



Land to the South of the A271 and East of the A22, Lower Horsebridge

Air Quality Assessment

On behalf of **Hertfordshire Holdings Limited**

Project Ref: 332110699/1300 | Rev: Issued | Date: December 2022

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1 Introduction

1.1 Proposed Development

- 1.1.1 Hertfordshire Holdings Ltd. (the Client) has commissioned Stantec UK Ltd. (Stantec) to undertake an air quality assessment to support an outline planning application for a proposed residential development at land to the south of the A271 and east of the A22, Lower Horsebridge (the Site). The Site is located within the administrative boundary of Wealden District Council (WDC).

1.2 Scope of Assessment

- 1.2.1 This report describes existing air quality within the study area, considers the suitability of the Site for the proposed end-use and assesses the impact of the construction and operation of the Proposed Development on air quality in the study area.
- 1.2.2 The main air pollutants of concern during the construction period are emissions of dust and fine particulate matter (PM₁₀) associated with on-site demolition and construction activities and off-site trackout. Additionally, there is the potential for emissions of nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}) from construction-related vehicles.
- 1.2.3 The main air pollutants of concern during the operational period are NO₂, PM₁₀ and PM_{2.5} emissions associated with proposed and existing road traffic.
- 1.2.4 The Proposed Development does not include a centralised energy centre and is expected to meet its energy demand through zero-emission air source heat pumps (ASHPs). Therefore, an assessment of the impact of emissions from combustion-based energy plant has been scoped out of this report.
- 1.2.5 In relation to air quality impacts resulting from additional road traffic associated with the Proposed Development on sensitive ecological sites, detailed air quality assessment of impacts is required if there are sensitive habitats (within designated sites) within 200 m of a road with a 'potentially significant change'. The 'potentially significant change' could be associated with realignment, changes to speed, or traffic flow. The applied screening criteria for changes in road traffic flows resulting from a development are a change of light duty vehicle (LDV) flows of more than 1,000 annual average daily traffic (AADT) or heavy-duty vehicle (HDV) flows of more than 100 AADT. To account for potential 'in-combination' effects at Habitat Regulations Sites, the threshold of 1,000 AADT is applied to the change in 'in-combination' traffic flows and to enable a proportionate assessment, a lower screening criterion of 50 AADT has been applied to development traffic. JNCC research (JNCC, 2021) indicates that such changes in traffic flows are unlikely to lead to impacts in excess of 0.5% of the annual average critical level for NO_x or critical load for N-deposition at 1 m from road edge are therefore not considered to have the potential to result in a significant effect which might undermine a site's conservation objectives. The increase in road traffic resulting from the Proposed Development on the road network within 200 m of the Pevensey Levels Special Area of Conservation (SAC), has been confirmed by the Project's transport consultants, Stantec, to be less than 50 AADT. This increase in road traffic is therefore not considered to be significant and a detailed assessment of air quality impacts of sensitive ecological sites has been scoped out of this report.
- 1.2.6 The assessment has been prepared taking into account the requirements of relevant local and national guidance, policy and legislation.

2 Legislation, Policy, and Guidance

2.1 Air Quality Regulations

- 2.1.1 The Air Quality (England) Regulations 2000 (AQR) defined National Air Quality Objectives (NAQOs, a combination of concentration-based thresholds, averaging periods and compliance dates) for a limited range of pollutants. Subsequent amendments were made to the AQR in 2001 and 2002 to incorporate 'limit values' and 'target values' for a wider range of pollutants as defined in European Union (EU) Directives.
- 2.1.2 These amendments were consolidated by the Air Quality Standards Regulations 2010 (AQSR) (with subsequent amendments most notably in 2016 and for the devolved administrations), which transposed the EU's Directive on ambient air quality and cleaner air for Europe (2008/50/EC).
- 2.1.3 Following the Transition Period after the UK's departure from the EU in January 2020, the Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 (and subsequent amendments for the devolved administrations) have amended the AQ Standards Regulations 2010 to reflect the fact that the UK has left the EU. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amended the PM_{2.5} limit value in the AQSR to 20 µg/m³.
- 2.1.4 The relevant AQOs and limit values for this assessment are shown in **Table 2-1**.

Table 2-1 Relevant Air Quality Objectives / Limit Values

Pollutant	Time Period	Objectives	Source
NO ₂	1-hour mean	200 µg/m ³ not to be exceeded more than 18 times a year	AQO and AQSR limit value
	Annual mean	40 µg/m ³	AQO and AQSR limit value
PM ₁₀	24-hour mean	50 µg/m ³ not to be exceeded more than 35 times a year	AQO and AQSR limit value
	Annual mean	40 µg/m ³	AQO and AQSR limit value
PM _{2.5}	Annual mean	20	AQSR limit value

- 2.1.5 The NAQOs for NO₂ and PM₁₀ were to have been achieved by 2005 and 2004 respectively, but also continue to apply in all future years thereafter.
- 2.1.6 The 2019 Clean Air Strategy includes a commitment to set a "*new, ambitious, long-term target to reduce people's exposure to PM_{2.5}*" which the Environment Act 2021 commits the Secretary of State to setting.

National Air Pollution Plan for NO₂ in the UK

- 2.1.7 The national Air Quality Plan for NO₂ (DEFRA, 2018) sets out how the Government plans to deliver reductions in NO₂ throughout the UK, with a focus on reducing concentrations to below the EU Limit Values throughout the UK within the 'shortest possible time'.

- 2.1.8 The Plan requires all Local Authorities (LAs) in England which DEFRA identified as having exceedances of the limit values in their areas past 2020 to develop local plans to improve air quality and identify measures to deliver reduced emissions, with the aim of meeting the limit values within their area within "*the shortest time possible*". Potential measures include changing road layouts, encouraging public and private ultra-low emission vehicle (ULEV) uptake, the use of retrofitting technologies and new fuels and encouraging public transport. In cases where these measures are not sufficient to bring about the required change within 'the shortest time possible' then LAs may consider implementing access restrictions on more polluting vehicles (e.g. Clean Air Zones (CAZs)).

2.2 Air Quality Management

The Air Quality Strategy

- 2.2.1 Part IV of the Environment Act 1995 (Environment Act, 1995) required the Secretary of State to prepare and publish and 'strategy' regarding air quality.
- 2.2.2 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK (DEFRA, 2007). The primary objective of the Air Quality Strategy is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Air Quality Strategy sets out the NAQOs and Government policy on achieving these.
- 2.2.3 The Clean Air Strategy (2019) aims to lower national emissions of pollutants, thereby reducing background pollution and minimising human exposure to harmful concentrations of pollution. The Strategy aims to create a stronger and more coherent framework for action to tackle air pollution (DEFRA, 2019a).

Local Air Quality Management

- 2.2.4 Part IV of the Environment Act 1995 (Environment Act, 1995) introduced a system of Local Air Quality Management (LAQM) which requires local authorities to regularly and systematically review and assess air quality within their boundary and appraise development and transport plans against these assessments.
- 2.2.5 Where a NAQO is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the NAQO's within its AQMA.
- 2.2.6 The Local Air Quality Management Technical Guidance 2022 (LAQM.TG (22); DEFRA, 2022), issued by the Department for Environment, Food and Rural Affairs (DEFRA) for LAs provides advice on where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year) as summarised in **Table 2-2**.

Table 2-2 Relevant Public Exposure

Averaging Period	NAQOs should apply at:	NAQOs don't apply at:
Annual mean	All locations where members of the public might be regularly exposed For example: Building façades of residential properties, schools, hospitals, care homes etc	Façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residences Kerbside sites Any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean NAQO would apply, together with hotels and gardens of residences	Kerbside sites Any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean NAQOs apply as well as: Kerbside sites Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside locations where the public would not be expected to have regular access
15-minute mean	All locations where members of the public might reasonably be regularly exposed for a period of 15 minutes or longer.	

2.3 Planning Policy

National Planning Policy

2.3.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how they are expected to be applied (Ministry of Housing, Communities & Local Government, 2021). The following paragraphs are considered relevant from an air quality perspective.

2.3.2 Paragraph 104 on promoting sustainable transport states:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: ...

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; ..."

2.3.3 Paragraph 105 goes on to state:

“Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health.”

2.3.4 Paragraph 185 within ground conditions and pollution states:

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

2.3.5 Paragraph 186 states that:

“Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”

2.3.6 Paragraph 187 states that:

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

National Planning Practice Guidance

2.3.7 Paragraph 005, Reference 32-005-20191101 (revision date 01.11.2019), of the PPG provides guidance on how considerations regarding air quality can be relevant to the development management process as follows:

“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.

