in excess of the requirements of Approved Document S: Infrastructure for Charging Electric Vehicles of the Building Regulations⁴⁰. The specific detail for such will come forward post-planning as a building control requirement.

³⁹ Hub Transport Planning Ltd, Framework Travel Plan – Land at Cliffe Farm, Markfield, August 2025.

⁴⁰ <https://www.gov.uk/government/publications/infrastructure-for-charging-electric-vehicles-approved-document-s>.



8.0 Conclusions

SLR Consulting Ltd has been commissioned by Caddick Developments Ltd to undertake an Air Quality Assessment to support the outline planning application for a storage and distribution warehouse, on Land at Junction 22 of the M1, Cliffe Hill Farm.

8.1 Construction Phase

A qualitative assessment of the potential dust impact during the construction of the development has been undertaken following IAQM Dust guidance. Following the construction dust assessment, the Site is found to be at worst 'medium risk' in relation to dust soiling effects on people and property, and 'low risk' in relation to human health impacts.

It is noted that the calculated risk and commensurate mitigation measures are considered to be conservative, given that sources of construction dust are unlikely to be concurrent with the Site boundary and the limited number of sensitive receptors surrounding the Site.

Providing effective mitigation measures are implemented, such as those outlined in Table O of this report, residual impacts from dust emissions during the construction phase are deemed to be 'not significant'. Given the short-term nature of the construction phase and the comparatively low volume of vehicle movements that will likely arise (when compared to the operational phase, for which a full assessment has been undertaken), there is predicted to be an 'insignificant' effect on air quality from construction-generated road traffic emissions in accordance with the EPIC & IAQM.

8.2 Operational Phase

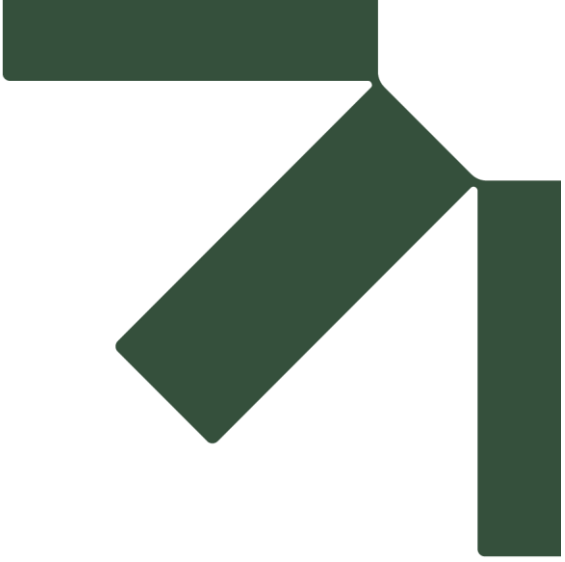
The assessment of operational phase effects considered impacts on all relevant receptors from road traffic emissions associated with the Proposed Development.

The ADMS-Roads dispersion model was used to determine the likely NO₂, PM₁₀, and PM_{2.5} concentrations at all assessed receptor locations for a series of scenarios, in accordance with technical guidance published in LAQM.TG(22). Predicted pollutant concentration changes at relevant receptor locations are a result of the Proposed Development were assessed using the EPIC & IAQM significance criteria.

In accordance with EPIC & IAQM guidance, the impact of the Proposed Development on NO₂, PM₁₀ and PM_{2.5} concentrations at all existing assessed receptor locations are considered to be 'negligible'. Unmitigated effects associated with NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations are therefore considered to be 'not significant'.

Consideration has been given to potential impacts on air quality at sensitive habitats within ecological designations within the vicinity of the Site. Project alone development trips are below the applied screening criteria and, therefore, operational phase project alone road traffic emission impacts will result in '*no likely significant effect*' on habitats within the Groby Pool and Woods SSSI, and no further assessment is required.





Appendix A Model Inputs and Verification

Land at Junction 22 of the M1, Cliffe Hill Farm

Proposed B2 / B8 Development

Caddick Developments Ltd

SLR Project No.: 410.066282.00001

27 August 2025

A.1 Traffic Data

Table P details the traffic data used within the assessment.

