



Land at Bird in Eye Farm, Uckfield

Air Quality and Emissions Mitigation Assessment

Croudace Homes Ltd

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Basis of Report

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1.0 Introduction

SLR Consulting Ltd (SLR) has been commissioned by Croudace Homes Ltd to appraise a planning application for a proposed residential development of up to 190 dwellings (the 'Proposed Development'), on land at Bird in Eye Farm, South of Bird in Eye Hill, Uckfield (the 'Site'). The full description comprises:

"Outline planning application for the erection of up to 190 dwellings, with associated works, parking, landscaping, publicly accessible open space and SANG provision, with access from the B2102."

The Site is located at the approximate National Grid Reference (NGR): x548350, y120750 and is bounded by:

- The B2102 Bird in Eye Hill to the north, with a mixture of residential properties and agricultural land beyond;
- Green open space and agricultural land to the east;
- Green open space, agricultural land and woodland to the south; and
- Uckfield Hospital immediately to the west with the residential dwellings of Uckfield beyond.

Vehicular access to the Site will be off the B2102 Bird in Eye Hill to the north.

1.1 Background Context

An application for outline permission was submitted to Wealden District Council (WDC) in August 2021 (WD/2021/2198/MAO), relating to a previous design iteration of the Proposed Development (290 units).

An Air Quality and Emission Mitigation Assessment¹ was prepared to support the application which established all impacts were considered not significant, following the application of best practice techniques (e.g. construction dust mitigation).

This assessment was conducted in accordance with local and national planning policy and guidance, along with established best practices relevant at the time of the assessment. No statutory consultee (e.g. Natural England nor the Environmental Health Department at WDC) raised any objections or comments in response to the assessment.

Due to WDC's non-determination of the application, an appeal was lodged against WDC (Planning Inspectorate Appeal Reference: APP/C1435/W/22/3307820). This appeal was dismissed by the Planning Inspectorate on non-air quality grounds. Croudace Homes Ltd are now seeking to support a revised design.

1.2 Scope of Assessment

The Air Quality and Emission Mitigation Assessment has been updated to account for design changes. Although there has been a reduction in the number of dwellings (from 290 to 190), which is proportionately reduce the level of impact, new assessment techniques and datasets have become available in the interim.

The scope of the updated assessment is based on the 2021 Air Quality and Emission Mitigation Assessment. Given that no issues were raised in response to the 2021 assessment, it is considered suitable. The following scope of works has been undertaken:

¹ SLR Consulting, Land at Bird in Eye Farm, Air Quality Assessment and Emission Mitigation Assessment, Prepared for: Croudace Homes Ltd, SLR Ref: 410.03013.00011, Version No: v2.0, June 2021.



- Baseline Evaluation;
- Construction Phase Assessment;
- Operational Phase Assessment; and
- Emissions Mitigation Assessment.

1.2.1 Nightingale Shaw Ancient Woodland Assessment

During the appeal, WDC, as a Rule 6 party, provided a Statement of Case (SoC) outlining their reasons for refusal, including the impact of the Proposed Development on Ancient Woodland (AW). Specifically, the AW recognised as 'Nightingale Shaw' which bordered the south and southwest of the Site.

The SoC referred to the separation distance between the AW (and Veteran Trees identified therein) and the Proposed Development. Paragraphs 5.21 and 5.22 of the SoC specifically mention the increase in traffic on internal site roads in proximity to the AW due to the Proposed Development and the subsequent effects of air pollution. This was used to justify seeking a larger buffer zone/separation distance to mitigate impacts.

An Ancient Woodland Air Quality Assessment² was submitted to the Planning Inspectorate (PINS) in August 2023 to support the Ecology Proof of Evidence³ and address the concerns raised in WDC's SoC regarding potential increases in traffic and subsequent air pollution levels originating from internal Site roads in proximity to the AW. The outcomes indicated that impacts on the Nightingale Shaw AW due to vehicle emissions generated by the Proposed Development on all site internal roads are not likely. While the appeal was dismissed, road traffic emissions were not cited as a reason for dismissal.

Although the Nightingale Shaw AW assessment did not feature as a principal issue or originate from a direct request from any statutory consultee, it has been updated within Appendix B.

² SLR Consulting, Land at Bird in Eye Farm, Ancient Woodland Air Quality Assessment, Prepared for: Croudace Homes Ltd, SLR Ref: 416.064957.00001, Version No: v1.0, August 2023.

³ Ecology Proof of Evidence, Report No. CSA/2646/20.



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

The Air Quality Standards Regulations 2010⁴ (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, however, must be assessed at specific locations (micro and macroscale sampling points). Carriageways or central reservations of roads and any location where the public do not have access (e.g. industrial sites) are exempt. If the sampling point does not comply with the siting locations (Schedule 1: AQSR), then strict comparison cannot be made.

Following the UK's withdrawal from the EU, the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020⁵ was introduced to mirror revisions to supporting EU legislation. The fine particulate matter (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 and Devolved Administrations who undertake assessments on an annual basis. Local Authorities have no responsibility to achieve the AQSR or the European equivalent Directives, unless otherwise instructed to assist Central Government under Ministerial Direction.

2.1.1.1 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.

2.1.2 Local Obligations

Part IV of the Environment Act 1995 (as amended) requires the Secretary of State to publish a national Air Quality Strategy (AQS) every five years and established the system of Local Air Quality Management (LAQM) for Local Authorities to regularly review and assess air quality within its 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; Local Authorities are however 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 (relevant exposure). Table 2-2 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

⁴ The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.

⁵ The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument No. 1313, The Stationary Office Limited.

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



local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the objective.

The latest AQS for England was published in 2023⁷. 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 2-1. 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 also been included for completeness, to provide an indicative assessment (as the sampling point may not comply with the siting locations prescribed under Schedule 1: AQSR).

Table 2-1: Relevant Ambient AQALs

Pollutant	AQAL (µg/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 (PM ₁₀)	40	Annual mean
	50	24-hour mean (not to be exceeded on more than 35 occasions per annum)
Particles (PM _{2.5})	20	Annual mean
Table Notes: 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 2-2: 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 1990⁸ sets out provisions for the regulation of statutory nuisances. Section 79 sets out this statutory nuisance as, 'any dust, steam, smell or other

⁷ Air Quality Strategy: Framework for Local Authority Delivery, Department for Environment Food and Rural Affairs, April 2023.

⁸ The Environmental Protection Act 1990. Available at <http://www.legislation.gov.uk/ukpga/1990/43/contents>.



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 and decide whether the odour is prejudicial to health or a nuisance.

Fractions of dust greater than 10µm (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.

2.2 Policy

2.2.1 National Policy

2.2.1.1 Clean Air Strategy

The 2019 Clean Air Strategy⁹ 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 Environment Improvement Plan 2023

The 2023 Environment Improvement Plan¹⁰ is the first revision of the UK Government’s 25 Year Environment 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 Environment Improvement Plan builds on the 2019 Clean Air Strategy by setting environmental targets 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 2023 update to the National Planning Policy Framework¹¹ (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

“Para 192: 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

⁹ The Clean Air Strategy, Defra. January 2019.

¹⁰ Environmental Improvement Plan 2023, Defra. 2023.

¹¹ National Planning Policy Framework, Ministry of Housing, Communities & Local Government. 2023.



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)¹² which includes guiding principles on how planning can take account of the impacts of new development on air quality. Regarding 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).”

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

2.2.2 Local Policy

2.2.2.1 Core Strategy Local Plan

WDC’s Core Strategy Local Plan¹³ was adopted in 2013 and is the main document to guide new development within the area up until 2027. No policies contained within the Core Strategy Local Plan relate to air quality.

2.2.2.2 Wealden Draft Local Plan

WDC are in the process of developing a new local plan which will guide development till 2040. The Wealden Draft Local Plan¹⁴ is currently undergoing Regulation 18 consultation. Notwithstanding, the following policy of relevance to air quality has been considered:

“Policy NE12: Air Quality

1. *Development proposals should seek to improve air quality and reduce the effects of poor air quality, ensuring compliance with the objectives set out in the latest Air Quality Strategy for England, in place at the time of the application, the Air Quality and Emissions Mitigation Guidance for Sussex and/or any subsequent local air quality objectives.*
2. *Development proposals will only be supported where they:*
 - a) *Do not result in significant adverse impacts on sensitive receptors, including human health, sensitive habitats and species and any sites*

¹² Planning Practice Guidance Air Quality, Ministry of Housing, Communities and Local Government. 2019.