- *Where air quality is a relevant consideration the local planning authority may need to establish:*
- *The ‘baseline’ local air quality, including what would happen to air quality in the absence of the development;*

- *Whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and*
- *Whether occupiers or users of the development could experience poor living conditions or health due to poor air quality."*

2.3.8 Paragraph 006, Reference 32-006-20191101 (revision date 01.11.2019), of the PPG identifies what specific air quality issues need to be considered in determining a planning application:

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

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

2.3.9 Paragraph 007, Reference 32-007-20191101 (revision date 01.11.2019), of the PPG provides guidance on how detailed an assessment needs to be:

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

and

"The following could form part of assessments:

A description of baseline conditions and any air quality concerns affecting the area, and how these could change both with and without the proposed development;

- *Sensitive habitats (including designated sites of importance for biodiversity);*
- *The assessment methods to be adopted and any requirements for the verification of modelling air quality;*

- *The basis for assessing impacts and determining the significance of an impact;*
- *Where relevant, the cumulative or in-combination effects arising from several developments;*
- *Construction phase impacts;*
- *Acceptable mitigation measures to reduce or remove adverse effects; and*
- *Measures that could deliver improved air quality even when legally binding limits for concentrations of major air pollutants are not being breached."*

2.3.10 Paragraph 008, Reference 32-008-20140306 (revision date 01.11.2019), of the PPG provides guidance on how an impact on air quality can be mitigated:

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

Examples of mitigation include:

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

Local Planning Policy

2.3.11 WDC is currently preparing a new Local Plan which will provide policies to plan and manage growth in the district over a 15 – 20-year period. However, until the New Local Plan is adopted, the WDC Affordable Housing Delivery Local Plan 2016, Core Strategy Local Plan 2013 and saved policies from the Wealden Local Plan 1998 form the Council's current development plan for the district.

2.3.12 The Core Strategy Local Plan and Affordable Housing Delivery Local Plan do not contain any specific policies relating to air quality.

2.3.13 The following saved policy from the Wealden Local Plan 1998 is relevant to air quality:

EN1 – Sustainable Development

"The Council will pursue sustainable development, having regard to the principles contained in Government guidance and its own Strategy for the Environment, in considering location, layout and design of development, renewable energy and waste management proposals and in

assessment the effects of proposals and in assessment the effects of proposals on the environment, including on water and air quality.”

2.4 Assessment Guidance

- 2.4.1 The primary guidance documents used in undertaking this assessment are detailed in the section below.

DEFRA ‘Local Air Quality Management Technical Guidance (LAQM.TG (22))’

- 2.4.2 DEFRA LAQM.TG (22) was published for use by local authorities in their LAQM review and assessment work (DEFRA, 2022). The document provides key guidance on aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

EPUK / IAQM ‘Land-Use Planning & Development Control: Planning for Air Quality’

- 2.4.3 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have together published guidance to help ensure that air quality is properly accounted for in the development control process (EPUK / IAQM 2017). It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

IAQM ‘Guidance on the Assessment of Dust from Demolition and Construction’

- 2.4.4 Guidance on the assessment of dust from demolition and construction has been published by the IAQM (IAQM, 2014). The guidance provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities in order to identify appropriate mitigation measures that are defined within further IAQM guidance.

Air Quality and Emissions Mitigation Guidance for Sussex

- 2.4.5 This guidance aims to provide clarity to how authorities intend interpreting relevant Local Plan policies, as well as provide advice for developers and their consultants on how to assess and mitigate the impact that new developments may have on local air quality. The guidance also details a consistent approach by developers and Local Planning Authorities (LPAs) to address impacts on local air quality, ensure optimum scheme design to reduce emissions and/or exposure and avoid unnecessary delays in the planning process.

DEFRA’s Air Quality Damage Cost Guidance and Appraisal Toolkit

- 2.4.6 Damage costs are a set of values used to quantify air quality impacts by tonne of emission and provide an estimation of the societal costs associated with small changes in pollutant concentrations. The Air Quality Damage Cost Guidance (DEFRA, 2021b) developed by DEFRA details the methodology for calculating damage costs and provides the cost per tonne for each pollutant assessed.
- 2.4.7 The Air Quality Damage Cost Appraisal Toolkit (DEFRA, 2021c) has also been developed by DEFRA to assist with the calculation of damage costs. The Toolkit calculates the damage cost using the methodology outlined in the in the Damage Cost Guidance and requires the following user-defined inputs: appraisal period start year and end year, price base year, pollutants, and the transport-related pollutant emissions resulting from the development.

3 Methodology

3.1 Introduction

- 3.1.1 The assessment methodology detailed in the following sections has been applied to ascertain the potential impacts of emissions to air in order to identify their significance and compliance with policy and regulatory requirements (outlined in **Section 2** of this report), and whether or not additional mitigation is required.
- 3.1.2 This assessment first defines the 'study area' and outlines the baseline air quality (for both 'existing'¹ and relevant future years i.e. development construction, first occupation or completion) within this study area. The suitability of the Site for the proposed end use is then assessed followed by the impact of construction and operational activities on existing sensitive receptors located within the study area.

3.2 Baseline Air Quality

- 3.2.1 Any exceedances of the limit values along roads within the study area in the 'existing' year (2019) and relevant future years have been identified using the NO₂ and PM Projections Data published by DEFRA (DEFRA, 2020a). Information on baseline air quality in the study area has been obtained by collating the results of monitoring carried out by WDC and their LAQM reports to identify potential AQMAs. Background concentrations for the study area have been defined using the national pollution maps published by DEFRA which cover the whole country on a 1x1 km grid (DEFRA, 2020b).

3.3 Construction Dust Impacts

- 3.3.1 During demolition and construction, dust from on-site activities and off-site trackout by construction vehicles has the potential to impact on sensitive human receptors within the study area; the main potential impacts are loss of amenity (as a result of dust soiling) and deterioration of human health (as a result of concentrations of PM₁₀).
- 3.3.2 The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source(s).
- 3.3.3 Separation distance is also an important factor. Large dust particles (greater than 30µm), can be potentially responsible for most dust annoyance, will largely deposit within 100 m of sources. Intermediate particles (10-30 µm) can travel 200-500 m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10 µm), which are the predominant fraction that can be potentially responsible for human health impacts largely remain airborne. However, the impact on the short-term concentrations of PM₁₀ occurs over a shorter distance due to the rapid decrease in concentrations with distance from the source due to dispersion.
- 3.3.4 The assessment of the risk of potential construction dust impacts has been undertaken with reference to relevant guidance (IAQM, 2014).

¹ 2019 has been used as the 'existing' year as this is the latest year for which representative local monitoring data is available due to the impact of Covid-19 restrictions on traffic flows and subsequent air pollutant concentrations in 2020 and 2021.

Screening Assessment

- 3.3.5 The first stage of the assessment involves screening to determine if there are sensitive receptors within threshold distances of the activities associated with the construction phase of a proposed development; defined as the study area. No further assessment is required if there are no receptors within the study area.
- 3.3.6 The IAQM guidance outlines that an assessment is only required in cases where:
- A 'human receptor' is located within:
 - 350 m of the boundary of the Site; OR
 - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).
 - An 'ecological receptor' is located within:
 - 50 m of the boundary of the Site; OR
 - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

Further Assessment

- 3.3.7 The risk of impacts associated with dust soiling and PM₁₀ caused by the Proposed Development has been determined (following the IAQM 2014 guidance) based on the dust emission class (or magnitude) for each activity arising from four activities in the absence of mitigation (demolition, earthworks, construction and trackout), the sensitivity of nearby receptors and the overall sensitivity of the area. The dust emission class, receptor sensitivity and the overall sensitivity of the area are determined using the criteria outlined in **Table B-1, Table B-2, Table B-3, Table B-4 and Table B-5 of Appendix B** (based on the IAQM guidance), indicative thresholds and professional judgement. The risk of dust impacts arising is a product of the relationship between the dust emission magnitude and the area sensitivity and is based on the criteria outlined in **Table B-6** (based on the IAQM guidance). The risk of impact is then used to determine the mitigation requirements.
- 3.3.8 The IAQM guidance recommends that no assessment of the significance of effects is made without mitigation in place, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations.
- 3.3.9 With appropriate mitigation in place, the IAQM guidance indicates that the residual effect dust emissions associated with the demolition and construction can be classified as being 'not significant'.

3.4 Demolition and Construction Road Traffic Impacts

- 3.4.1 The potential for a significant overall effect on existing sensitive receptors within the study area as a result of emissions from demolition and construction traffic generated by the Proposed Development has been determined qualitatively, taking into consideration the screening criteria outlined in the EPUK / IAQM guidance (EPUK / IAQM, 2017) (see **Appendix C**), the anticipated routing of the generated traffic and the anticipated duration of impacts associated with the generated traffic.

3.5 Operational Road Traffic Emission Impacts

Screening Assessment

Site Suitability

- 3.5.1 A qualitative assessment to determine whether there is a potential for exceedances of the relevant NAQOs at sensitive locations within the Proposed Development has initially been undertaken, taking into account future baseline air quality conditions within and in close proximity to the Site, and the proximity of sensitive locations within the development to nearby sources of emissions.

Detailed Assessment

Human Receptors

- 3.5.2 Concentrations of pollutants (NO₂, PM₁₀ and PM_{2.5}) have been predicted for a range of worst-case locations of relevant human receptor exposure both at sensitive existing properties and within the Proposed Development itself to allow comparison with the NAQOs and (for existing receptors only) determination of the significance of impacts at each receptor.
- 3.5.3 Emissions from road vehicles and their resultant impact at receptor locations have been predicted using the ADMS-Roads dispersion model (v5.0.1.3). The model requires the user to provide various input data, including traffic flows (in AADT format), vehicle composition (i.e. the proportion of HDVs, road characteristics (including road width, gradient and street canyon dimensions, where applicable), and average vehicle speed. AADT flows and the proportions of HDVs, for roads within the study area have been provided by the Project's transport consultants, Stantec. Traffic data used in this assessment are summarised in **Appendix D** and the modelled road network is shown in **Figure 1**.