Table P: Traffic Data Used Within the Assessment

Link		2023 BC		2026 DM		2026 DS		Speed (kph) ^(A)
No.	Name	AADT	% HDV	AADT	% HDV	AADT	% HDV	
1	A511	31,854	15.7	32,396	15.7	33,475	15.3	80/64/97
1a	A511 50/50 split	15,927	15.7	16,198	15.7	16,738	15.3	80/64/97
2	M1(N)	107,182	15.8	110,933	15.8	111,380	15.9	113/97
2aLDV	M1(N) 50/50 (LDV)	45,124	0.0	46,703	0.0	46,851	0.0	113
2aHDV	M1(N) 50/50 (HDV)	8,468	100.0	8,764	100.0	8,839	100.0	97
3	M1(S) and AQMA 3	139,216	16.3	144,089	16.3	144,821	16.4	113/97
3aLDV	M1(S) and AQMA 3 50/50 (LDV)	58,262	0.0	60,301	0.0	60,544	0.0	113
3aHDV	M1(S) and AQMA 3 50/50 (HDV)	11,346	100.0	11,743	100.0	11,866	100.0	97
4	A50	32,818	7.1	33,376	6.9	35,814	7.7	80/97
4a	A50 EB West of Access	16,319	7.7	16,597	7.7	17,918	8.4	80/97
4b	A50 EB East of Access	16,319	7.7	16,597	7.7	16,597	7.7	97
4c	A50 WB East of Slip Road	14,981	7.5	15,236	7.5	15,393	7.7	97
4d	A50 WB West of Slip Road	16,499	7.2	16,779	7.2	18,053	8.2	80/97
5	Whitwick Road	7,536	1.2	7,664	1.2	8,957	4.0	80
5a	Whitwick Road N of Egress	7,536	1.2	7,664	1.2	7,755	1.4	80
5b	Whitwick Road S of Egress	7,536	1.2	7,664	1.2	8,866	3.9	80
6	A50(E)	31,301	7.2	31,833	7.2	32,145	7.4	64/97
6a	A50(E) 50/50 split	15,650	7.2	15,916	7.2	16,073	7.4	64/97
9 ^(B)	M1 Within J22 SB	41,290	21.8	42,735	21.8	42,735	21.80	113/97
9LDV ^(B)	M1 Within J22 SB	32,289	0.0	33,419	0.0	33,419	0.0	113
9HDV ^(B)	M1 Within J22 SB	9,001	100.0	9,316	100.0	9,316	100.0	97
10 ^(B)	M1 Within J22 NB	41,444	26.4	42,894	26.4	42,894	26.4	113/97
10LDV ^(B)	M1 Within J22 NB	30,515	0.0	31,583	0.0	31,583	0.0	113
10HDV ^(B)	M1 Within J22 NB	10,929	100.0	11,312	100.0	11,312	100.0	97



Link		2023 BC		2026 DM		2026 DS		Speed (kph) ^(A)
No.	Name	AADT	% HDV	AADT	% HDV	AADT	% HDV	
11 ^(B)	M1 J22 Southbound Access	5,869	25.3	6,075	25.3	6,807	26.2	48
12 ^(C)	J22 Roundabout	21,600	37.8	22,069	38.1	23,260	37.3	32
13	Site Egress	-	0.0	-	0.0	1,292	20.9	32
14	Site Access	-	0.0	-	0.0	1,321	17.7	32
15	Internal Roads	-	0.0	-	0.0	2,614	19.3	32
Note: (A) Speeds are based upon posted speed limits. Traffic speeds have been adjusted to take into account queues and congestion in accordance with LAQM.TG(22). Emission factors for LDVs & HDVs on the motorway (i.e. Links 2-3, 9-10) have been calculated separately to account for the differences in the National Speed Limit applied to these vehicles. (B) Baseline traffic flows have been supplemented by National Highways. (C) Flows on the roundabout have been calculated in accordance with LAQM.TG(22).								

A.2 Model Verification

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is specifically listed in the Defra's LAQM.TG(22) guidance as an accepted dispersion model.

Model validation undertaken by the software developer (CERC) will not have included validation in the vicinity of the Site. It is therefore necessary to perform a comparison of modelled results with local monitoring data at relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

Prior to undertaking model verification, model setup parameters and input data were reviewed to maximise the performance of the dispersion model in relation to the real-world conditions.

A.2.1 NO_x / NO₂ Verification

NO_x / NO₂ verification relates to the comparison and adjustment of modelled road-NO_x (as output from the ADMS-Roads dispersion model), relative to monitored road-NO_x.

For NO_x / NO₂ model verification, the annualised 2023 annual mean NO₂ monitoring dataset obtained from the site-specific diffusion tube monitoring has been used (see Section 4.3). It is noted that diffusion tube monitoring location DT4 has been excluded from the model verification process due to 'poor' precision during a single exposure period (See Section B.1.5). In relation to this, LAQM.TG(22) states:

"The aim should be to use results from tubes that are giving good precision, as this will improve the overall reliability of the annual mean concentrations derived from the diffusion tubes".

Table Q presents the site-specific annualised monitoring data available for model verification.

Table Q: Local Monitoring Data Available for Model Verification

Site ID	NGR X (m)	NGR Y (m)	2023 Annual Mean NO ₂ Concentration (µg/m ³)
DT1	448496	311414	17.0



Site ID	NGR X (m)	NGR Y (m)	2023 Annual Mean NO ₂ Concentration (µg/m ³)
DT2	448239	312583	15.1
DT3	447501	311390	28.2
DT5	449889	309714	23.2
DT6	449933	309710	19.8
DT7	450112	309579	21.5
DT8	450093	309569	24.0

NO_x was back calculated using the latest version of Defra's NO_x to NO₂ Calculator (v9.1) for all monitors – given the absence of data. The NO_x to NO₂ Calculator was also used to facilitate the conversion of modelled road-NO_x (as output from the ADMS-Roads dispersion model) into road-NO₂.

Verification was completed using the 2023 Defra background mapped concentrations (2021 base year) for the relevant 1km² grid squares (i.e. those within which the model verification locations are located), as discussed in Section 4.4.

Comparison of the modelled vs. monitored road-NO_x contribution at the verification locations detailed in Table Q is provided in Table R. An adjustment factor of 3.643 has been derived, based on a linear regression forced through zero as shown in Table R.