¹³ Wealden District Council, Core Strategy Local Plan, Adopted 2013.

¹⁴ Wealden District Council, Wealden Draft Local Plan, March 2024.



- designated for their nature conservation value, from any sources of emissions to air;*
- b) Are not located where they would be at unacceptable risk from, or be adversely affected by existing sources of odour, dust and /or other forms of air pollution; and*
- c) Minimise any air quality impacts, including cumulative impacts from extant developments, both during the construction process and lifetime of the proposed development, either through the design of the development or, where this is not possible or sufficient, through appropriate mitigation measures.*
3. *Development proposals are required to include a detailed Air Quality Assessment, where:*
- a) major development is proposed and has the potential, including when combined with the cumulative effect of other approved developments and site allocations, to have significant adverse impacts on air quality; or*
- b) the proposed development has the potential to result in significant adverse impacts and is within, and in close proximity to a sensitive habitat and/or species, including any site designated for its nature conservation value; or*
- c) development would introduce or intensify sensitive uses within an area that is known to experience existing poor air quality conditions.*
4. *Where an Air Quality Assessment identifies potential significant adverse impacts on sensitive receptors from any source, the applicant must detail the appropriate avoidance and mitigation measures that will be implemented to prevent the identified impacts, including impacts on future occupiers or users of the site.*
5. *Mitigation measures on a scheme will be secured through planning condition and / or planning obligation depending on the scale and nature of the development and its associated impacts on air quality."*

2.3 Assessment Guidance

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

- Department for Environment Food and Rural Affairs (Defra): Local Air Quality Management Technical Guidance (LAQM.TG(22))¹⁵;
- Defra: COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021¹⁶;
- Defra: Damage Cost guidance¹⁷;
- Environmental Policy Implementation Community (EPIC) (previously Environmental Protection United Kingdom (EPUK)), and the Institute of Air Quality Management (IAQM): Land-Use Planning and Development Control: Planning for Air Quality¹⁸;

¹⁵ Local Air Quality Management Technical Guidance (22), Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland. August 2022.

¹⁶ Defra and the Greater London Authority, COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021. April 2021.

¹⁷ Defra, Air quality appraisal: damage cost guidance, March 2023.

¹⁸ EPIC (previously EPUK) and IAQM, Land-Use Planning and Development Control: Planning for Air Quality. v1.2 2017.



- IAQM: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites¹⁹;
- IAQM: Guidance on the Assessment Dust from Demolition and Construction²⁰; and
- IAQM: Position Statement: Use of 2020 and 2021 Monitoring Datasets²¹; and
- Sussex-air Air Quality Partnership: Air Quality and Emissions Mitigation Guidance for Sussex (the 'Sussex-air guidance')²².

¹⁹ IAQM, A guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, v1.1, 2020.

²⁰ IAQM, Guidance on the Assessment Dust from Demolition and Construction. v2.2 January 2024.

²¹ IAQM, Position Statement: Use of 2020 and 2021 Monitoring Datasets. December 2023.

²² Air Quality and Emissions Mitigation Guidance for Sussex, v1.1, April 2021.



3.0 Assessment Methodology

As defined by Town and Country Planning (Development Management Procedure) Order 2015²³ the Proposed Development is considered to classify as 'major' as the number of proposed dwellings exceeds 10. As such, in accordance with the Sussex-air guidance, an air quality assessment and emissions mitigation assessment are required.

3.1 Construction Phase

A construction dust assessment has been undertaken in accordance with IAQM 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 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 (when compared to the operational phase, for which a full assessment has been undertaken), 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 based on their assumed insignificant and temporary impact.

3.2 Operational Phase

To assess the road traffic impacts of the Proposed Development on existing human receptors and evaluate the site's suitability for residential purposes, detailed dispersion

²³ UK Statutory Instruments 2015 No. 595, The Town and Country Planning (Development Management Procedure) (England) Order 2015.



modelling was conducted using the CERC ADMS-Roads v5 model. This focused on concentrations of NO₂, PM₁₀, and PM_{2.5} for the following scenarios:

- 2022 Base Case / Model Verification (2022 BC) – Base flows for the year 2022;
- 2029 Do Minimum (2029 DM) – Future baseline (inclusive of any relevant committed development flows) for the proposed year of opening (2029); and
- 2029 Do Something (2029 DS) – Future baseline (inclusive of any relevant committed development flows) with maximum vehicle movements generated by the Proposed Development.

Milestone Transport Planning confirmed the traffic flows derive from surveys conducted from 2022 onwards which is likely to represent a post-pandemic baseline. As per the IAQM Position Statement, the latest available monitoring data (post COVID-19) has been used for model verification (presently 2022).

For the above future year scenarios (2029), concurrent emission factors and background pollutant concentrations have been used. Details of model inputs are discussed in turn, below.

3.2.1 Traffic Inputs

Traffic data was provided by Milestone Transport Planning – the appointed transport consultant.

This data has primarily informed the spatial extent and inclusion of initial road links within the assessment, as traffic data is a key input for an ADMS-Roads assessment. The scope of road links considered was refined using screening thresholds prescribed by EPIC & IAQM guidance concerning changes in vehicular volumes to identify the spatial extent of affected road network. Where available, neighbouring links were also included in the dispersion model to ensure a robust assessment, rather than relying solely on their individual contributions as represented in the relevant background datasets.

Where available, traffic speeds are based on Automatic Traffic County Surveys (average 85th percentile), this is limited to B2102 Bird in Eye Hill, east and west of the Site Access. For all other road links 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 12.0.1 developed by Defra²⁴ has been used to determine vehicle emission factors for input into the ADMS-Roads dispersion model.

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 B.

3.2.2 Sensitive Receptors

Human receptors considered in the assessment of emissions from road traffic are shown in Table 3-1, whilst their locations are illustrated in Figure B.

Receptors R1 – R11 are representative of worst-case exposure locations at existing receptors within the Site locale, relative to the affected road network discussed. New receptors introduced as a result of the Proposed Development, NR1 – NR9, are selected as

²⁴ Defra, EFT v12.0.1 (2023). <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/>.



the locations of worst-case exposure on the Site relative to the surrounding modelled road network.

All receptors were considered in relation to exposure at breathing height relative to the adjacent modelled road (i.e. 1.5m at ground level). Receptor locations represent relevant exposure – in accordance with LAQM.TG(22) presented in Table 2-2.

Table 3-1: Receptor Locations Considered

Receptor	NGR X (m)	NGR Y (m)	Height (m)
Existing Receptors			
R1	548430	120729	1.5
R2	548341	120878	1.5
R3	548327	120922	1.5
R4	548079	120834	3.5
R5	547919	120772	1.5
R6	547541	120703	1.5
R7	547359	120719	1.5
R8	547306	120810	3.5
R9	547274	120942	3.5
R10	547226	120999	3.5
R11	546370	121004	1.5
New Receptors			
NR1	548202	120828	1.5
NR2	548232	120853	1.5
NR3	548257	120844	1.5
NR4	548282	120876	1.5
NR5	548293	120852	1.5
NR6	548499	120788	1.5
NR7	548491	120777	1.5
NR8	548498	120729	1.5
NR9	548566	120677	1.5

3.2.3 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 2022 data from the Herstmonceux West End meteorological station, located approximately 16km to the south-east of the Site – the closest representative meteorological station relative to the Site.