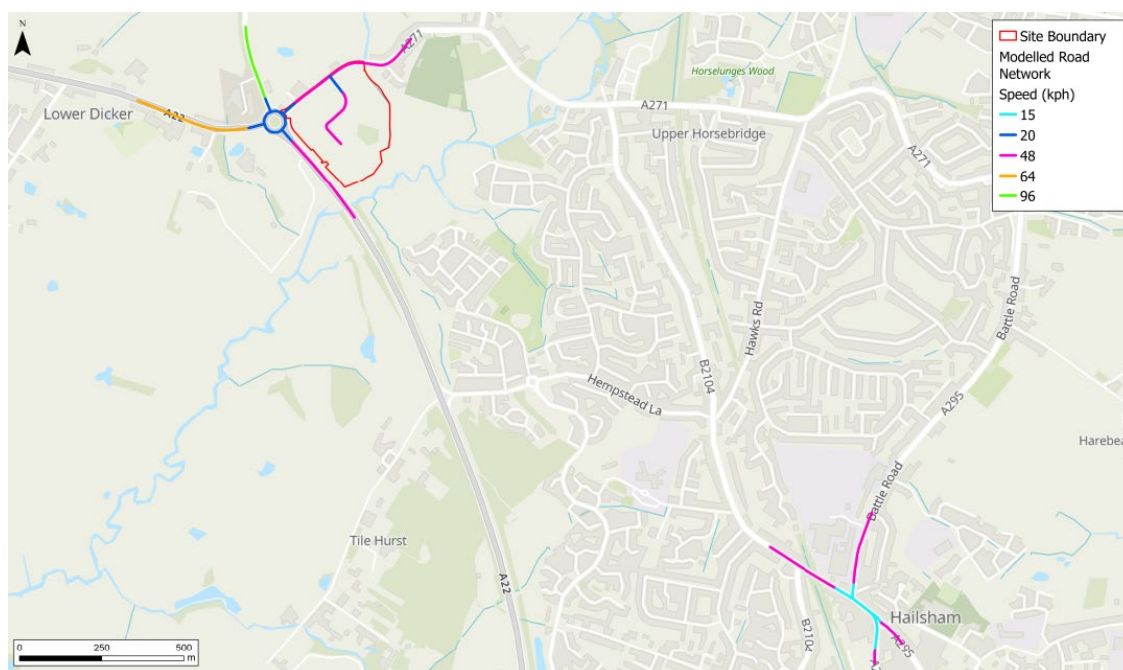


Figure 1: Modelled Road Network. Service Layer Credits - GB Topographic: Contains OS data © Crown Copyright and database right 2022. Contains data from OS Zoomstack.

- 3.5.4 The model also requires meteorological data and has been run using 2019 meteorological data from the Herstmonceux West End meteorological station, which is considered suitable for this

area due to its proximity (5.7 km) and similarity in elevation to the Site. **Appendix D** provides further details on the model inputs.

- 3.5.5 Traffic emissions have been calculated using the Emission Factor Toolkit (EFT) v11 (DEFRA, 2021a), which utilises NO_x emission factors taken from the European Environment Agency (EEA) COPERT 5.3 emission tool. The traffic data were entered into the EFT to provide emission rates for each of the road links entered into the model. Road vehicular emissions are primarily associated with the exhaust emissions but also include particles generated from abrasion (of tyres, brakes and road). The EFT allows users to calculate road vehicle pollutant emission rates for NO_x, PM₁₀ and PM_{2.5} (exhaust and brake, tyre and road wear) for a specified year, road type, vehicle speed and vehicle fleet composition.
- 3.5.6 The EFT provides pollutant emission rates for 2018 through to 2050 for England (not London), and 2018 to 2030 for Wales, Scotland, Northern Ireland and London and takes into consideration bespoke vehicle fleet information as well as the following information available from the National Atmospheric Emissions Inventory (NAEI):
- fleet composition data for motorways, urban and rural roads in the UK (excluding London);
 - fleet composition based on European emission standards from pre-Euro I to Euro6/VI (including Euro 6 subcategories);
 - scaling factors reflecting improvements in the quality of fuel and some degree of retrofitting; and
 - technology conversions in the national fleet.
- 3.5.7 As a result of this the road vehicle exhaust emissions of NO_x are projected to decrease year-on-year due to technological advances and improvements to the fleet mix i.e. penetration of Euro VI HDVs, which recent research suggests are performing well. Whilst there has been uncertainty over NO_x emissions from vehicle exhausts (particularly from Euro 5 and 6 LDVs it is important to note the EFT is not based on the Euro emission standards.
- 3.5.8 Generally, concentrations of air pollutants in the UK are anticipated to decrease in the coming years; as such, in most cases, the earlier the year that is assessed, the more worst-case the assessment is. The earliest year that the Proposed Development could potentially be occupied by is 2025. Therefore, in order to take account of uncertainties relating to future year vehicle emissions and background pollutant concentrations in order to provide a conservative assessment, the assessment has been carried out utilising emission factors and background concentrations from 2025, combined with traffic data from 2030 (which includes full-development flows).

3.6 Emissions Mitigation Assessment

- 3.6.1 The Air Quality and Emissions Mitigation Guidance for Sussex (Sussex Air Quality Partnership, 2021) requires an emissions mitigation assessment to be undertaken for all 'major' developments, which the Proposed Development is considered to be, as defined by the Town and Country Planning (Development Management Procedure) Order (England) 2015.
- 3.6.2 An emissions mitigation assessment for the Proposed Development has been carried out in accordance the Sussex Air Quality Partnership Guidance. As recommended in the Sussex guidance, a damage cost calculation has been carried out in accordance with the principles of DEFRA's Air Quality Damage Cost Guidance (DEFRA, 2021b) and uses emissions obtained from the latest DEFRA EFT (v11). The damage cost calculation has been undertaken in DEFRA's Damage Cost Appraisal Toolkit (DEFRA, 2021c) which translates the DEFRA Air Quality Damage Cost Guidance into an accessible tool.

- 3.6.3 In order to calculate the amount of transport-related pollutant emissions the Proposed Development is likely to produce, the additional number of trips generated by the Proposed Development has been input into the EFT. The EFT has been run for the key pollutants, NO_x and PM_{2.5}. In accordance with the Sussex Guidance (Sussex Air Quality Partnership, 2021), a vehicle speed of 50 kph (average speed) and a link length of 10 km (NTS UK average) have been used and the road type has been determined to be rural (not London). 2025 has been used as the emissions factor year as this is the earliest year the Proposed Development could be occupied.
- 3.6.4 Emissions calculated in the EFT have then been input into DEFRA's Damage Cost Appraisal Toolkit (DEFRA, 2021c). The source sector in the Toolkit was defined as 'road transport rural', and a 5-year appraisal period for 2025-2029 has been used in the calculation. The central damage cost value for NO_x and PM_{2.5} has then been obtained from the Toolkit.

3.7 Assumptions and Limitations

- 3.7.1 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.
- 3.7.2 There has been an acknowledged disparity between national road transport emissions projections and measured annual mean concentrations of nitrogen oxides (NO_x) and NO₂ for many years. Recent monitoring has shown that reductions in concentrations are now being measured in many parts of the country (Air Quality Consultants Ltd., 2020a), however, there is still some uncertainty regarding the rate at which emissions will reduce in the future and therefore some consideration must be given to the accuracy of any projection and to appropriately respond to this.
- 3.7.3 The complete development modelling has been based on emission factors and background concentrations for the first year of development occupation in 2025, whilst utilising traffic flows for 2030. The model has been verified against 2019 monitoring data. This is considered to provide an appropriately conservative assessment taking into account the uncertainties regarding future vehicle emission factors.
- 3.7.4 The default fleet projections in the DEFRA's EFT v11.0 and 2018-based background maps are based on fleet growth assumptions which were current before the Covid-19 outbreak in the UK. As a result, default outputs from these tools do not reflect short- or longer-term impacts on emissions in 2020 and potentially beyond resulting from behavioural change during lockdowns.

3.8 Air Quality Impacts Significance Criteria

- 3.8.1 The relevant NAQOs are set out in **Table 2-1**. The predicted pollutant concentrations in the future year (2025) at each identified sensitive receptor have been compared to the relevant NAQOs and any exceedances identified.
- 3.8.2 Analysis of long-term monitoring data suggests that if the annual mean NO₂ concentration is less than 60 µg/m³ then the 1-hour mean NO₂ NAQO is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the one-hour mean objective is likely to be achieved (DEFRA, 2022). Analysis of long-term monitoring data also suggests that if the annual mean PM₁₀ concentration is less than 32 µg/m³ then the 24-hour mean PM₁₀ NAQO is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment this concentration has been used to screen whether the 24-hour mean NAQO is likely to be achieved

- 3.8.3 There is no official guidance in the UK on how to assess the significance of the air quality impacts of existing air quality on a new development. The assessment of proposed receptors within the Site has therefore been limited to predicting pollutant concentrations at worst-case receptors within the Site and comparing these predicted concentrations to the relevant NAQOs, with the overall significance being based on whether the NAQOs for each pollutant are exceeded or not.
- 3.8.4 There is no official guidance in the UK on how to assess the significance of the air quality impacts of a new development on existing receptors. The approach developed by EPUK and the IAQM (EPUK / IAQM, 2017), which considers the change in air quality as a result of a proposed development on existing receptors in combination with baseline concentrations at the receptors, has therefore been used. The guidance sets out three stages: determining the magnitude of change at each receptor, describing the impact, and assessing the overall significance. Impact magnitude relates to the change in pollutant concentration; the impact description relates this change to the air quality objective and is shown in **Table 3-1**.