Table R: NO_x / NO₂ Model Verification - Initial (3.643)

Site ID	Monitored Road NO _x (µg/m ³)	Modelled Road NO _x (µg/m ³)	Ratio (Monitored vs. Modelled Road NO _x)	Adjustment Factor	Adjusted Modelled Total NO ₂ (µg/m ³)	Monitored Total NO ₂ (µg/m ³)	% Difference (Adjusted Modelled NO ₂ vs Monitored NO ₂)
DT1	18.0	4.0	4.5	3.643	15.4	17.0	-9.2
DT2	12.3	3.8	3.2		15.8	15.1	+4.8
DT3	40.1	8.9	4.5		25.3	28.2	-10.2
DT5	33.8	7.1	4.8		20.0	23.2	-13.9
DT6	25.3	10.7	2.4		25.1	19.8	+26.9
DT7	29.5	9.9	3.0		24.0	21.5	+11.8
DT8	35.9	6.8	5.3		19.6	24.0	-18.2

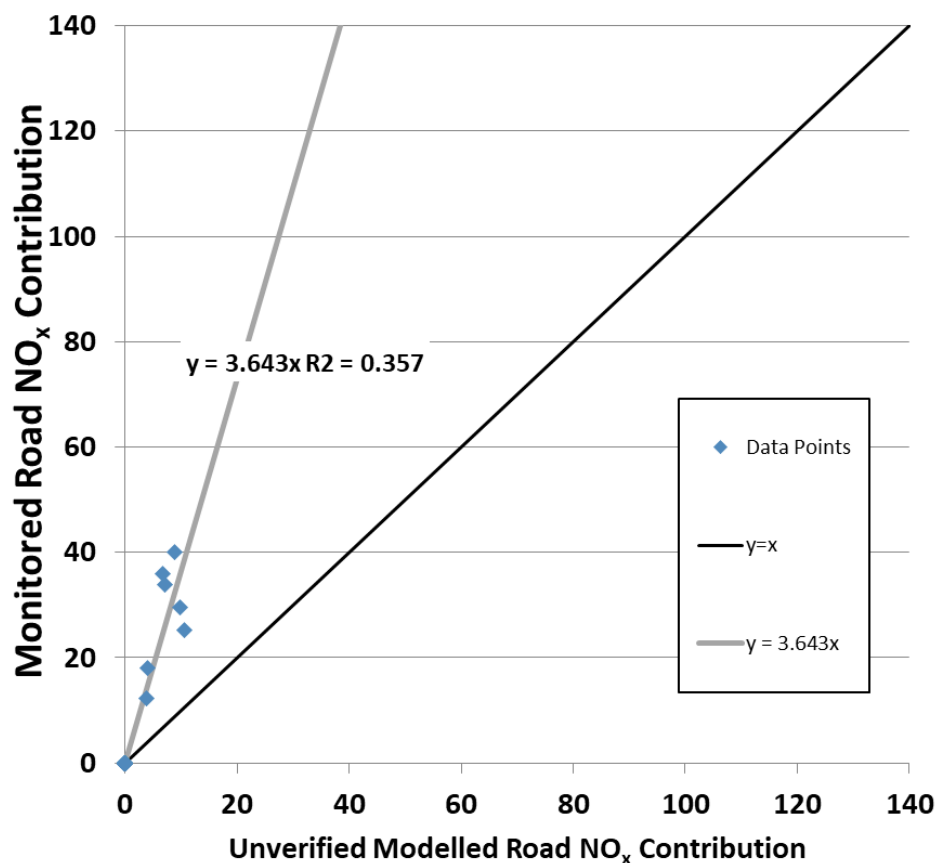


Figure 6: Comparison of Modelled vs. Monitored Road-NO_x Contribution – Initial (3.643)

LAQM.TG(22) states that:

“In order to provide more confidence in the model predictions and the decisions based on these, the majority of results should be within 25% of the monitored concentrations as a minimum, preferably within 10%”.



As shown in Table S, the difference between the adjusted modelled NO₂ and monitored NO₂ is marginally outside of the LAQM.TG(22) minimum limit of $\pm 25\%$ at DT6. Given this, a review of model performance at each verification location was undertaken. The largest disagreement between monitored road-NO_x and modelled road-NO_x was at DT8, where the model is underpredicting concentrations by a ratio of 5.8. A review of the setting of DT8 shows that the monitoring location is in close proximity to a bus stop, where stationary or idling busses are likely to result in an increased emission contribution at this location. Given that the model was unable to replicate these conditions accurately and the resultant disagreement in model performance, DT8 was removed from the verification process.

A further comparison of the of the modelled vs. monitored road NO_x contributions for those remaining verification locations is provided in Table S. An adjustment factor of 3.440 has been derived, based on a linear regression forced through zero.