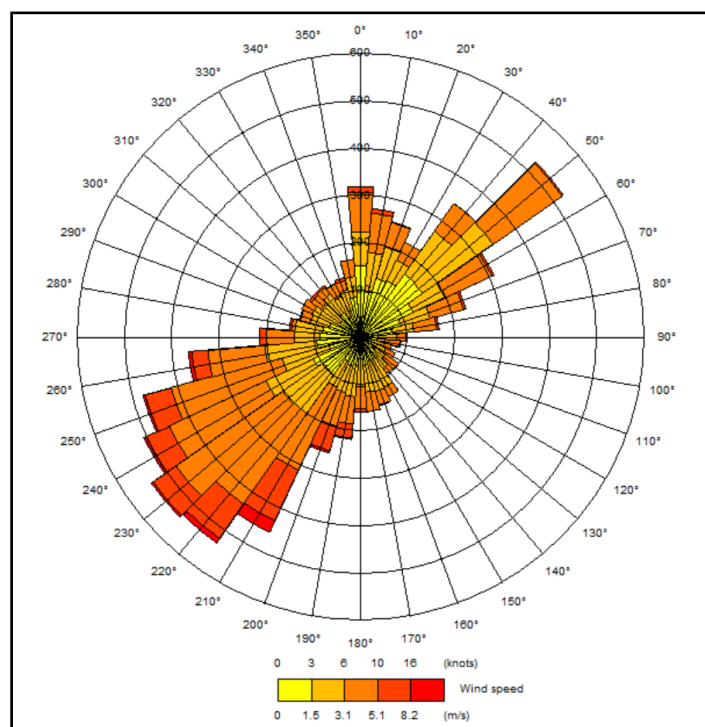
LAQM.TG(22) recommends that meteorological data should have a percentage of usable hours greater than 85%. 2022 meteorological data from Herstmonceux West End meteorological station includes 8,600 lines of usable hourly data for the year, i.e. 98.2% usable data. This is therefore suitable for the dispersion modelling exercise.



A surface roughness value of 0.3m (agricultural areas (max)) was used to represent the dispersion site. Whereas a surface roughness value of 0.02m was used to represent the meteorological station (open grassland).

A wind rose for Herstmonceux West End meteorological station is presented in Figure A.

Figure A: Wind Rose for Herstmonceux West End Meteorological Station (2022)



3.2.4 Background Concentrations

In the absence of 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 (2018 reference year)²⁵, based on the 1km grid squares which cover the modelled area. Further detail on these datasets can be found in Section 4.0.

No adjustment for background concentration variability with height has been made.

3.2.5 Model Outputs

The background pollutant values discussed in Section 4.3 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 nitrogen oxides (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 (v8.1)²⁶. The modelled NO₂ road contribution was then added to the appropriate NO₂ background concentration value to obtain an overall total annual mean NO₂ concentration.

²⁵ Defra Background Maps (2018-Reference) <http://uk-air.defra.gov.uk/data/laqm-background-home>.

²⁶ Defra NO_x to NO₂ Calculator v8.1 (2020), available at <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/no2-adjustment-for-nox-sector-removal-tool/>



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 AQAL for NO₂ 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. All results presented in the assessment are calculated following the process of model verification, using an adjustment factor of 1.026 for NO₂, PM₁₀ and PM_{2.5}.

3.2.6 Assessing Significance

Significance criteria as provided within EPIC & IAQM guidance has been used for the purposes of informing effects arising from road traffic emissions on human receptors.

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 3-2.

Table 3-2: 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
Table 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.

Modelled pollutant concentrations predicted at future receptors have been compared with the relevant AQALs to determine the suitability of the Site for residential use.



3.2.7 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 latest representative publicly available local monitoring data, as collected by WDC.

Historically, there has been a disparity between emission factors and ambient monitoring data²⁷. To help minimise any associated uncertainty when forming conclusions from the results, this assessment has utilised the latest EFT version 12.0.1 utilising COPERT 5.6 emission factors, and associated tools/datasets published by Defra.

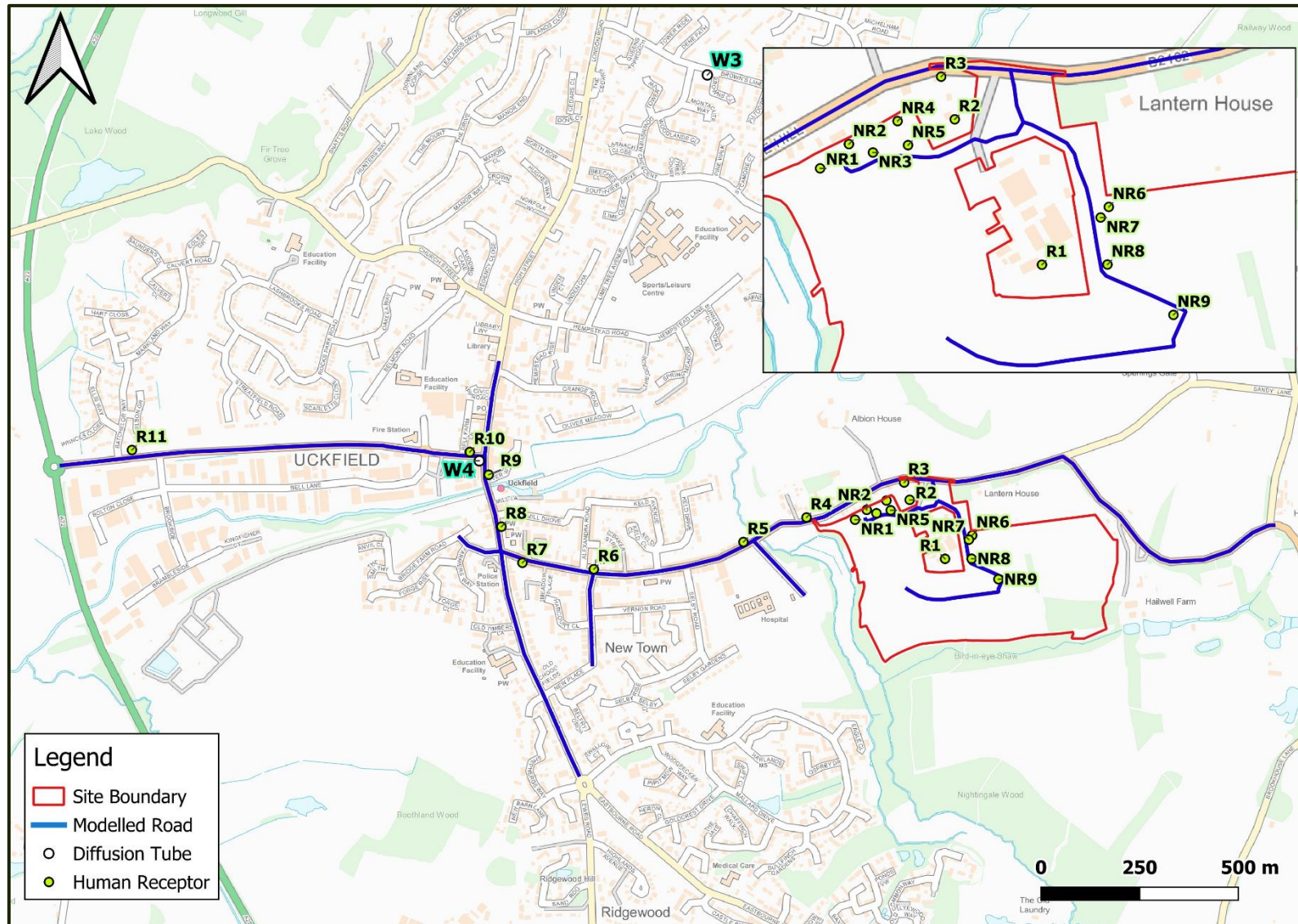
The dispersion modelling assessment employed 2029 emission factors and background concentrations, combined with the maximum vehicle movements generated by the Proposed Development at full capacity.

Despite the inherent uncertainty in quantification, it is generally expected that air pollutant conditions will improve by 2029. As presented in Section 4.0, monitored concentrations at key roadside locations have decreased from 2018 to 2022, indicating that pollutant levels are declining across the study area – correlating somewhat to national projections.

²⁷ Carslaw, et al. (2011). Trends in NO_x and NO₂ emissions and ambient measurements in the UK.



Figure B: Model Setup and Local Monitors



4.0 Baseline Environment

Pollutant concentrations monitored during 2020 and 2021 (i.e. affected by the COVID-19 pandemic) are expected to be atypical and not representative of the local environment. Therefore, they have not been considered in this assessment.

4.1 LAQM Review and Assessment

WDC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within their administrative area. The latest publicly available Annual Status Report (ASR) at the time of writing is the 2023 ASR²⁸.

WDC do not presently have any declared AQMAs.