Table 3-1 Impact Significance Criteria

Long term average Concentration at receptor in assessment year	% Changes in Concentration with development in relation to NAQO / Limit Value			
	1*	2-5	6-10	>10
> 110 % ^a	Moderate	Substantial	Substantial	Substantial
>102% - ≤110% ^b	Moderate	Moderate	Substantial	Substantial
>95% - ≤102% ^c	Slight	Moderate	Moderate	Substantial
>75% - ≤95% ^d	Negligible	Slight	Moderate	Moderate
≤75% ^e	Negligible	Negligible	Slight	Moderate

Where concentrations increase the impact is described as adverse, and where it decreases as beneficial.

% change rounded to nearest whole number. Where the % change is 0 (i.e. Less than 0.5%) the impact will be Negligible.

^a NO₂ or PM₁₀: > 44 µg/m³ annual mean; PM_{2.5} >27.5 µg/m³ annual mean; PM₁₀ >35.2 µg/m³ annual mean (days).

^b NO₂ or PM₁₀: > 40.8 – ≤ 44 µg/m³ annual mean; PM_{2.5} > 20.4 – ≤22 µg/m³ annual mean; PM₁₀ >32.64 – ≤35.2 µg/m³ annual mean (days).

^c NO₂ or PM₁₀: > 38 – ≤40.8 µg/m³ annual mean; PM_{2.5} >19 – ≤20.4 µg/m³ of annual mean; PM₁₀ >30.4 – ≤32.64 µg/m³ annual mean (days).

^d NO₂ or PM₁₀: >30 – ≤38 µg/m³ annual mean; PM_{2.5} >15 – ≤19 µg/m³ annual mean; or <24 – ≤ 30.4 µg/m³ annual mean (days).

^e NO₂ or PM₁₀: ≤30 µg/m³ annual mean; PM_{2.5} ≤15 µg/m³ annual mean; PM₁₀ ≤24 µg/m³ annual mean (days).

- 3.8.5 The guidance states that the overall assessment of significance should be based on professional judgement, taking into account factors including:
- the number of properties affected by 'slight', 'moderate' or 'substantial' adverse air quality impacts and a judgement on the overall balance;
 - the magnitude of the changes and the descriptions of the impacts at the receptors;
 - whether or not an exceedance of an NAQO or limit value is predicted to arise in the operational study area (where there are significant changes in traffic) where none existed before or an exceedance area is substantially increased;
 - the uncertainty, comprising the extent to which worst-case assumptions have been made; and
 - the extent to which an NAQO or limit value is exceeded.

- 3.8.6 Therefore, where impacts at an individual receptor are classified as 'negligible' or 'slight', effects would typically be considered 'not significant'. However, where 'moderate' or 'substantial' adverse impacts are identified at individual receptors, the overall effect needs to be considered in the round taking into account the changes at all of the modelled receptor locations, with a judgement made as to whether the overall air quality effect of the development is 'significant' or not.

4 Baseline Environment

4.1 Site Context

- 4.1.1 The Site is bound to the north by the A271 and to the west by the A22, as well as a roundabout to the west. To the east is an area of open grassland, beyond which is Cuckmere River, followed by residential properties.
- 4.1.2 To the north-east of the site is the village of Lower Horsebridge which includes the village recreation ground which abuts part of the Site. To the south is an area of informal public open space which extends between the edge of the Welbury Farm development and the River Cuckmere.

4.2 Study Area

- 4.2.1 The study area adopted for this assessment is as follows:
- for the construction dust risk assessment, the study area (based on IAQM, 2014 guidance) is defined as comprising the area up to 350 m from the site boundary and 50 m from the route used by construction vehicles (up to 500 m from the site entrance(s)).
 - for the construction phase road traffic emission assessment, the study area (based on the EPUK / IAQM, 2017 guidance) includes all roads (and adjacent properties) predicted to exceed the screening criteria outlined in **Appendix C**
 - for the operational phase road traffic emissions assessment, the study area (based on EPUK / IAQM, 2017 guidance) includes the Site, all roads (and adjacent properties) within 250 m of the site boundary and any other roads with the potential to exceed the screening criteria outlined in **Appendix C**.

4.3 Sensitive Receptor Locations

- 4.3.1 Relevant sensitive human receptor locations are places where members of the public might be expected to be regularly present over the averaging period of the NAQOs. The NO₂, PM₁₀ and PM_{2.5} annual mean NAQO sensitive locations include proposed residences and the 1-hour mean NO₂ NAQO sensitive locations will include the proposed residences. When identifying these receptors, particular attention has been paid to assessing impacts close to junctions, traffic lights and roundabouts where traffic may become congested, where there is a combined effect of several road links and routes along which substantial volumes of traffic generated by the Proposed Development will travel.
- 4.3.2 Based on these criteria, two existing residential properties adjacent to the site access and seven proposed residential properties within the Site itself have been identified as worst-case receptors for the assessment. The locations of these receptors have been chosen to represent locations where impacts from road traffic are likely to be the greatest i.e. as a result of development traffic at junctions. The locations of existing and proposed receptors are described in **Appendix D** and shown in **Figure 2**.



Figure 2: Human Receptor Locations. Service Layer Credits - GB Topographic: Contains OS data © Crown Copyright and database right 2022. Contains data from OS Zoomstack.

- 4.3.3 Concentrations have also been predicted at two diffusion tube monitoring sites located adjacent to the A22 in Lower Horsebridge (W8) and on London Road B2104 in Hailsham (W6) in order to verify the modelled results. **Appendix D** provides further details on the verification method.

4.4 Ambient Air Quality

Limit Values

- 4.4.1 The study area does not contain any predicted or measured exceedances of limit values either in the 'existing' baseline year (2019) or in the future years. The study area is not within a zone where DEFRA have reported an exceedance of a limit value either in the 'existing' year (2019) or in future years.

LAQM

- 4.4.2 WDC has investigated air quality within its area as part of its responsibilities under the LAQM regime. Currently, WDC does not have any declared AQMAs.

Local Monitoring Data

NO₂

- 4.4.3 WDC carries out monitoring at ten NO₂ diffusion tubes, the nearest of which, W8, is located approximately 240 m from the Proposed Development, as well as W6 located within the study area (see **Figure 3**).

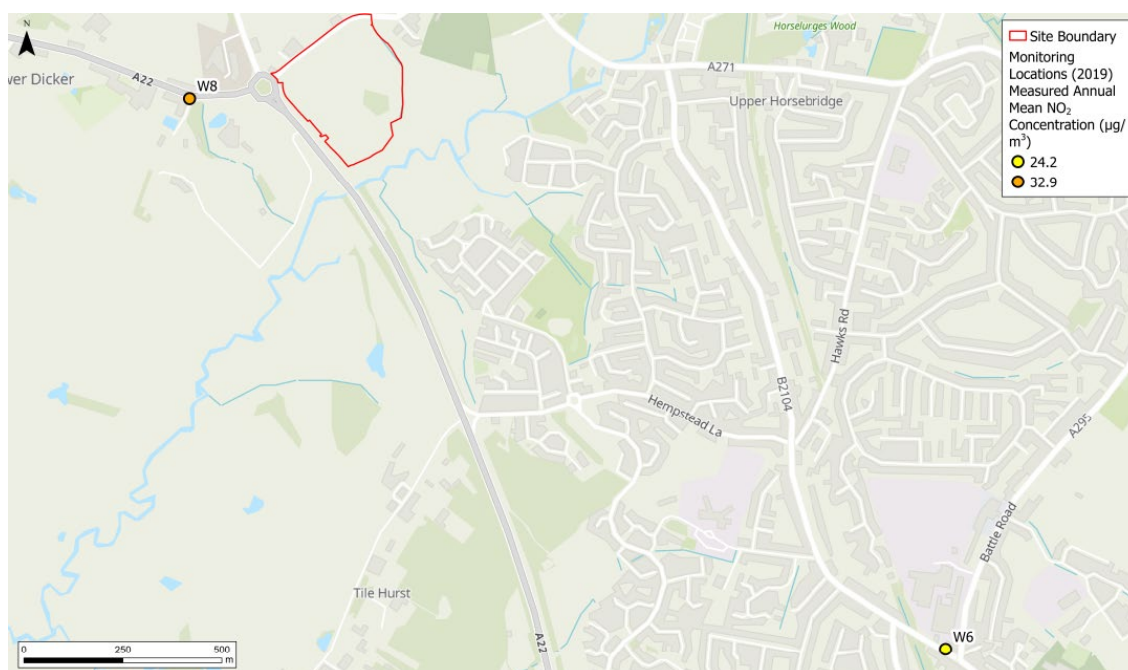


Figure 3: Monitoring Locations. Service Layer Credits - GB Topographic: Contains OS data © Crown Copyright and database right 2022. Contains data from OS Zoomstack.

- 4.4.4 2015-2019 monitoring results for the most representative and closest monitoring locations to the Site are shown in **Table 4-1**. It should be noted that 2021 and 2020 measured concentrations are not considered to be representative of longer-term trends due to Covid-19 restrictions in place during these years and have therefore not been included in **Table 4-1**.