Table S: NO_x / NO₂ Model Verification – Final: DT8 Removed (3.440)

Site ID	Monitored Road NO _x (µg/m ³)	Modelled Road NO _x (µg/m ³)	Ratio (Monitored vs. Modelled Road NO _x)	Adjustment Factor	Adjusted Modelled Total NO ₂ (µg/m ³)	Monitored Total NO ₂ (µg/m ³)	% Difference (Adjusted Modelled NO ₂ vs Monitored NO ₂)
DT1	18.0	4.0	4.5	3.440	15.1	17.0	-11.3
DT2	12.3	3.8	3.2		15.5	15.1	+2.5
DT3	40.1	8.9	4.5		24.6	28.2	-12.7
DT5	33.8	7.1	4.8		19.4	23.2	-16.5
DT6	25.3	10.7	2.4		24.3	19.8	+22.8
DT7	29.5	9.9	3.0		23.3	21.5	+8.2

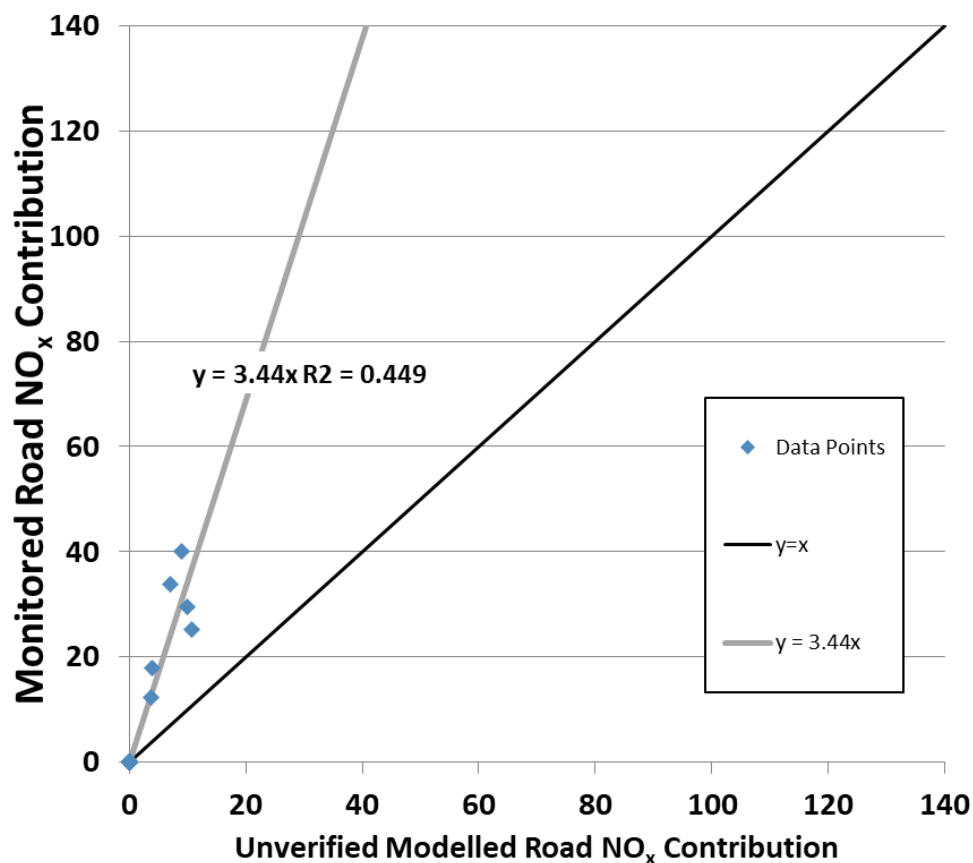


Figure 7: Comparison of Modelled vs. Monitored Road Nox Contribution (3.440)

As shown in Table S, the removal of DT8 results in the difference between the adjusted modelled NO₂ and monitored NO₂ being within $\pm 25\%$ at all locations and therefore within LAQM.TG(22) limit.

In addition, a verification factor of 3.440 reduces the Root Mean Square Error (RMSE) from a value of $8.748\mu\text{g}/\text{m}^3$ to $3.019\mu\text{g}/\text{m}^3$ (i.e. 7.5% of the annual mean NO₂ AQAL) – within the preferred LAQM.TG(22) prescribed limit of 10%.

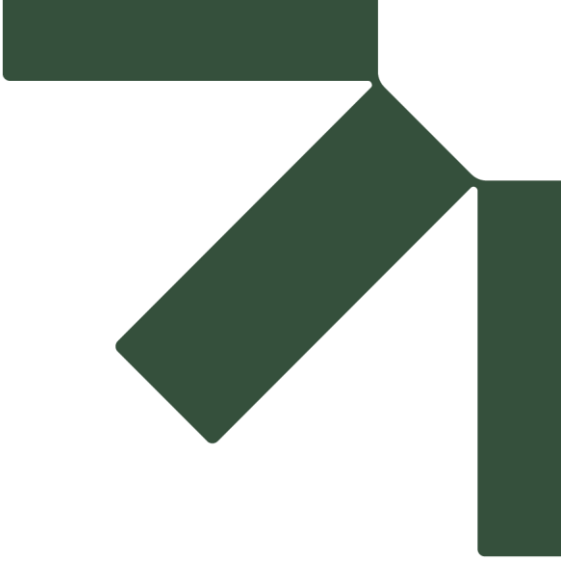


On this basis, the derived verification factor (3.440) was considered acceptable and was subsequently applied to all road-NO_x concentrations predicted (as output of the ADMS Roads dispersion model).