4.2 Review of Air Quality Monitoring

4.2.1 Automatic Monitoring

The closest automatic monitor in relation to the Site is located approximately 5km away (Wealden – Isfield), operated by WDC which monitors ozone alone. The next nearest automatic monitor is located approximately 20km away and is not considered representative.

4.2.2 Diffusion Tube Monitoring

Passive NO₂ diffusion tube monitoring is currently undertaken by WDC within the Site locale.

The details and results of the monitoring locations of relevance to the Site (i.e. within 2km of the Site) are presented in Table 4-1 and Table 4-2 respectively, whilst their locations are illustrated in Figure B. All monitoring data presented has been ratified by WDC.

Table 4-1: Local NO₂ Diffusion Tube Monitoring Sites: Details

Site ID	Site Type	NGR (m)		Height (m)	Within AQMA	Distance to Site (km)
		X	Y			
W3	Roadside	Urban Background	547828	121954	2.5	No
W4	Roadside	Roadside	547250	120977	2.5	No

Table 4-2: Local NO₂ Diffusion Tube Monitoring Sites: Results

Site ID	2022 Data Capture %	Annual Mean NO ₂ Concentration (µg/m ³)				
		2018	2019	2020	2021	2022
W3	100	14.9	13.4	12.1	11.2	10.1
W4	67.3	36.7	33.6	23.0	25.0	26.2

As shown in Table 4-2, there have been no exceedances of the annual mean NO₂ AQAL (40µg/m³) across the period presented (2018 – 2022) at W3 and W4.

In 2018, the annual NO₂ concentration at W4 was within 10% of the AQAL. Since then, concentrations have decreased; in 2022, the annual mean NO₂ concentration was 26.2µg/m³, which is well below (<75%) the AQAL. Monitoring site W4 is located roadside of

²⁸ Wealden District Council, Air Quality Annual Status Report (ASR). 2023.



the B2102 in the centre of Uckfield, near a road junction. Pollutant concentrations are expected to be elevated due to queuing traffic and street canyon-like urban architecture limiting pollutant dispersion. This demonstrates that annual mean NO₂ concentrations have improved at key roadside locations in Uckfield, aligning somewhat with national projections.

The empirical relationship given in LAQM.TG(22) states that exceedences of the 1-hour mean AQAL for NO₂ is 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 2018-2022.

4.3 Defra Mapped Background Concentrations

Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution. The data sets include annual average concentration estimates for NO_x, NO₂, PM₁₀ and PM_{2.5} using a base year of 2018 (the year in which comparisons between modelled and monitoring are made).

The Defra mapped background concentrations for the base year (2022) and the earliest predicted opening year of the development (2029) across the modelled domain are presented in Table 4-3.

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

Table 4-3: Defra Mapped Background Pollutant Concentrations

Grid Square (X, Y)	Year	Annual Mean Concentration (µg/m ³)			
		NO _x	NO ₂	PM ₁₀	PM _{2.5}
548500, 120500	2022	10.3	8.0	13.0	8.6
	2029	8.8	6.9	12.5	8.3
547500, 120500	2022	11.7	9.0	13.8	9.3
	2029	9.8	7.6	13.3	8.9
546500, 121500	2022	10.6	8.2	13.4	9.0
	2029	8.5	6.7	12.9	8.6
AQAL		-	40	40	20



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 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 and a designated habitat site within 50m of the Site boundary. Therefore, an assessment of construction dust on human receptors and ecological receptors is required.

5.1.2 Potential Dust Emissions Magnitude

5.1.2.1 Demolition

The Site currently comprises of agricultural fields with no existing buildings or structures to be demolished. As such, consideration of impacts associated with demolition activities have been scoped out of the assessment.

5.1.2.2 Earthworks

The proposals comprise the development of up to 190 dwellings across a total area 18,000-110,000m². There may be 5-10 heavy earth moving vehicles active at any one time. Due to the typical phased nature of the construction of residential schemes, the total construction area at any given time has the potential to be less than this. Notwithstanding, the dust emission magnitude for earthworks is considered to be 'medium'.

5.1.2.3 Construction

Taking into account the number of proposed residential dwellings, the total building volume associated with the Proposed Development is predicted to be >75,000m³ with potentially dusty construction material used (i.e. concrete, brickwork). However, due to the typical phased nature of the construction of residential schemes, the building volume is expected to be no greater than 75,000m³ at any given time. As such, the dust emission magnitude for construction is therefore considered to be 'medium'.

5.1.2.4 Trackout

Construction vehicles are expected to use the B2102 Bird in Eye Hill to access the Site. No details are available at the time of assessment on the number of additional HDV movements associated with construction works in each phase. However, given the scale and nature of works required, there are anticipated to be <50 HDV outward movements in any worst-case day. In addition, due to the proposed construction of internal Site roads and the phased approach to construction, the unpaved road length is likely to be <100m at any one time. The dust emission magnitude for trackout is therefore considered to be 'medium'.

5.1.2.5 Summary

A summary of the potential dust emission magnitude for each of the activities is displayed in Table 5-1.



Table 5-1: Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Earthworks	Medium
Construction	Medium
Trackout	Medium

5.1.3 Sensitivity of the Area

5.1.3.1 Dust Soiling Impacts

There are 1-10 residential dwellings (high sensitivity receptors) within 20m of the Site boundary and <100 within 50m. There are also 10-100 residential dwellings located within 20m of the access routes up to 250m from the Site entrance (assuming that vehicles may travel both east and west along B2102 Bird in Eye Hill when accessing the Site).

The sensitivity of the area with respect to dust soiling effects on people and property in relation to earthworks and construction is therefore considered to be 'medium' and in relation to trackout is considered to be 'high'.

5.1.3.2 Human Health Impacts

The maximum 2022 mapped background PM₁₀ concentration (2018 reference year) for the 1km² grid square centred on the Site is estimated to be 13.8µg/m³ (i.e. falls into the <24µg/m³ class).

Given the above information, the sensitivity of the area with respect to human health impacts in relation to earthworks, construction and trackout is therefore considered to be 'low'.

5.1.3.3 Ecological Impacts

The Nightingale Shaw AW is located within 20m of the Site boundary. There are no ecological designations within 50m of the access routes up to 250m from the Site entrance. The sensitivity of the area with respect to ecological impacts in relation to earthworks and construction is therefore considered to be 'low'.

5.1.3.4 Summary

A summary of the sensitivity of the area defined for each potential impact is displayed in Table 5-2, whereas the spatial densities of receptors discussed in relation to the Site boundary are illustrated in Figure C.

Table 5-2: Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	High
Human Health	Low	Low	Low
Ecological	Low	Low	-

5.1.4 Risk of Impacts

The outcomes of the assessment are combined in Table 5-3 below to determine the risk of impact which is used to inform the selection of appropriate mitigation.



Table 5-3: Risk of Dust Impacts

Potential Impact	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk
Ecological	Low Risk	Low Risk	-

5.1.5 Mitigation

Following the construction dust assessment, the Site is found to be at worst:

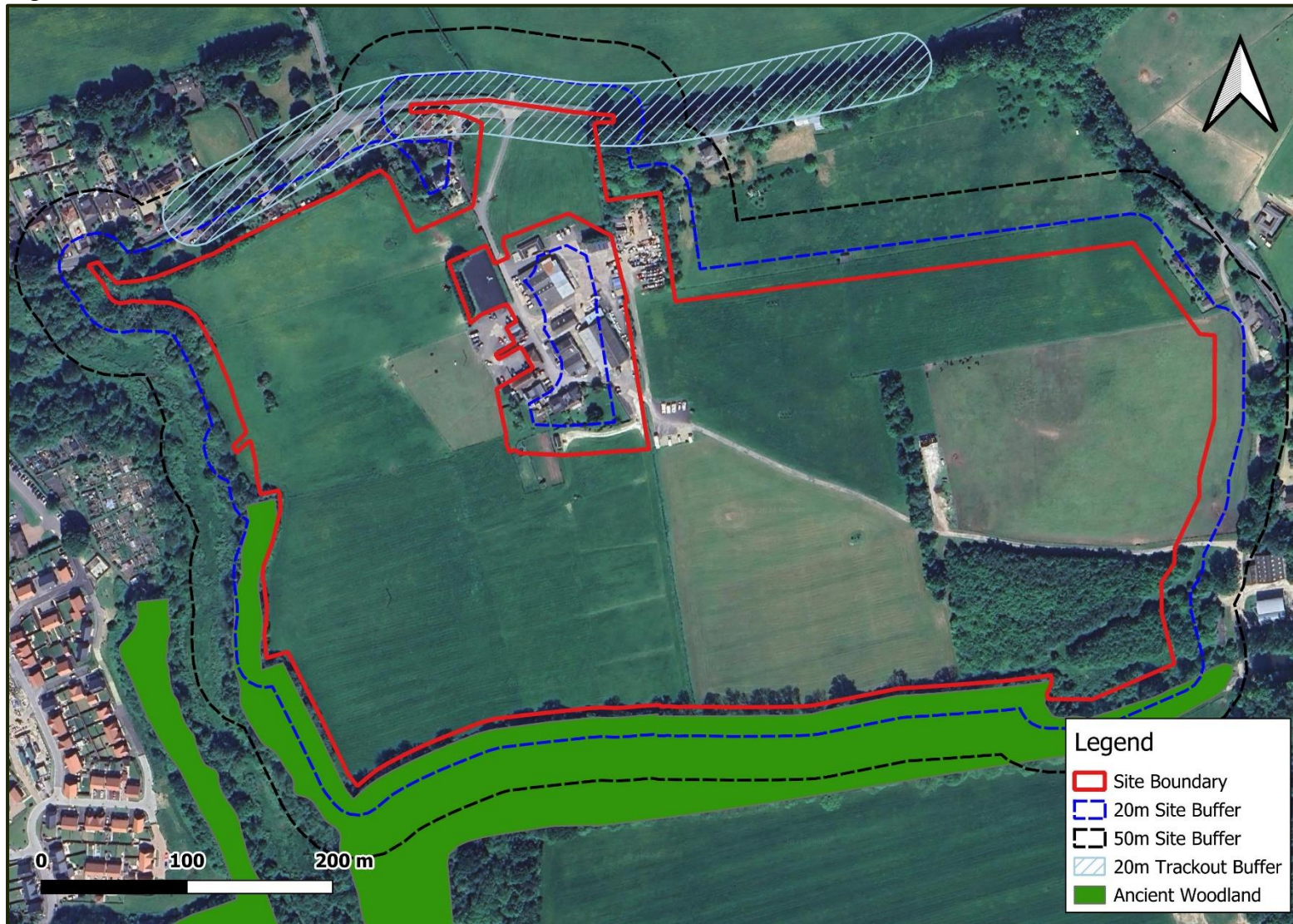
- Medium risk in relation to dust soiling effects on people and property;
- Low risk in relation to human health impacts; and
- Low risk in relation to ecological impacts

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 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 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 C: Construction Dust Assessment Buffers



6.0 Operational Phase Assessment

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

6.1 NO₂ Modelling Results

Table 6-1 presents the annual mean NO₂ concentrations predicted at all assessed receptor locations.

Table 6-1: Predicted Annual Mean NO₂ Concentrations

Receptor	Predicted Annual Mean NO ₂ Concentration (µg/m³)			% Change of AQAL	% of 2029 DS Relative to AQAL	Impact
	2022 BC	2029 DM	2029 DS			
Existing Receptors						
R1	8.4	7.1	7.2	0.4	18.0	Negligible
R2	9.1	7.3	7.6	0.6	19.0	Negligible
R3	10.7	8.1	8.5	0.9	21.3	Negligible
R4	9.5	7.5	7.7	0.4	19.3	Negligible
R5	12.1	9.0	9.3	0.7	23.3	Negligible
R6	13.4	9.6	9.8	0.7	24.5	Negligible
R7	14.9	10.2	10.5	0.8	26.3	Negligible
R8	13.8	9.8	9.9	0.3	24.8	Negligible
R9	19.5	12.4	12.6	0.5	31.5	Negligible
R10	19.3	12.2	12.4	0.5	31.0	Negligible
R11	11.7	8.2	8.3	0.2	20.8	Negligible
New Receptors						
NR1	-	-	7.5	-	18.8	-
NR2	-	-	7.6	-	19.0	-
NR3	-	-	7.6	-	19.0	-
NR4	-	-	7.6	-	19.0	-
NR5	-	-	7.6	-	19.0	-
NR6	-	-	7.5	-	18.8	-
NR7	-	-	7.7	-	19.3	-
NR8	-	-	7.7	-	19.3	-
NR9	-	-	7.7	-	19.3	-

The outcomes are as follows:

- At existing receptors, the impact of the Proposed Development on annual mean NO₂ concentrations is considered to be 'negligible' and there are no exceedances of the AQAL at any receptor location;
- At new receptors, there are no predicted exceedances of the annual mean NO₂ AQAL. The Site is suitable for its proposed residential use; and
- Exceedances of the 1-hour mean NO₂ AQAL are unlikely to occur.



Effects associated with NO₂ concentrations at all assessed receptor locations are therefore considered to be not significant.

6.2 PM₁₀ Modelling Results

Table 6-2 presents the annual mean PM₁₀ concentrations predicted at all assessed receptor locations.

Table 6-2: Predicted Annual Mean PM₁₀ Concentrations

Receptor	Predicted Annual Mean PM ₁₀ Concentration (µg/m³)			% Change of AQAL	% of 2029 DS Relative to AQAL	Impact
	2022 BC	2029 DM	2029 DS			
Existing Receptors						
R1	13.1	12.6	12.7	0.2	31.8	Negligible
R2	13.3	12.8	12.9	0.3	32.3	Negligible
R3	13.6	13.2	13.3	0.5	33.3	Negligible
R4	13.4	12.9	13.0	0.2	32.5	Negligible
R5	14.6	14.1	14.3	0.4	35.8	Negligible
R6	15.0	14.5	14.6	0.4	36.5	Negligible
R7	15.3	14.8	15.0	0.4	37.5	Negligible
R8	15.0	14.5	14.6	0.2	36.5	Negligible
R9	16.6	16.1	16.3	0.3	40.8	Negligible
R10	16.5	16.1	16.2	0.3	40.5	Negligible
R11	14.2	13.7	13.8	<0.1	34.5	Negligible
New Receptors						
NR1	-	-	12.9	-	32.3	-
NR2	-	-	12.9	-	32.3	-
NR3	-	-	12.9	-	32.3	-
NR4	-	-	12.9	-	32.3	-
NR5	-	-	12.9	-	32.3	-
NR6	-	-	12.8	-	32.0	-
NR7	-	-	13.0	-	32.5	-
NR8	-	-	13.0	-	32.5	-
NR9	-	-	13.0	-	32.5	-

The outcomes are as follows:

- At existing receptors, the impact of the Proposed Development on annual mean PM₁₀ concentrations is considered to be 'negligible' and there are no exceedances of the AQAL at any receptor location;
- At new receptors, there are no predicted exceedances of the annual mean PM₁₀ AQAL. The Site is suitable for its proposed residential use; and
- The maximum predicted annual mean PM₁₀ concentration equates to <1 day where 24-hour mean PM₁₀ concentrations are predicted to be greater than 50µg/m³. This is



well below the 35 permitted exceedences, and therefore the number of maximum exceedences is in compliance with the 24-hour mean AQAL.

Effects associated with PM₁₀ concentrations at all assessed receptor locations are therefore considered to be not significant.

6.3 PM_{2.5} Modelling Results

Table 6-3 presents the annual mean PM_{2.5} concentrations predicted at all assessed receptor locations.