Table 4-1 Measured Annual Mean NO₂ Concentrations 2015 – 2019

Site ID	Site Type	Within AQMA	Annual Mean (µg/m³)				
			2015	2016	2017	2018	2019
Diffusion Tubes							
W6 – London Road, Hailsham*	Roadside	No	26.1	23.9	26.1	27.1	24.2
W8 – A22 W of Boship roundabout*	Roadside	No	31.3	35.9	35.0	34.2	32.9
NAQO		40					

2015 – 2019 data taken from the WDC Air Quality Annual Status Report for 2020 (WDC, 2020).

* Used for model verification.

- 4.4.5 Measured concentrations at the closest monitoring location to the Site, W8 (circa 240 m), have been well below the annual mean NAQO between 2015 and 2019. Furthermore, measured concentrations at both diffusion tube monitoring sites are below 60 µg/m³, indicating that it is unlikely that any exceedances of the 1-hour mean objective have occurred. There is no clear trend in concentrations over time.

PM₁₀ and PM_{2.5}

- 4.4.6 WDC does not currently undertake any PM₁₀ or PM_{2.5} monitoring within its administrative area.

4.5 Predicted Background Concentrations

- 4.5.1 Estimated background concentrations for the Site have been obtained from the latest 2018-based national maps provided by DEFRA (DEFRA, 2020b). The DEFRA background concentrations for the study area/identified receptors area are provided in **Table 4-2**.
- 4.5.2 The background concentrations are all well below the relevant NAQOs and limit value both in the 'existing' and future years.

Table 4-2 Estimated Annual Mean Background Concentrations

Year	Location	Annual Mean ($\mu\text{g}/\text{m}^3$)		
		NO ₂	PM ₁₀	PM _{2.5}
2019	557_111 ^a	9.0	13.7	9.1
	556_111	8.3	13.3	8.9
	558_109	11.0	14.6	10.0
2025	557_111 ^a	7.0	12.6	8.2
	556_111	6.6	12.2	8.0
	558_109	8.9	13.4	9.1
NAQOs/Limit value		40	40	20

^a Development Site.

Note: Projections in the 2018 reference year background maps and associated tools are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these tools do not reflect short- or longer-term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns.

4.6 Predicted Baseline Concentrations

Human Receptors

- 4.6.1 The ADMS-Roads model has been used to predict baseline NO₂, PM₁₀ and PM_{2.5} annual mean concentrations at the existing receptor locations identified in **Figure 2**. The results for the 2019 and 2025 baseline scenarios are presented in **Table 4-3**.

Table 4-3 Predicted Baseline Concentrations of NO₂, PM₁₀ and PM_{2.5} in 2019 and 2025

Receptor	Annual Mean ($\mu\text{g}/\text{m}^3$)					
	NO ₂		PM ₁₀		PM _{2.5}	
Year	2019	2025	2019	2025	2019	2025
R08	19.3	15.0	15.6	15.3	10.2	9.6
R09	19.2	14.6	15.4	14.9	10.1	9.4
NAQO / limit value	40		40		20	

- 4.6.2 The predicted 2019 and 2025 baseline concentrations of NO₂, PM₁₀ and PM_{2.5} do not exceed the relevant NAQO / limit value at either of the existing receptor locations (R08 and R09).
- 4.6.3 None of the predicted annual mean NO₂ concentrations exceed 60 $\mu\text{g}/\text{m}^3$ and therefore exceedance of the 1-hour mean NO₂ NAQO is unlikely.
- 4.6.4 None of the predicted annual mean PM₁₀ concentrations exceed 32 $\mu\text{g}/\text{m}^3$ and therefore the 24-hour mean PM₁₀ NAQO is not predicted to be exceeded.

- 4.6.5 Overall, baseline concentrations of all of the pollutants considered are predicted to decrease in future years as vehicle emissions and background concentrations are assumed to improve, despite general growth in traffic on the network.

5 Predicted Impacts

5.1 Construction Dust Impact

Screening Assessment

- 5.1.1 There are a number of existing sensitive human receptors (including residential properties) located within 350 m of the site boundary and within 50 m of the routes that will be used by demolition and construction vehicles. As such, further assessment of the risk of dust soiling and PM₁₀ emissions is required.
- 5.1.2 There are no sensitive ecological receptors located within 50 m of the site boundary or within 50 m of the routes used by demolition and construction vehicles on the public highway. The closest designated ecological site to the Site is located >4 km from the site boundary. As such, the potential for ecological impacts as a result of dust soiling can be screened out as being 'not significant'.

Further Assessment

Dust Emission Magnitude

- 5.1.3 The dust emissions magnitude of demolition, earthworks and construction activities and as a result of trackout have been determined based the criteria shown in **Table B-1, Appendix B**
- There is no demolition proposed on-site and therefore there will be no risk of dust impacts associated with this activity.
 - The Site is greater than 10,000 m² in area and soil at the Site is considered to be potentially dusty (being slightly acid loamy soil, with a silty texture (British Geological Survey, 2022)). Based on this, the dust emission magnitude of earthworks activities is judged to be 'large'.
 - Construction activities comprise the construction of 124 residential properties, consisting of 54 apartments and 70 houses, and associated parking facilities, with a building volume of greater than 100,000 m². Based on this, the dust emission magnitude of construction activities is judged to be 'large'.
 - The number of HDVs that will exit the Site on a daily basis is unknown, however, given the large size of the Site, it is anticipated to be over 50 HDVs per day. Based on this, the dust emission magnitude of trackout is judged to be 'large'.

Area Sensitivity

- 5.1.4 The area sensitivity to dust soiling and human health impacts has been determined based on the criteria shown in **Table B-3, Table B-4, Table B-5, Appendix B**
- 5.1.5 The construction dust study area used in this assessment is shown below in **Figure 4**.

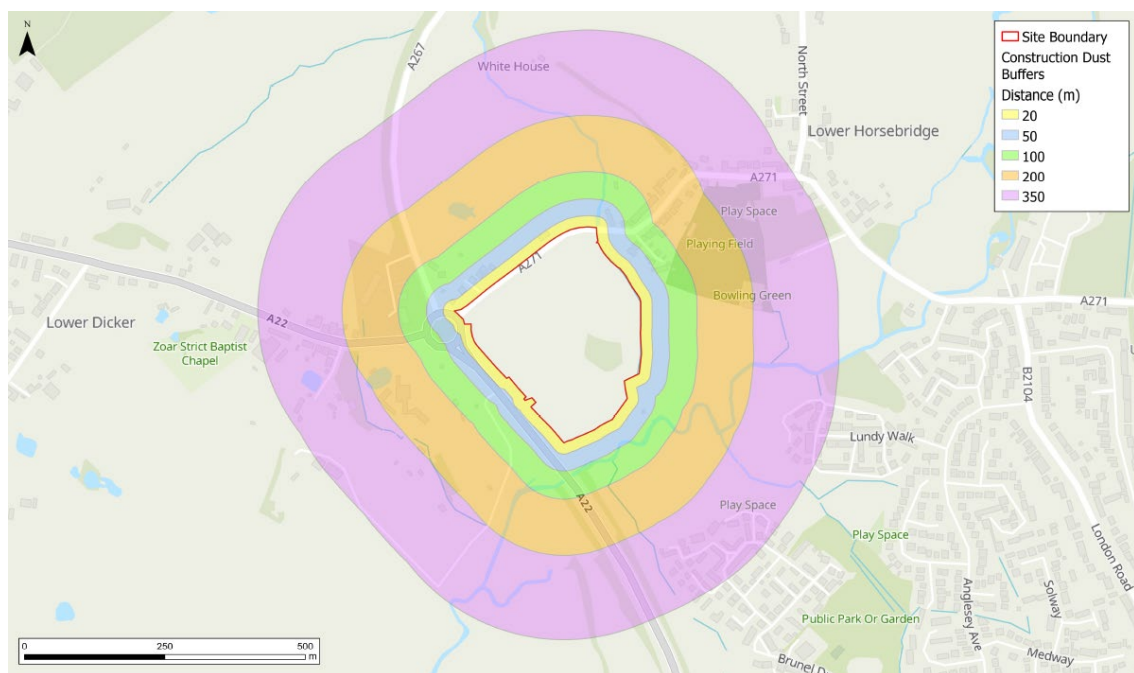


Figure 4: Construction Dust Study Area. Service Layer Credits - GB Topographic: Contains OS data © Crown Copyright and database right 2022. Contains data from OS Zoomstack.

- 5.1.6 Residential properties are classed as being 'high sensitivity' receptors to dust soiling, based on the IAQM guidance (IAQM, 2014) (see **Table B-3, Appendix B**). There are approximately 10 residential properties located within 50 m of the site boundary, two within 20 m. However, there is potential for future residents of the Proposed Development to occupy residential properties within the Site that are within 20 m of construction activities during the later phases of the Proposed Development build-out. As such, the sensitivity of the area surrounding the Site to dust soiling is judged to be 'medium'.
- 5.1.7 The IAQM guidance states that trackout may occur for distance of up to 500 m from large sites. As the construction traffic routing is currently unknown, the worst-case assumption has been made that all main roads may potentially be used by HDVs leaving the Site entrance. There are between 10-100 residential properties located within 20 m of roads extending up to 500 m of the Site; as such, the sensitivity to dust soiling of the area surrounding roads along which material may be tracked is judged to be 'high'.
- 5.1.8 The IAQM also defines residential properties as being 'high sensitivity' receptors to human health impacts (see **Table B-4, Appendix B**). PM₁₀ concentrations at existing residential properties within the study area are anticipated to be similar to the predicted 2019 baseline PM₁₀ concentrations at receptors R08 and R09 (i.e 15.4 – 15.6 µg/m³). Based on the predicted existing PM₁₀ concentrations and the number of sensitive receptors within 20 m of the site boundary and roads along which material may be tracked, the sensitivity to human health impacts of the areas surrounding the Site and the area surrounding roads along which material may be tracked are judged to be 'low'.