A.2.2 PM₁₀ / PM_{2.5} Verification

The adjustment factor of 3.440 was also applied to road-PM₁₀ and PM_{2.5} concentrations (as output of the ADMS-Roads dispersion model), following the recommendations of LAQM.TG(22), in the absence of local particulate monitoring.





Appendix B Site-Specific Baseline NO₂ Monitoring

Land at Junction 22 of the M1, Cliffe Hill Farm

Proposed B2 / B8 Development

Caddick Developments Ltd

SLR Project No.: 410.066282.00001

27 August 2025

B.1 Site-Specific Baseline NO₂ Monitoring

Baseline NO₂ monitoring was completed at roadside locations adjacent to the 'affected road network', to support the verification of the road traffic emissions dispersion modelling assessment.

As per LAQM.TG(22) guidance, NO₂ concentrations alone can be used to verify road-traffic related pollutants. As such, monitoring of NO₂ has solely been undertaken using passive diffusion tubes.

B.1.1 Monitoring Methodology

The baseline monitoring survey and ratification of results has been undertaken in accordance with guidance published by AEA Energy and Environment²¹, the Defra LAQM web pages⁴¹ and LAQM.TG(22)²³.

Site-specific monitoring of ambient NO₂ concentrations was undertaken using passive diffusion tubes over a 3-month period. All diffusion tubes used for the purposes of the monitoring survey were prepared using 20% triethanolamine (TEA) absorbent in water, with NO₂ concentrations determined through spectrophotometrical analysis.

Diffusion tubes were supplied and analysed by Gradko International, which participates in the National Diffusion Tube Inter-laboratory scheme. As per this scheme, Gradko International is subject to an independent analytic performance test on a quarterly basis, titled AIR-PT, where a series of diffusion tubes are circulated to the relevant laboratories with a known nitrate amount for testing within agreed analytical ranges. Based upon the most recent reported AIR-PT scheme data⁴² covering the period May 2020 – June 2022, Gradko International were deemed to be 'satisfactory' (where results are binary as either 'satisfactory' or 'unsatisfactory'). In addition, Gradko International is a UKAS accredited laboratory, which ensures conformance with the requirements of ISO/IEC 17025.

B.1.2 Monitoring Programme

The NO₂ monitoring programme has been undertaken following Defra's National Diffusion Tube Monitoring Network Calendar⁴³. Monitoring was undertaken between 2nd October 2024 to 6th January 2025, relating to three discrete exposure periods, as detailed in Table T.

Table T: Diffusion Tube Exposure Dates

Monitoring Period	Monitoring Period – Start Date	Monitoring Period – End Date
October 2024	2 nd October 2024	5 th November 2024
November 2024	5 th November 2024	2 nd December 2024
December 2024	2 nd December 2024	6 th January 2025

B.1.3 Monitoring Site Selection

Site selection for the diffusion tube monitoring locations targeted roadside locations surrounding the Site. Early discussion was undertaken with Hub, Transport Consultant to the Applicant, to understand the Proposed Development's trip assignment / distribution to inform

⁴¹ Defra, Diffusion Tubes. Available at: <https://laqm.defra.gov.uk/diffusion-tubes/diffusion-tubes.html>.

⁴² Summary of Laboratory Performance in AIR NO₂ Proficiency Testing Scheme (May 2020 – June 2022). Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/07/LAQM-NO2-Performance-data_Up-to-June-2022_V2.1.pdf.

⁴³ Defra, NO₂ Diffusion Tube Monitoring Calendar. Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/diffusion-tube-monitoring-calendar/>.



the future road traffic emissions dispersion modelling assessment. As such, the use of the immediate area surrounding the Site as the principal monitoring study area is anticipated to improve the representativeness and certainty of the applied verification factor as part of the dispersion modelling.

Monitoring sites were selected in accordance with the methodology outlined within established guidance. Following these recommendations, monitoring was undertaken at seven separate locations along Whitwick Road, the A511 Little Shaw Lane and the A50 Leicester Road, as presented in Table U and illustrated in Figure 3.

Diffusion tubes were deployed as duplicates in order to increase the confidence of concentrations reported.

Table U: Diffusion Tube Monitoring: Details

Site ID	Location Description	LAQM Site Type	NGR (m)		Height Above Ground Level (m)
			X	Y	
DT1	Whitwick Road (Northbound/Upper)	Roadside ^(A)	448496	311414	2.1
DT2	Whitwick Road (Southbound/Lower)	Roadside ^(A)	448239	312583	1.9
DT3	A511 - Little Shaw Lane (Westbound Carriageway)	Roadside ^(A)	447501	311390	1.9
DT4	Coach & Horses (A50 - Leicester Road)	Roadside ^(A)	449661	310023	2.1
DT5	A50 - Leicester Road (Northbound Upper)	Roadside ^(A)	449889	309714	2.0
DT6	A50 - Leicester Road (Southbound Upper)	Roadside ^(A)	449933	309710	2.0
DT7	A50 - Leicester Road (Southbound Lower)	Roadside ^(A)	450112	309579	2.2
DT8	A50 - Leicester Road (Northbound Lower)	Roadside ^(A)	450093	309569	2.1
Note: ^(A) 'Roadside' site classification defined by LAQM.TG(22) as: "A site sampling typically within one to five metres of the kerb of a busy road (although distance can be up to 15 m from the kerb in some cases)".					