Table 6-3: Predicted Annual Mean PM_{2.5} Concentrations

Receptor	Predicted Annual Mean PM _{2.5} Concentration (µg/m³)			% Change of AQAL	% of 2029 DS Relative to AQAL	Impact
	2022 BC	2029 DM	2029 DS			
Existing Receptor						
R1	8.7	8.3	8.4	0.3	42.0	Negligible
R2	8.8	8.4	8.5	0.3	42.5	Negligible
R3	9.0	8.6	8.7	0.5	43.5	Negligible
R4	8.8	8.5	8.5	0.2	42.5	Negligible
R5	9.8	9.4	9.5	0.5	47.5	Negligible
R6	10.0	9.6	9.6	0.4	48.0	Negligible
R7	10.1	9.7	9.8	0.5	49.0	Negligible
R8	10.0	9.6	9.6	0.2	48.0	Negligible
R9	10.8	10.4	10.5	0.3	52.5	Negligible
R10	10.8	10.4	10.4	0.3	52.0	Negligible
R11	9.5	9.1	9.1	0.1	45.5	Negligible
New Receptors						
NR1	-	-	8.5	-	42.5	-
NR2	-	-	8.5	-	42.5	-
NR3	-	-	8.5	-	42.5	-
NR4	-	-	8.5	-	42.5	-
NR5	-	-	8.5	-	42.5	-
NR6	-	-	8.4	-	42.0	-
NR7	-	-	8.5	-	42.5	-
NR8	-	-	8.5	-	42.5	-
NR9	-	-	8.5	-	42.5	-

The outcomes are as follows:

- At existing receptors, the impact of the Proposed Development on annual mean PM_{2.5} concentrations is considered to be 'negligible' and there are no exceedences of the AQAL at any receptor location; and
- At new receptors, there are no predicted exceedences of the annual mean PM_{2.5} AQAL. The Site is suitable for its proposed residential use.



Effects associated with PM_{2.5} concentrations at all assessed receptor locations are therefore considered to be not significant.



7.0 Emissions Mitigation Assessment

7.1 Construction Phase

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

In order to control potential impacts, Table 7-1 presents a range of mitigation measures which could be applied and align with the IAQM guidance. The measures are grouped into those which are highly recommended and those which are desirable. With the effective application of the dust mitigation measures, residual effects will be 'not significant'.

Table 7-1: 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.
	Agree dust deposition, dust flux, or real-time PM ₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
Operating Vehicle/Machinery and Sustainable Travel	Ensure all vehicles switch off engines when stationary - no idling vehicles.
	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
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.



Site Application	Mitigation Measures
	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 logbook.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
	Avoid dry sweeping of large areas.
	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
	Record all inspections of haul routes and any subsequent action in a site logbook.
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).



Site Application	Mitigation Measures
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
	Access gates to be located at least 10m from receptors where possible.
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.
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 windowsills 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 EPIC & IAQM guidance, the overall effect of the Proposed Development on NO₂, PM₁₀ and PM_{2.5} concentrations at all assessed receptor locations is 'not significant'. Furthermore, the Site is found to be suitable for its proposed residential. The assessment outcomes indicate additional mitigation is not required.

Notwithstanding the above, the Sussex-air guidance provides standard mitigation measures required for all residential developments:

- All gas-fired boilers to meet a minimum standard of <40mgNO_x/kWh. Consideration should be given to renewable sources of energy, e.g. air source heat pumps; and
- Meet the electric vehicle charging point guidance (East Sussex)²⁹.

In addition to the standard measures, the Sussex-air guidance provides a longlist of potential further mitigation measures that should be considered for residential developments.

²⁹ The reference within the Sussex-air guidance contains a broken link.



Croudace Homes Ltd has provided details of design commitments the Proposed Development will include. These measures are aimed at reducing private vehicular use which are expected to minimise emissions and thus the Site's operational impact. Measures include:

- Bus stop and bus service improvements;
- Provision of a car club scheme;
- Provision of a framework travel plan; and
- Improvements to pedestrian routes.

7.2.1 Damage Cost Calculation

An estimation of the likely financial operational emission impact of the Proposed Development (Damage Cost Calculation) has been undertaken to determine health and society costs. The outcomes may be used as a benchmark to indicate minimum mitigation requirements.

The Damage Cost Calculation has been conducted in accordance with Sussex-air and Defra guidance. Health damage costs associated with transport pollutant emissions (NO_x and PM_{2.5}) from the operational development trips over a 5-year period from the first year of operation – i.e. 2029 to 2034) have been calculated. The latest version of the Defra Emissions Factors Toolkit (presently v12.0.1) has been used iteratively for each year to determine vehicle emission factors. Vehicle flows provided by Milestone Transport Planning relating to maximum operational use have been used. Table 7-2 details the Damage Cost Calculation inputs.

Table 7-2: Damage Cost Calculation – Inputs

Input Parameter		Inputs
Total Trips (AADT)	LDVs	1,751
	HDVs	0
Average Trip Length (km) (A)		10
Speed (kph) ^(A)		50
NO _x Base Damage Cost (£ per tonne) ^(B)		£12,295
PM _{2.5} Base Damage Cost (£ per tonne) ^(B)		£88,984
Notes:		
^(A) Detailed within the Sussex-air guidance. ^(B) The 2022 'Road Transport' damage cost, rebased to 2024 (the price base year for appraisal).		

Over a 5-year period a damage cost has been calculated at **£85,352**.

The above damage costs provide an indicator of the financial commitment required to offset emissions. The amount (value) determined is not a direct indication of the monetary contribution required to off-set impacts upon air quality. Rather, the scale of damage cost determines the level of appropriate mitigation required for specific proposals.

Despite this, the sum of the proposed on-site mitigation measures discussed in Section 7.2 are expected to exceed the damage cost calculation.



8.0 Conclusions

SLR has been commissioned by Croudace Homes Ltd, to undertake an air quality assessment to appraise a planning application for a proposed residential development comprising up to 190 dwellings, on land at Bird in Eye Farm, Uckfield.

8.1 Construction Phase

A qualitative assessment of the potential dust impacts during the construction of the Proposed Development has been undertaken following the IAQM 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' to human health and ecological impacts. Providing effective mitigation measures are implemented, such as those outlined in Section 7.1 of this report, residual effects from dust emissions during the construction phase would be 'not significant'.

8.2 Operational Phase

The ADMS-Roads dispersion model (v5) 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 relevant guidance.

In accordance with EPIC & IAQM guidance, road traffic effects associated with the operation of the Proposed Development on existing and proposed human receptors are found to be 'not significant'. No mitigation is required. Notwithstanding the above, standard mitigation measures required as endorsed by local guidance is required to be implemented.

A Damage Cost Calculation has been undertaken to inform the operational air quality impacts associated with the Proposed Development. Over a 5-year period, the Damage Cost Calculation is £85,352. This value provides an indicator of the financial commitment required to offset health and societal costs.

A series of measures implemented as part of the Proposed Development have been collated and are expected to exceed the Damage Cost Calculation. These measures are aimed at reducing private vehicular use which are expected to minimise emissions and thus the Site's operational impact.



Appendix A Model Inputs



A.1 Traffic Data

Table A-1 details the traffic data used within the assessment.

Table A-1: Traffic Data Used Within the Assessment

Link	2022 BC		2029 DM		2029 DS		Speed (kph) ^(A)
	AADT	% HDV	AADT	% HDV	AADT	% HDV	
B2102 Bird in Eye Hill (east of Site Access)	4,614	1.8	4,901	1.8	5,370	1.7	73.7 ^(B)
Site Access	217	0.0	230	0.0	1,981	0.0	32.2
Site Access (West)	0	0.0	0	0.0	876	0.0	32.2
Site Access (East)	0	0.0	0	0.0	1,751	0.0	32.2
B2102 Bird in Eye Hill (west of Site Access)	4,235	1.8	4,499	1.8	5,781	1.4	65.5 ^(B)
Uckfield Hospital Access	1,191	0.5	1,265	0.5	1,265	0.5	48.3
B2102 Framfield Road	5,005	1.7	5,316	1.7	6,599	1.4	48.3
Harecourt Road	2,455	2.2	2,607	2.2	2,607	2.2	48.3
B2102 Framfield Road (east of junction)	6,419	1.9	6,818	1.9	8,024	1.6	48.3
B2102 New Town	10,505	2.3	11,345	2.3	11,756	2.2	48.3
B2102 New Town (north of junction)	9,055	2.5	9,805	2.4	10,216	2.3	48.3
Bridge Farm Road	1,432	4.6	1,533	4.6	1,533	4.6	48.3
B2102 New Town (north of junction)	14,909	2.0	16,010	2.0	16,806	1.9	48.3
B2102 Bellfarm Road	10,222	3.7	10,917	3.7	11,500	3.5	48.3/64.4
B2102 High Street	14,241	1.7	15,240	1.7	15,401	1.7	48.3
Table Notes: ^(A) Unless specified, speeds are based upon National Speed Limits. Traffic speeds have been adjusted to take into account queues and congestion in accordance with LAQM.TG(22). ^(B) Speeds based on Automatic Traffic County Surveys (average 85 th percentile).							