Risk of Impacts

- 5.1.9 The risk of construction dust impacts, without mitigation, have been defined based on the criteria shown in **Table B-6, Appendix B** and are presented in **Table 5-1**.

Table 5-1 Risk of Construction Dust Impacts without Mitigation

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

5.2 Construction Road Traffic Impacts

- 5.2.1 At present, detailed information regarding the construction methodology for the development, specific activities and traffic movements is not available. However, a Construction Environmental Management Plan (CEMP) will outline measures to control and minimise the risk of adverse effects from construction activities. The CEMP will be submitted to WDC for their approval. The CEMP will consider Heavy Goods Vehicles (HGV) and other construction traffic movements, including details of routing and times of day of movements. HGV access will be prevented or minimised, where possible, on traffic sensitive roads, residential streets, congested roads or unsuitable junctions.
- 5.2.2 Vehicle movements associated with access, demolition and construction will vary through the construction programme, with short periods of peak HGV movements associated with demolition and the delivery of materials during the construction phase. However, when the HGV movements are averaged over a full year period (AADT), these will be significantly lower than peak movements. Together with the implementation of the CEMP, the construction vehicle movements impact on human health receptors in the area are considered to be temporary and not significant. Moreover, vehicle movements associated with construction are typically significantly lower than the number of vehicle movements associated with operation of the Proposed Development, which have been taken into account in this assessment.

5.3 Site Suitability

Screening Assessment

- 5.3.1 The Site is located adjacent to a busy road. Therefore, a detailed assessment of site suitability has been undertaken (see following section).

Detailed Assessment

- 5.3.2 Predicted concentrations at modelled receptor locations are presented in **Table 5-2**. Details of the proposed receptors are provided in **Appendix D** and their locations are shown in **Figure 2**.

Table 5-2 Predicted Concentrations within the Site in 2025

Receptor	Annual Mean ($\mu\text{g}/\text{m}^3$)		
	NO ₂	PM ₁₀	PM _{2.5}
R01	16.3	15.4	9.7
R02	18.5	15.8	10.0
R03	22.2	16.5	10.4
R04	18.9	15.2	9.7
R05	16.0	14.5	9.3
R06	15.5	15.4	9.7
R07	15.5	15.4	9.7
NAQO / limit value	40	40	20

- 5.3.3 There are no predicted exceedances of the annual mean NO₂, PM₁₀ and PM_{2.5} NAQOs / limit value at any of the worst-case modelled proposed receptors within the Site. Therefore, air quality within the Site is considered to be acceptable and no further mitigation to improve air quality at proposed receptor locations is required.

5.4 Operational Phase Road Traffic Impacts

Screening Assessment

- 5.4.1 The Proposed Development will generate more than 500 AADT on the site access only. As such, traffic generated by the Proposed Development is predicted to be above the EPUK / IAQM screening criteria (see **Appendix C**) on the site access and, therefore, a detailed assessment on the closest existing receptors to the site access has been undertaken.

Detailed Assessment

- 5.4.2 Predicted concentrations of NO₂, PM₁₀ and PM_{2.5} at existing receptors, both without and with the Proposed Development in place, are presented in **Table 5-3**, **Table 5-4** and **Table 5-5**. The 'without development' scenario predicted concentrations include background concentrations and emissions from existing traffic (and growth), and the 'with development' scenario predicted concentrations include background concentrations, emissions from existing traffic and traffic generated by the Proposed Development.

Table 5-3 Predicted Concentrations of NO₂ (µg/m³), % Change and Impact at each Receptor in 2025

Receptor	Without Development	With Development	Change (as % of NAQO)	Impact Descriptor
R08	15.0	15.2	0.5%	Negligible
R09	14.6	14.7	0.4%	Negligible
NAQO	40			-

Table 5-4 Predicted Concentrations of PM₁₀ (µg/m³), % Change and Impact at each Receptor in 2025

Receptor	Without Development	With Development	Change (as % of NAQO)	Impact Descriptor
R08	15.3	15.3	0.2%	Negligible
R09	14.9	14.9	0.1%	Negligible
NAQO	40			-

Table 5-5 Predicted Concentrations of PM_{2.5} (µg/m³), % Change and Impact at each Receptor in 2025

Receptor	Without Development	With Development	Change (as % of NAQO)	Impact Descriptor
R08	9.6	9.7	0.2%	Negligible
R09	9.4	9.5	0.1%	Negligible
Limit value	20			-

- 5.4.3 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations both without and with the Proposed Development in place, are well below the relevant NAQOs / limit values at all existing receptors. Furthermore, predicted annual mean NO₂ concentrations are below 60 µg/m³ at all receptors, indicating that exceedances of the 1-hour mean NO₂ NAQO are not likely, and the predicted annual mean PM₁₀ concentrations are below 32 µg/m³ at all receptors, indicating that exceedances of the 24-hour mean PM₁₀ NAQO are not likely.

- 5.4.4 The changes in annual mean NO₂, PM₁₀ and PM_{2.5} concentrations range from 0.1% – 0.5% at all receptors. Using the criteria set out in **Table 3-1**, the impacts are described as being 'negligible' at all existing receptor locations.

5.5 Damage Costs

- 5.5.1 Based on 124 residential units, the Proposed Development is predicted to generate an additional 527 vehicle trips per day (AADT). The development vehicle trip generation will largely consist of car trips, with a minimal number of HDV trips expected per day associated with deliveries and servicing. The percentage of HDV vehicle trips as a proportion of the total development vehicle trip generation is estimated to be 1%.
- 5.5.2 The estimated damage costs using the emission factors (EFT v11) are £11,440 for 414 kg/year of NO_x and £12,230 for 26.6 kg/year of PM_{2.5}; a combined damage cost of £23,670.

5.6 Impact Significance

- 5.6.1 The IAQM guidance recommends that no judgement of the significance of effects of construction dust without mitigation is made, as mitigation is assumed to be secured by planning conditions, legal requirements or required by regulations (IAQM, 2014). Following the implementation of appropriate mitigation measures (as described in **Section 6.1**) the residual effects will be 'not significant'.
- 5.6.2 Overall, taking into account the conservative nature of the assessment, and the criteria set out in **Section 3.8**, the operational air quality effects of the Proposed Development are considered to be 'not significant' on the basis that:
- Emissions associated with the Proposed Development (i.e. from traffic generated by the Proposed Development) will not cause any exceedances of the NAQOs.
 - Impacts as a result of emissions associated with the operation of the Proposed Development will be 'negligible' at all receptors.
 - Predicted concentrations of pollutants (NO₂, PM₁₀ and PM_{2.5}) at worst-case sensitive locations within the Proposed Development will be well below the relevant NAQOs and, therefore, new residents / users of the development will experience acceptable air quality.

6 Mitigation

6.1 Construction

6.1.1 The following standard mitigation measures from the IAQM guidance (IAQM, 2014) are recommended, taking into account the outcomes of the construction dust risk assessment (presented in **Table 5-1**).

Communication

- Develop and implement a stakeholder communications plan.
- Display the name and contact details of persons accountable on the site boundary.
- Display the head or regional office information on the site boundary.

Management

- Develop and implement a dust management plan.
- Record all dust and air quality complaints, identify causes and take measures to reduce emissions.
- Record exceptional incidents and action taken to resolve the situation.
- Carry out regular site inspections to monitor compliance with the dust management plan and record results.
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken.
- Agree dust monitoring locations with the local authority and instigate monitoring 3 months in advance of works commencing in the area.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary at least as high as any stockpile 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 run off of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove potentially dusty materials from the Site as soon as possible.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of diesel- or petrol-powered generators where possible.

- Produce a Construction Logistics Plan to manage the delivery of goods and materials.
- Only use cutting, grinding and sawing equipment with dust suppression equipment.
- Ensure an adequate supply of water on-site for dust suppressant.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate.
- Ensure equipment is readily available on-site to clean up spillages of dry materials.
- No on-site bonfires and burning of waste materials on-site.

Earthworks

- Re-vegetate earthworks and exposed areas /soil stockpiles to stabilise surfaces as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless required for a particular process.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored silos with suitable emissions control systems.

Trackout

- Use water assisted dust sweepers on the site access and local roads.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving the Site are covered to prevent escape of materials.
- Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable.
- Install hard surfaced haul routes which are regularly damped down.
- Install a wheel wash with a hard-surfaced road to the site exit where site layout permits.
- The site access gate to be located at least 10 m from receptors where possible.

6.2 Operation

- 6.2.1 In accordance with the Sussex Guidance (Sussex Air Quality Partnership, 2021), electric vehicle charging infrastructure will be required within the Proposed Development. Whilst the number and specification of electric vehicle charging points will be confirmed as part of the Reserved Matters Application (RMA), the electric vehicle charging provision will meet the standards outlined in the East Sussex Parking Standards Supplementary Planning Document.