B.1.4 Raw Monitored Concentrations

Table V presents a summary of raw monthly / period mean monitoring results from the average of the duplicate diffusion tubes.

Reference should be made to Figure 8 for a graphical illustration of the monthly mean variation in monitored NO₂ concentrations, based upon a numerical average of the duplicate exposures at each monitoring location.

Table V: Raw NO₂ Monitoring Results

Site ID	Raw NO ₂ Concentration (µg/m ³)			
	October 2024	November 2024	December 2024	Period Mean
DT1	23.7	27.3	17.6	22.9
DT2	21.4	23.4	16.5	20.4
DT3	48.5	41.4	24.0	38.0
DT4	27.5	27.6	14.1	23.1
DT5	33.0	34.9	26.2	31.4
DT6	27.0	31.9	21.3	26.7
DT7	30.2	35.5	21.5	29.1
DT8	36.0	36.6	24.7	32.4

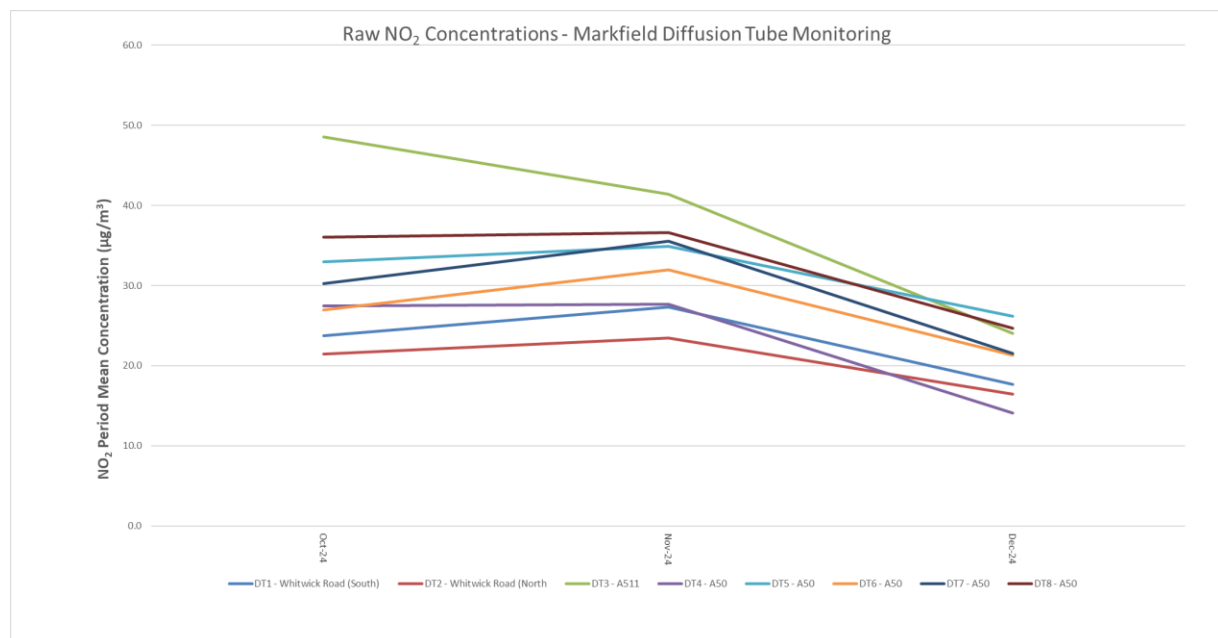


Figure 8: Raw Monitored NO₂ Concentrations – Monthly Exposure

B.1.5 Diffusion Tube Precision

LAQM.TG(22) requires 'precision' to be calculated whilst monitoring via diffusion tubes. Precision is an indication of how similar the results of the duplicate tubes are to each other.



A tool has been prepared by Defra for the calculation of precision⁴⁴, for the purposes of identifying a suitable local bias adjustment factor.

The results of the precision analysis are presented in Figure 9 to Figure 16 and calculate a 'good' overall precision over each discrete exposure period of monitoring, with the single exception of DT4 during the period 02/12/24 – 06/01/25 which calculates a 'poor' precision.

It is noted that collocation with an automatic / continuous monitor was not possible and therefore the 'accuracy' of the diffusion tube dataset cannot be determined.

Diffusion Tubes Measurements										Data Quality Check	
Period	Start Date	End Date	Tube 1	Tube 2	Tube 3	Triplicate	Standard	CV	95% CI	Diffusion Tubes Precision Check	
	dd/mm/yyyy	dd/mm/yyyy	μgm^{-3}	μgm^{-3}	μgm^{-3}	Average	Deviation		mean		
1	02/10/2024	05/11/2024	24.1	23.3		23.7	0.57	2.39	5.08	Good	
2	05/11/2024	02/12/2024	26.9	27.8		27.4	0.64	2.33	5.72	Good	
3	02/12/2024	06/01/2025	18.1	17.2		17.7	0.64	3.61	5.72	Good	
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Figure 9: Diffusion Tube Monitoring Location DT1 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check	
Period	Start Date	End Date	Tube 1	Tube 2	Tube 3	Triplicate	Standard	CV	95% CI	Diffusion Tubes Precision Check	
	dd/mm/yyyy	dd/mm/yyyy	μgm^{-3}	μgm^{-3}	μgm^{-3}	Average	Deviation		mean		
1	02/10/2024	05/11/2024	21.7	21.2		21.5	0.35	1.65	3.18	Good	
2	05/11/2024	02/12/2024	24.1	22.8		23.5	0.92	3.92	8.26	Good	
3	02/12/2024	06/01/2025	16.2	16.7		16.5	0.35	2.15	3.18	Good	
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⁴⁴ Defra, Precision and Accuracy. Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/precision-and-accuracy/>.