A.1.1 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.1.2 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, 2022 LAQM WDC monitoring data has been used for those roadside locations situated adjacent to a modelled link i.e. where traffic data exists. Table A-2 presents all local monitoring data available for model verification.

Table A-2: Local Monitoring Data Available for Model Verification

Site ID	NGR X (m)	NGR Y (m)	2022 Monitored Annual Mean NO ₂ (µg/m ³)	2022 Data Capture (%)
W4	547250	120977	26.2	67.3

It is acknowledged that using a single monitoring location for verification purposes is not ideal. However, considering the extent of the traffic data, sensitivity of the area and the limited monitoring conducted within the development area, the use of one location is deemed appropriate in this context.

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.

NO_x was back calculated using the latest version of Defra's NO_x to NO₂ Calculator (v8.1) 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 2022 Defra background mapped concentrations (2018 base year) for the relevant 1km x 1km grid squares (i.e. those within which the model verification locations are located), as discussed in Section 4.3. No sectors were removed from the background dataset.

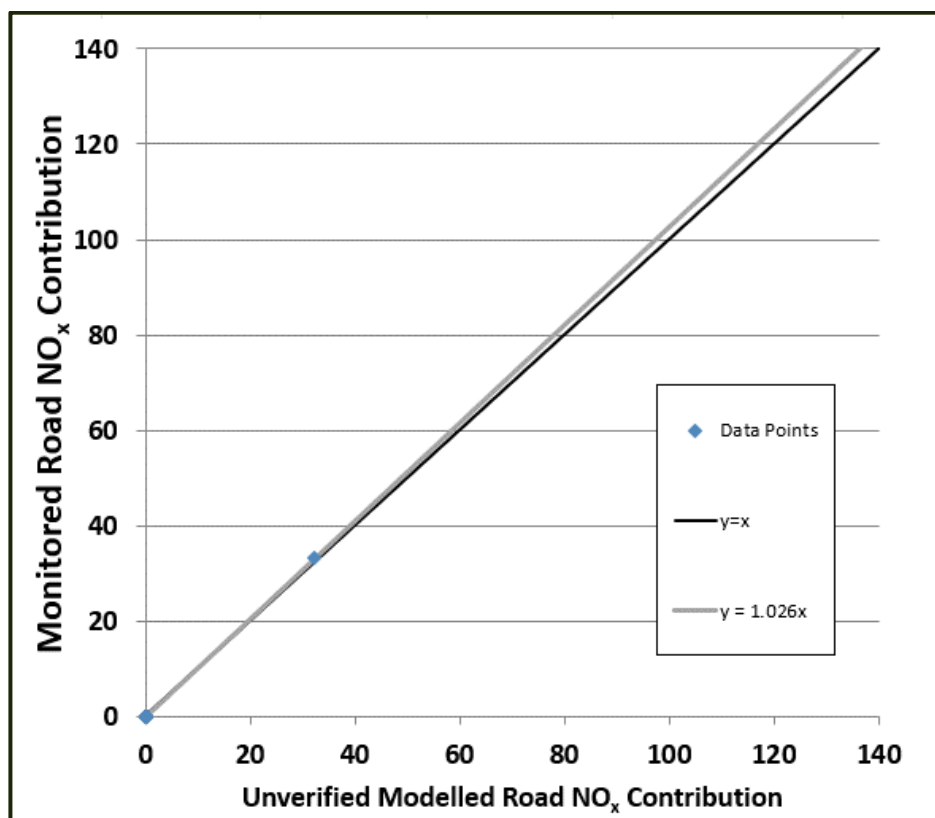
Comparison of the modelled vs. monitored road NO_x contribution at the verification locations is provided in Table A-3. An initial adjustment factor of 1.026 has been derived, based on a linear regression forced through zero as shown in Figure D.

Table A-3: NO_x / NO₂ Model Verification (1.026)

Site ID	Monitored Road NO _x (µg/m ³)	Modelled Road NO _x (µg/m ³)	Adjustment Factor
W4	33.1	32.2	1.026



Figure D: Comparison of Modelled vs. Monitored Road NO_x Contribution (1.026)



Only one monitoring location has been used for verification purposes, in the absence of other suitable monitoring locations. On this basis, the derived verification factor (1.026) was subsequently applied to all modelled road-NO_x concentrations predicted (as output of the ADMS Roads dispersion model).

A.1.3 PM₁₀ / PM_{2.5} Verification

The adjustment factor of 1.026 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 Nightingale Shaw Ancient Woodland Assessment



B.1 Background Context

In the UK, sites of ecological importance are provided environmental protection from activities that may result in atmospheric emissions. This is through the application of standards known as Critical Levels and Critical Loads.

B.1.1 Critical Levels

Critical Levels are a quantitative estimate of exposure to airborne pollutants in gaseous form, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

Critical Levels for the protection of vegetation and ecosystems apply irrespective of habitat type and are based on the concentration of the relevant pollutants in ambient air.

The Critical Level of relevance to the road traffic emissions modelling assessment is specified in Table B-1. This Critical Level is specified within relevant European air quality directives and corresponding UK air quality regulations.

Table B-1: Critical Level of Relevance

Pollutant	Critical Level ($\mu\text{g}/\text{m}^3$)	Measured As
Nitrogen Oxides (NO_x)	30	Annual Mean

B.1.2 Critical Loads

Critical Loads are a quantitative estimate of exposure to deposition of one or more pollutants, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

In relation to road traffic emissions, Critical Loads for eutrophication and acidification are relevant.

Eutrophication and acidification can both occur via wet and dry deposition. Wet deposition occurs due to rainout (within cloud) scavenging and washout (below cloud) scavenging, whereas dry deposition occurs when particles are brought to the surface by gravitational settling and turbulence.

Consistent with the Design Manual for Roads and Bridges (DMRB) LA 105 guidance³⁰, wet deposition does not need to be considered for the assessment of road traffic emissions and is therefore discounted from further assessment. The focus of this study relates to dry deposition with respect to Critical Loads.

Critical Loads for the habitats and species of relevance to this assessment have been obtained from the Air Pollution Information System (APIS) website³¹.

B.2 Assessment Procedure

The assessment procedure outlined within the Institute of Air Quality Management (IAQM) guidance relating to the consideration of air quality impacts on designated nature conservation sites³² has been utilised to inform the assessment.

Consistent with IAQM guidance (and recent case law outcomes e.g., the Wealden Judgement), an in-combination screening assessment has been undertaken. This involves

³⁰ Highways England (2019). DMRB LA 105.

³¹ Air Pollution Information System <http://www.apis.ac.uk/>

³² IAQM (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, v1.1.



the consideration of traffic vehicle movements generated by other live project and plans prior to screening out impacts.

B.2.1 Step 1: Are Sensitive Habitats Within 200m of the Affected Roads?

The first stage is to identify whether ecological designations (with sensitive qualifying features) are located within 200m of a road link projected to experience developmental-generated vehicle movements.

In this context, are the internal Site roads located within 200m of the Nightingale Shaw AW?

As illustrated in Figure B-5, some (not all) internal Site roads are located within 200m of the Nightingale Shaw AW. These road links are located towards the south and southwest of the Site.

Impacts cannot be screened out.

B.2.2 Step 2: Numerical Screening of Road Traffic Flows

The second stage is to determine whether the road links within 200m of the ecological designation are projected to experience a change of:

- >1,000 total AADT; and / or
- >200 HDVs AADT.

For the purposes of informing the screening assessment, it has been assumed that the maximum number of vehicle movements the Site is expected to generate (190 units) occur on roads within 200m of the Nightingale Shaw AW (Figure B-5). This is unlikely, as the maximum number of vehicle movements will only occur at the Site exit / entrance (which is >200m from the Nightingale Shaw AW). The full number of predicted trips will not route through all internal Site roads (i.e., those within 200m of the Nightingale Shaw AW).