- 6.2.2 In addition, the Proposed Development would provide cycle parking in line with East Sussex County Council's (ESCC's) cycle parking standards, as well as pedestrian facilities such as footways and spaces within the Site and create links with the wider local area walking network and bus stops. Contributions would be provided for the improvement of bus services and facilities. The level of contribution and appropriate trigger in relation to the level of occupation would be agreed with ESCC to ensure funds are used effectively. In addition, a car sharing scheme for residents would be investigated prior to full occupation and will be implemented if deemed feasible and practical.
- 6.2.3 A Travel Plan will also be prepared for the Proposed Development including measures to encourage greater use of sustainable transport modes, facilitate the use of electric vehicles and reduce the need to travel.
- 6.2.4 As the details of the mitigation measures proposed are to be confirmed at the RMA stage, the estimated cost of measures cannot be compared against the damage cost of the Proposed Development at this stage. Therefore, it is recommended that the cost of air quality-related mitigation is also quantified at the RMA stage and compared against the damage cost of the Proposed Development to determine whether additional mitigation is required to offset the damage cost.

7 Summary and Conclusions

- 7.1.1 The air quality impacts associated with the proposed residential development of the Site at Land East of the A22 and South of the A271, Lower Horsebridge, located within the boundary of Wealden District Council have been assessed. WDC currently does not have any declared AQMAs.
- 7.1.2 The construction works have the potential to create dust. During construction it is recommended that in accordance with the IAQM guidance a package of mitigation measures is put in place to minimise the risk of elevated PM₁₀ concentrations and dust nuisance in the surrounding area. With mitigation in place the construction impacts are judged as not significant.
- 7.1.3 Concentrations of NO₂, PM₁₀ and PM_{2.5} have been predicted for a number of worst-case receptor locations representing existing properties as well as future proposed receptor locations within the Site. Predicted concentrations are well below the relevant NAQOs / limit value at all of the proposed and existing receptor locations with the Proposed Development in place. In addition, the operational effects of the Proposed Development are judged to be 'not significant'.
- 7.1.4 Additional transport-related mitigation measures will be employed to reduce emissions from the Development in accordance with Air Quality and Emissions Mitigation Guidance for Sussex (Sussex Air Quality Partnership, 2021).
- 7.1.5 Overall, the Proposed Development is considered to be in accordance with the requirements of the NPPF, and relevant local and national planning policy and guidance regarding air quality.

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Appendix A Glossary

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
AQR	Air Quality Regulations
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
CEMP	Construction Environmental Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Diffusion Tube	A passive sampler used for collecting NO ₂ in the air
EA	Environment Agency
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes Heavy Goods Vehicles and buses
HE	Highways England
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NAEI	National Atmospheric Emission Inventory
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO ₂	Nitrogen Dioxide
NO _x	Oxides of nitrogen generally considered to be nitric oxide and NO ₂ . Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
NPPF	National Planning Policy Framework
PM ₁₀ /PM _{2.5}	Small airborne particles less than 10/2.5 µm in diameter
PPG	Planning Practice Guidance
Receptor	A location where the effects of pollution may occur
SPG	Supplementary Planning Guidance
WHO	World Health Organisation
WDC	Wealden District Council

Appendix B IAQM Dust Guidance (2014) Approach

Table B-1 Dust Emission Magnitude Classification

Activity	Dust Emission Magnitude		
	Large	Medium	Small
Demolition	Total building volume of >50,000 m ³ , potentially dusty construction material, on-site crushing and screening, demolition activities >20 m above ground	Total building volume of 20,000 – 50,000 m ³ , potentially dusty construction material, demolition activities 10 – 20 m above ground level	Total building volume of <20,000 m ³ , construction material with low potential for dust release, demolition activities <10 m above ground, demolition during wetter months
Earthworks	Total site area of >10,000 m ² , potentially dusty soil type, >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes	Total site area of 2,500 - 10,000 m ² , moderately dusty soil type, 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 - 8 m in height, total material moved 20,000 - 100,000 tonnes	Total site area of <2,500 m ² , soil type with large grain size, <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes. Earthworks during wetter months
Construction	Total building volume >100,000 m ² , on-site concrete batching, sandblasting	Total building volume 25,000 - 100,000 m ² , potentially dusty construction material, on-site concrete batching	Total building volume <25,000 m ² , construction material with low potential for dust release
Trackout	>50 HDV outwards movements in any one day, potentially dusty surface material, unpaved road length >100 m	10 - 50 HDV outwards movements in any one day, moderately dusty surface material, unpaved road length 50 - 100 m	<10 HDV outwards movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

Table B-2 Receptor Sensitivity

Receptor Sensitivity	Impact		
	Dust Soiling	Health Effects of PM ₁₀	Ecological Effects
High	An area where: - Users can reasonably expect enjoyment of a high level of amenity; - The appearance, aesthetics of value of their property would be diminished by soiling; - The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples include dwellings, museums and other culturally important collections, medium and long-term car showrooms.	Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more per day. Examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	Locations with an international or national designation <i>and</i> the designated features may be affected by dust soiling; OR Locations where there is a community of particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain. Indicative examples include a SAC designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	An area where: - Users would expect to enjoy of a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; - The appearance, aesthetics of value of their property could be diminished by soiling; - The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods, as part of the normal pattern of use of the land. Examples include parks and places of work.	Locations where people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more per day. Examples include office and shop workers, but will generally not include workers occupationally exposed to for PM₁₀, as protection is covered by Health and Safety at Work legislation.	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; OR Locations with a national designation where the features may be affected by dust deposition. Indicative example is a SSSI with dust sensitive features.

Low	An area where: - The enjoyment of amenity would not reasonably be expected; - Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; - There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks and roads.	Locations where human exposure is transient. Examples include public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition. Indicative example is a LNR with dust sensitive features.
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Table B-3 Sensitivity of an Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	1 – 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table B-4 Sensitivity of an Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m ³	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32 µg/m ³	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28 µg/m ³	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low

Medium	>32 µg/m ³	>10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32 µg/m ³	>10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28 µg/m ³	>10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	<24 µg/m ³	>10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

Table B-5 Sensitivity of an Area to Ecological Impacts

Receptor Sensitivity	Distance from Source (m)	
	<20	<50
High	High Risk	Medium Risk
Medium	Medium Risk	Low Risk
Low	Low Risk	Low Risk

Table B-6 Risk of Dust Impacts Calculation Matrix

Sensitivity of Area		Dust Emission Magnitude		
		Large	Medium	Small
Demolition	High	High Risk	Medium Risk	Medium Risk
	Medium	High Risk	Medium Risk	Low Risk
	Low	Medium Risk	Low Risk	Negligible Risk
Earthworks	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible Risk
Construction	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible Risk
Trackout	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Low Risk	Negligible Risk
	Low	Low Risk	Low Risk	Negligible Risk

Appendix C EPUK IAQM Guidance (2017) Screening Criteria

The Development Will:	Indicative Criteria to Proceed to an Air Quality Assessment
Cause a significant change in LDV traffic flows on local roads with relevant receptors.	A change of LDV flow of: >100 AADT within or adjacent to an AQMA; and >500 AADT elsewhere.
Cause a significant change in HDV flows on local roads with relevant receptors.	A change of HDV flow of: >25 AADT within or adjacent to an AQMA; and >100 AADT elsewhere.
Realign roads i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5 m or more and the road is within an AQMA.
Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle acceleration / deceleration, e.g. traffic lights, or roundabouts.
Introduce or change a bus station.	A change of bus flows of: >25 AADT within or adjacent to an AQMA; and >100 AADT elsewhere.
Have an underground car park with extraction system.	The ventilation extract for the car park will be located within 20 m of a relevant receptor; and The car park will have >100 movements per day (total in and out).

The screening criteria presented is amended from Table 6.2 of the EPUK / IAQM guidance (EPUK / IAQM, 2017). Only the screening criteria relevant to changes in transport (including both traffic and the transport network) are outlined.