Figure 10: Diffusion Tube Monitoring Location DT2 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check	
1	02/10/2024	05/11/2024	50.3	46.8		48.6	2.47	5.10	22.24	Good	
2	05/11/2024	02/12/2024	41.7	41.2		41.5	0.35	0.85	3.18	Good	
3	02/12/2024	06/01/2025	25.3	22.7		24.0	1.84	7.66	16.52	Good	
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Figure 11: Diffusion Tube Monitoring Location DT3 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check	
1	02/10/2024	05/11/2024	28.0	27.0		27.5	0.71	2.57	6.35	Good	
2	05/11/2024	02/12/2024	27.2	28.1		27.7	0.64	2.30	5.72	Good	
3	02/12/2024	06/01/2025	17.0	11.2		14.1	4.10	29.09	36.85	Poor Precision	
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Figure 12: Diffusion Tube Monitoring Location DT4 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check	
1	02/10/2024	05/11/2024	34.9	31.1		33.0	2.69	8.14	24.14	Good	
2	05/11/2024	02/12/2024	33.7	36.1		34.9	1.70	4.86	15.25	Good	
3	02/12/2024	06/01/2025	25.8	26.6		26.2	0.57	2.16	5.08	Good	
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Figure 13: Diffusion Tube Monitoring Location DT5 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date	End Date	Tube 1	Tube 2	Tube 3	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
	dd/mm/yyyy	dd/mm/yyyy	μgm^{-3}	μgm^{-3}	μgm^{-3}					
1	02/10/2024	05/11/2024	25.2	28.7		27.0	2.47	9.18	22.24	Good
2	05/11/2024	02/12/2024	32.1	31.8		32.0	0.21	0.66	1.91	Good
3	02/12/2024	06/01/2025	21.0	21.7		21.4	0.49	2.32	4.45	Good
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Figure 14: Diffusion Tube Monitoring Location DT6 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date	End Date	Tube 1	Tube 2	Tube 3	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
	dd/mm/yyyy	dd/mm/yyyy	μgm^{-3}	μgm^{-3}	μgm^{-3}					
1	02/10/2024	05/11/2024	29.9	30.5		30.2	0.42	1.40	3.81	Good
2	05/11/2024	02/12/2024	33.9	37.2		35.6	2.33	6.56	20.97	Good
3	02/12/2024	06/01/2025	22.2	20.8		21.5	0.99	4.60	8.89	Good
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Figure 15: Diffusion Tube Monitoring Location DT7 – Precision Analysis

Diffusion Tubes Measurements										Data Quality Check
Period	Start Date	End Date	Tube 1	Tube 2	Tube 3	Triplicate Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check
	dd/mm/yyyy	dd/mm/yyyy	μgm^{-3}	μgm^{-3}	μgm^{-3}					
1	02/10/2024	05/11/2024	38.8	33.3		36.1	3.89	10.79	34.94	Good
2	05/11/2024	02/12/2024	36.6	36.7		36.7	0.07	0.19	0.64	Good
3	02/12/2024	06/01/2025	24.6	24.7		24.7	0.07	0.29	0.64	Good
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Figure 16: Diffusion Tube Monitoring Location DT8 – Precision Analysis

B.1.6 Monitoring Data Year Adjustment



LAQM.TG(22) provides a methodology for processing short-term diffusion tube monitoring data where data capture is less than 75% of the calendar year. Where a diffusion tube monitoring survey has been completed in the present year (2024, at the time of monitoring), data adjustment to the previous year (2023, the baseline year) is required to aid the derivation of an annual mean concentration (annualisation).

As part of this methodology, for roadside sites, national roadside NO₂ projection factors should be applied to the monitoring data to compensate for the general trend of decreasing concentrations in future years. As such, in line with LAQM.TG(22), 2024 monitoring data were adjusted to 2023 using the 2021-reference roadside NO₂ projection factors⁴⁵ (i.e. ratio of 2023/2024 roadside projection factors).

The roadside NO₂ projection factors are location and fleet-composition specific. Appropriate factors for 'Rest of UK (HDV<10%)' have been applied based upon the Site locale and traffic data received from Hub (see Table P). A factor of 1.061 has been derived for monitoring locations DT1 – DT2 and DT4 – DT8, and a factor of 1.064 has been derived for monitoring location DT3.

Derivation of the roadside adjustment factors and calculated ratio used are presented in Table W.