Table B-2 details the maximum projected number of road traffic vehicles the Proposed Development is expected to generate on the internal Site roads.

The Transport Consultant confirmed that there will be no road traffic movements associated with other live project and plans on the internal Site roads.

Table B-2: Road Traffic Numerical Screening Exercise

Road Link	Project Alone		In-Combination	
	Total	HDV	Total	HDV
	AADT			
Internal Site Roads (190 units)	1,751	-	1,751	-
<i>IAQM Screening Thresholds</i>	<i>1,000</i>	<i>200</i>	<i>1,000</i>	<i>200</i>

Maximum vehicle flows (alone and in-combination with other live project and plans) are found to be above the IAQM screening thresholds.

Impacts cannot be screened out.

B.2.3 Step 3: Dispersion Modelling

Dispersion modelling has been used to quantify the impact of road traffic movements on:

- Critical Level: Annual Mean NO_x;
- Critical Load: Eutrophication (Nutrient Nitrogen); and
- Critical Load: Acidification.



Changes can be classed as insignificant where they are <1% of the Critical Level / Load and can consequently be screened out as imperceptible.

Where impacts cannot be screened out on this basis, a detailed assessment is consequently required. This includes the calculation of the total predicted pollutant dataset at the affected site(s) to determine whether the Critical Level / Load will be exceeded (above which significant harmful effects are known to occur).

It should be reinforced that exceedance of this 1% threshold does not, of itself, imply damage to a habitat, rather implies further assessment is required as the impacts cannot be described as imperceptible.

Dispersion Model Inputs

The dispersion modelling methodology is consistent with the primary quantification exercise. However, it focuses on internal Site roads in response to concerns raised in WDC's SoC regarding potential increases in traffic and subsequent air pollution levels originating from these roads on the AW.

All internal Site roads have been included within the dispersion modelling exercise. Consistent with the numerical screening exercise, it has been assumed that the maximum number of vehicle movements the Site is expected to generate (190 units) occur on all internal Site roads. This is unlikely for the reasons documented previously. Therefore, the assessment is conservative and likely to exaggerate impacts at the Nightingale Shaw AW.

Concentrations of NO_x have been modelled with use of gridded and boundary receptors (to ensure maximum impacts are understood). Empirical methods prescribed within the IAQM guidance have been used to calculate potential deposition rates.

The maximum output across the Nightingale Shaw AW has been assessed – and therefore presents a worst-case outlook.

Annual Mean NO_x

Table B-3 presents the 2029 maximum NO_x annual mean impacts at the Nightingale Shaw AW.

Table B-3: Maximum Annual Mean NO_x Impacts

Development Impact	
Annual Mean NO _x (µg/m ³)	% of Critical Level
0.1	0.5

The maximum increase in annual mean NO_x concentrations as a result of the Proposed Development (on the internal Site roads) is predicted to be <1% of the Critical Level.

Impacts can be classed as insignificant.

Nutrient Nitrogen Deposition

Table B-4 presents the 2029 maximum nutrient nitrogen deposition impacts at the Nightingale Shaw AW.

Table B-4: Maximum Nutrient Nitrogen Impacts

Critical Load Class	Minimum Critical Load (kg N/ha/yr)	Development Impact	
		Nutrient Nitrogen (kg N/ha/yr)	% of Critical Load
Broadleaved Deciduous Woodland	10	0.01	0.1



The maximum increase in nutrient nitrogen deposition as a result of the Proposed Development (on the internal Site roads) is predicted to be <1% of the Critical Load.

Impacts can be classed as insignificant.

Acid Deposition

Table B-5 presents the 2029 maximum acidification deposition impacts at the Nightingale Shaw AW.

Table B-5: Maximum Acidification Impacts

Critical Load Class	Deposition N	Max N Critical Load	Development Impact	
	(keq/ha/yr)		Acid (keq/ha/yr)	% of Critical Load
Broadleaved / Coniferous Unmanaged Woodland	1.82	3.208	<0.01	<0.1

The maximum increase in acid deposition as a result of the Proposed Development (on the internal Site roads) is predicted to be <1% of the Critical Load.

Impacts can be classed as insignificant.

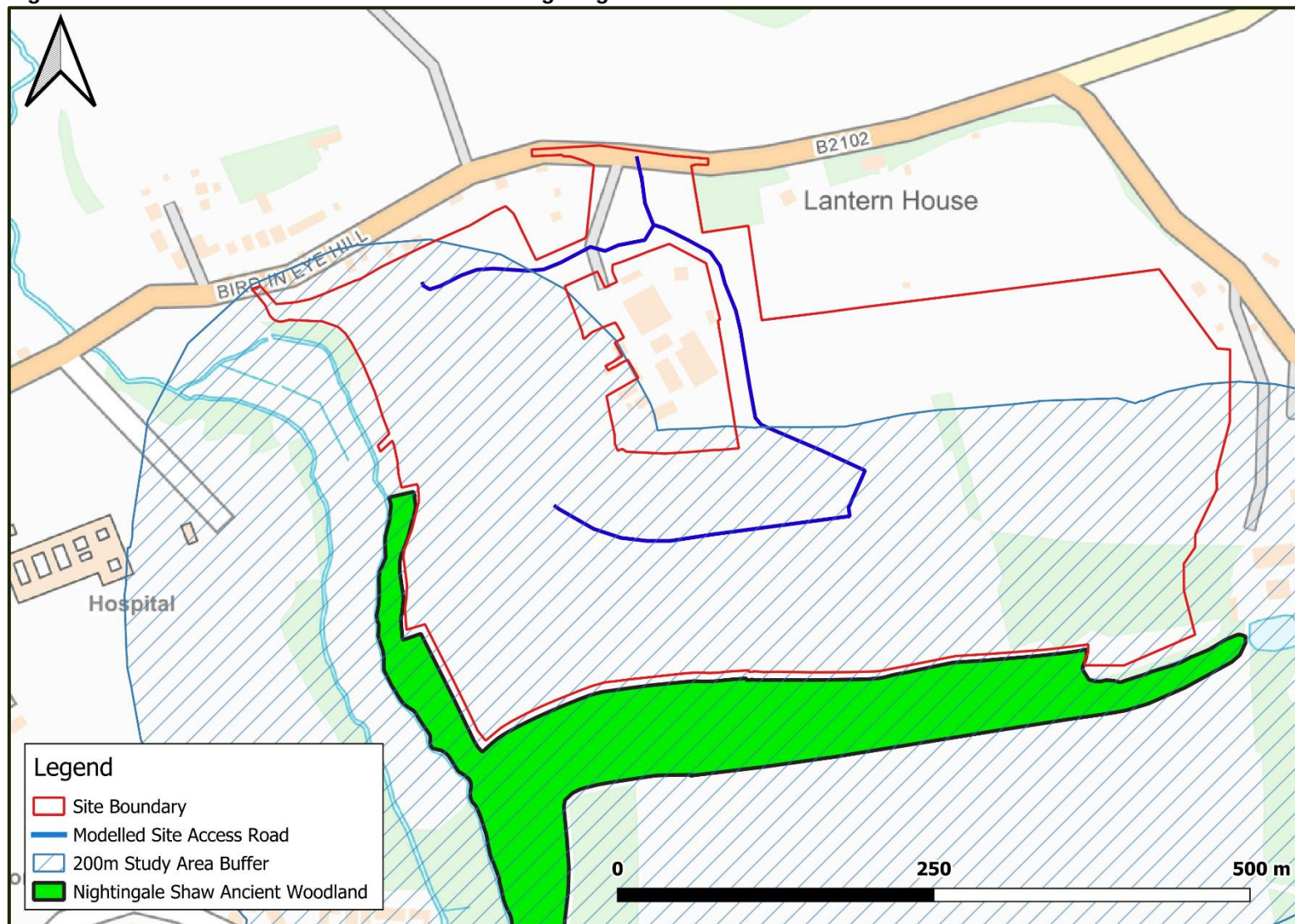
B.3 Summary

Despite the overly conservative assessment methodology, impacts on the Nightingale Shaw AW as a result of vehicle emissions generated by the Proposed Development on all Site internal roads are not likely.

Effects can be considered not significant.



Figure B-5: Site Access Road within 200m of the Nightingale Shaw AW





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