Table W: Defra Roadside NO₂ Projection Factors

Year	Defra's Roadside NO ₂ Projection Factors (Rest of UK (HDV >10%))	Defra's Roadside NO ₂ Projection Factors (Rest of UK (HDV <10%))
2023	0.930	0.934
2024	0.874	0.880
Ratio 2024/2023	1.064	1.061
Applicable to which monitors	DT3	DT1 – DT2, DT4 – DT8

B.1.7 Annualisation

As the period means presented in Table V relate to 3-months of monitoring, data has been annualised in accordance with LAQM.TG(22) in order to derive an annual mean estimate. The approach is based on the principle that regional patterns in ambient pollutant concentrations are usually consistent and therefore considers the relationship between period means and annual means at background monitoring stations in the same region as the site of interest. The use of background sites ensures localised influences are minimised and are not inherently applied when adjustment is made.

Data was collated from the UK Automatic Urban and Rural Network (AURN), which is a countrywide network of air quality monitoring stations operated on behalf of the Defra, used primarily in support of the UK's national compliance reporting against EU directives. Monitoring data for AURN sites is publicly available via the UK Air Information Resource (AIR) website⁴⁶.

As per the requirements of LAQM.TG(22), only those 'background' AURN monitoring sites (of either 'suburban', 'urban' or 'rural' classification) with a minimum data capture of 85% and within 50 miles have been considered as part of this calculation. Following a review of suitable AURN monitors relative to the deployed monitoring locations, four of the closest

⁴⁵ Defra, Roadside NO₂ Projection Factors (2021-reference). Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/roadside-no2-projection-factors/>.

⁴⁶ Defra, UK Air Information Resource (UK-AIR). Available at: <http://uk-air.defra.gov.uk/>.



AURN monitors with 'urban background'⁴⁷ classification were selected: Burton-on-Trent Horninglow, Coventry Allesley, Leicester University and Nottingham Centre.

Table X presents the Annual:Period mean ratio factor calculated in accordance with LAQM.TG(22).

Table X: Annual:Period Mean Adjustment Calculation

Background AURN Monitor	2023 Data Capture %	2023 NO ₂ Annual Mean Concentration (µg/m ³) ^(A)	NO ₂ Period Mean Concentration (µg/m ³) ^(B)	Annual:Period Mean Ratio
Burton-on-Trent Horninglow	99.6	15.4	18.5	0.83
Coventry Allesley	97.2	13.4	15.6	0.86
Leicester University	95.1	18.5	20.1	0.92
Nottingham Centre	89.8	19.1	22.7	0.84
Average Ratio				0.86
Notes:				
(A) The annual mean NO ₂ concentrations were calculated using the 2023 calendar year (i.e. 01/01/2023 to 31/12/2023) – in accordance with LAQM.TG(22).				
(B) The period mean NO ₂ concentrations were calculated using the diffusion tube exposure start and end dates shown in Table T.				

As presented within Table X, an average ratio factor (Ra) of 0.86 has been calculated, in order to derive an annual mean estimate. It is noted that all considered AURN monitors report an Annual:Period mean ratio of <1 (i.e. period mean concentrations are higher than annual mean concentrations).

B.1.8 Bias Correction

Due to the inherent bias associated with passive diffusion tubes when used for the purposes of monitoring NO₂ concentrations, it is necessary to apply an adjustment factor to derive a corrected concentration. This is typically achieved by calculating the deviation in diffusion tube monitored concentrations relative to a co-located continuous monitor, with the latter monitoring method employing a greater level of quality assurance, quality control and overall confidence.

Bias adjustment can either be undertaken using a locally derived bias adjustment factor (i.e. a locally operated co-location study), or use of a national adjustment factor specific to the monitoring period, laboratory and preparation method employed (i.e. a repository of returned local bias adjustment factors from around the UK derived using orthogonal regression).

As per Defra's latest National Bias Adjustment Spreadsheet⁴⁸, a bias adjustment of 0.81 for the year 2023 (based on 26no. studies), as supplied / analysed by Gradko International utilising the 20% TEA absorbent in water preparation method, has been derived.

⁴⁷ 'Urban background' site classification defined by LAQM.TG(22) as: "An urban location distanced from sources and therefore broadly representative of city-wide background conditions, e.g. urban residential areas".

⁴⁸ Defra, Diffusion Tube Bias Adjustment Factor Spreadsheet v03/25. Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/national-bias/>.



B.1.9 Monitoring Summary

The adjusted NO₂ monitoring concentrations are summarised in Table Y.

Table Y: Adjustment of NO₂ Monitoring Data: Summary

Site ID	Raw NO ₂ Period Mean Concentration (µg/m ³)	2024/2023 Roadside NO ₂ Projection Factor ^(A)	Annualisation Factor	National Bias Adjustment Factor	2023 Annual Mean NO ₂ Concentration (µg/m ³)	Percentage of Annual Mean AQAL (%)
DT1	22.9	1.061	0.86	0.81	17.0	42.4
DT2	20.4	1.061	0.86		15.1	37.8
DT3	38.0	1.064	0.86		28.2	70.5
DT4	23.1	1.061	0.86		17.1	42.7
DT5	31.4	1.061	0.86		23.2	58.1
DT6	26.7	1.061	0.86		19.8	49.5
DT7	29.1	1.061	0.86		21.5	53.9
DT8	32.4	1.061	0.86		24.0	60.1





Making Sustainability Happen