Appendix D Model Inputs and Results Processing

D.1 Summary of Model Inputs

Meteorological Data	2019 hourly meteorological data from Herstmonceux West End, East Sussex station has been used in the model. The wind rose is shown in Figure D.1 .
ADMS	Version 5.0.1.3
Time Varying Emission Factors	Based on Department for Transport statistics. Table TRA0307. Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2019
Latitude	51°
Minimum Monin-Obukhov length	A value of 10 for 'small towns <50,000' was used to represent the modelled and meteorological station site areas.
Surface Roughness	A surface roughness value of 0.5 for 'parkland and open suburbia' was used to represent the modelled area and a value of 0.3 for 'agricultural areas' was used for the meteorological station site.
Emission Factor Toolkit (EFT)	V11 (DEFRA, 2021a)
NOx to NO ₂ Conversion	NOx to NO ₂ calculator version 8.1, August 2020 (DEFRA, 2020c)
Background Maps	2018 reference year background maps (DEFRA, 2020b)

D.2 Receptor Locations

Receptor	Description	X Coordinate	Y Coordinate	Height (m)	No. Properties Represented
Proposed Receptors					
R01	Proposed Property 1	557252.2	111277.6	1.5	1
R02	Proposed Property 2	557214.4	111244.6	1.5	1
R03	Proposed Property 3	557189.7	111210.4	1.5	1
R04	Proposed Property 4	557207	111178	1.5	1
R05	Proposed Property 5	557232.4	111164	1.5	1
R06	Proposed Property 6	557315.9	111328.5	1.5	1
R07	Proposed Property 7	557298.9	111314.5	1.5	1
Existing Receptors					
R08	Marlyn, A271 Lower Horsebridge	557305.7	111362.8	1.5	1
R09	Brook House, A271 Lower Horsebridge	557216.7	111312.4	1.5	1

D.3 Traffic Data

Location	2019 Baseline		2025 Without Development		2025 With Development	
	AADT	HDV (%)	AADT	HDV (%)	AADT	HDV (%)
A22 West of Boship Roundabout	21813	3.7	30948	3.7	31138	3.7
A22 South of Boship Roundabout	19575	4.2	24787	4.2	25056	4.2
A267 North of Boship Roundabout	12912	4.9	14453	4.9	14479	4.9
A271 East of Boship Roundabout	8933	4.2	13868	4.2	14353	4.2
B2104 North St (north of A271 Junction)	3167	4.2	4101	4.2	4127	4.2
B2104 London Road	7337	4.2	8694	4.2	8741	4.2
A271 East of B2104 London Road	9781	4.2	15124	4.2	15203	4.2
Site Access	0	0	0	0	637	4.2
East of Site Access	8933	4.2	13868	4.2	14020	4.2
A295 Battle Road*	9283	2.2	0	0	0	0
A295 North Street*	15884	2.0	0	0	0	0
RdbA-B	16866	4.1	22823	4.0	23062	4.0
RdbB-C	15965	4.2	21389	4.1	21623	4.1
RdbC-D	14931	4.2	19942	4.1	20182	4.1
RdbD-A	15442	4.3	20091	4.2	20355	4.2
A295 High Street*	2557	4.8	0	0	0	0

* Used for verification only.

D.4 Windrose

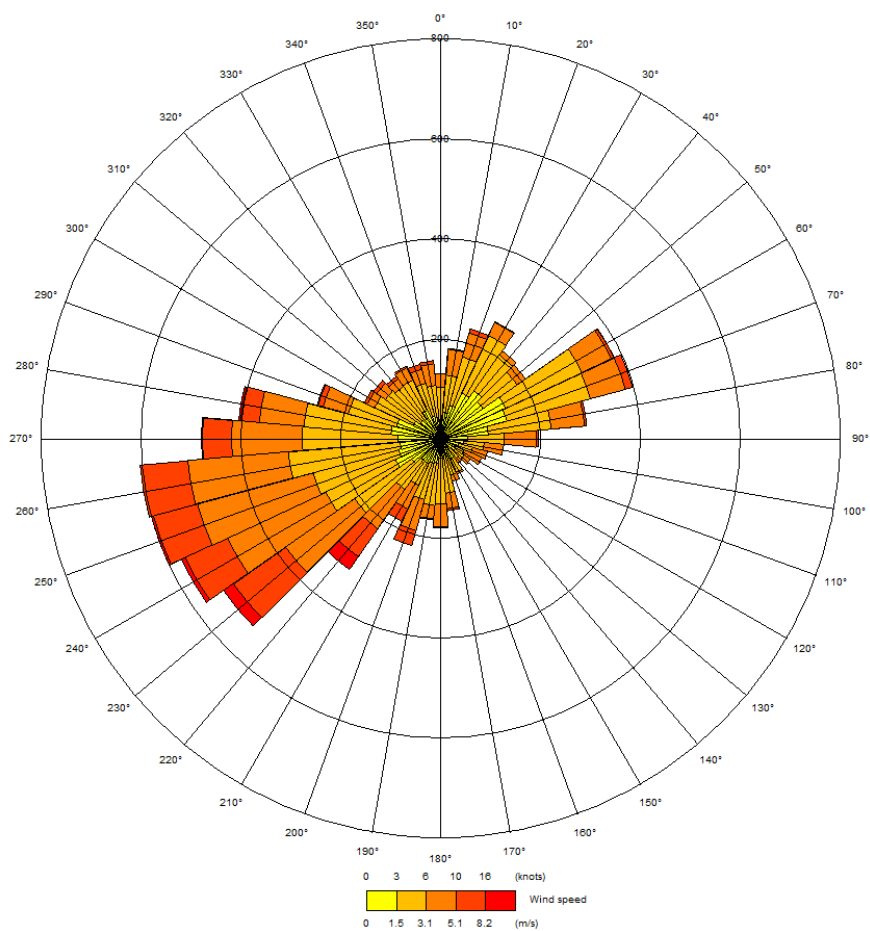


Figure D-1: Windrose for Herstmoncaux West End, East Sussex

Appendix E Model Verification

NO₂

Most NO₂ is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the 2019 annual mean road-NO_x contribution at the A22 West of Boship Roundabout (W8) and London Road diffusion tubes (W6) (identified in **Figure 3**), which are the closest to, and most representative of the Site.

Most NO₂ is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the 2019 annual mean road-NO_x contribution at two monitoring locations. Concentrations have been modelled at a height of 2.5 m for W6 and 2 m for W8.

A primary adjustment factor of **2.6289** has been determined as the slope of the best fit line between the modelled road NO_x contribution and the 'measured' road-NO_x (which is calculated from the measured and background NO₂ concentrations within DEFRA's NO_x from NO₂ calculator (DEFRA, 2020c)), forced through zero (**Figure E-1**). This factor has then been applied to the raw modelled road-NO_x concentration to provide adjusted modelled road-NO_x concentrations.

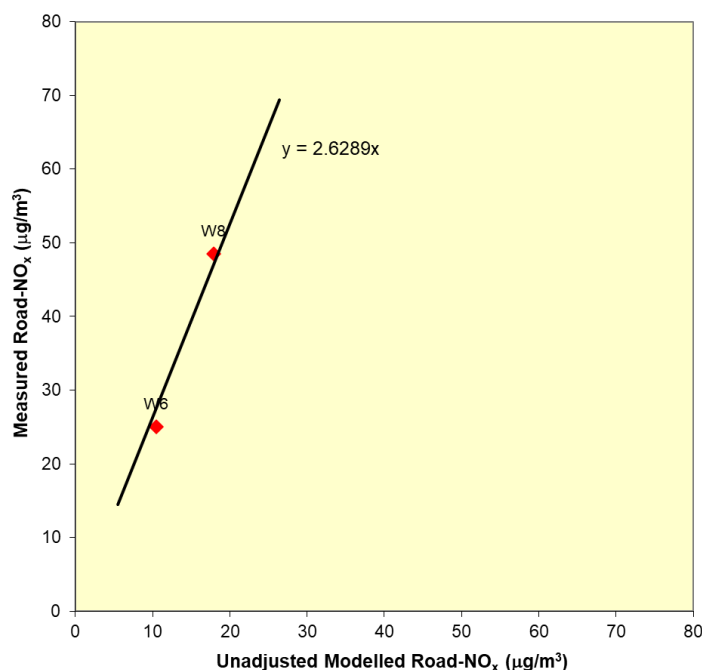


Figure E-1 Measured and Unadjusted Road-NO_x Comparison

The total NO₂ concentrations have then been determined by combining the adjusted modelled road-NO_x concentrations with the background NO₂ concentration within DEFRA's NO_x from NO₂ calculator (DEFRA, 2020c). A secondary adjustment factor of **0.9940** has then been calculated as the slope of the best fit line applied to the adjusted data and forced through zero (**Figure E-2**).

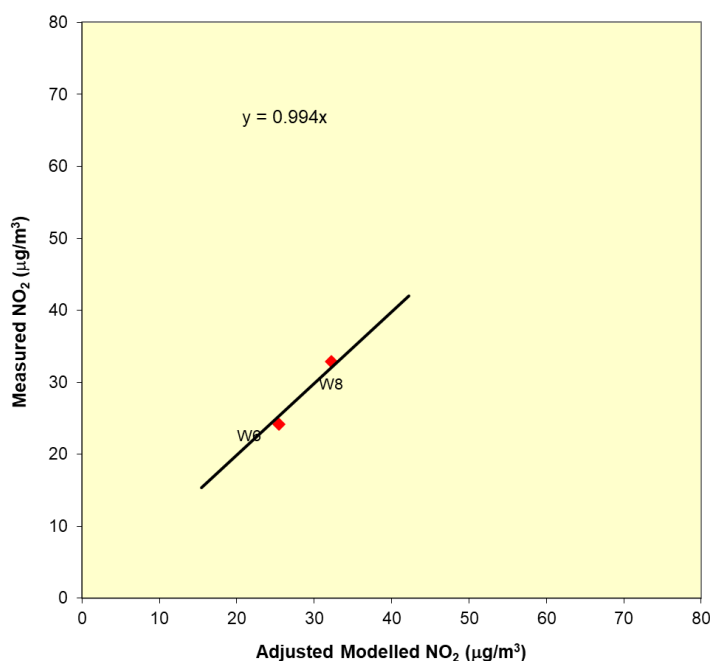


Figure E-2 Measured and Primary Adjusted Modelled NO₂ Comparison

Figure E-3 compares final adjusted modelled total NO₂ at each of the monitoring sites, to measured total NO_x and shows the 1:1 relationship, as well as $\pm 10\%$ and $\pm 25\%$ of the 1:1 line.

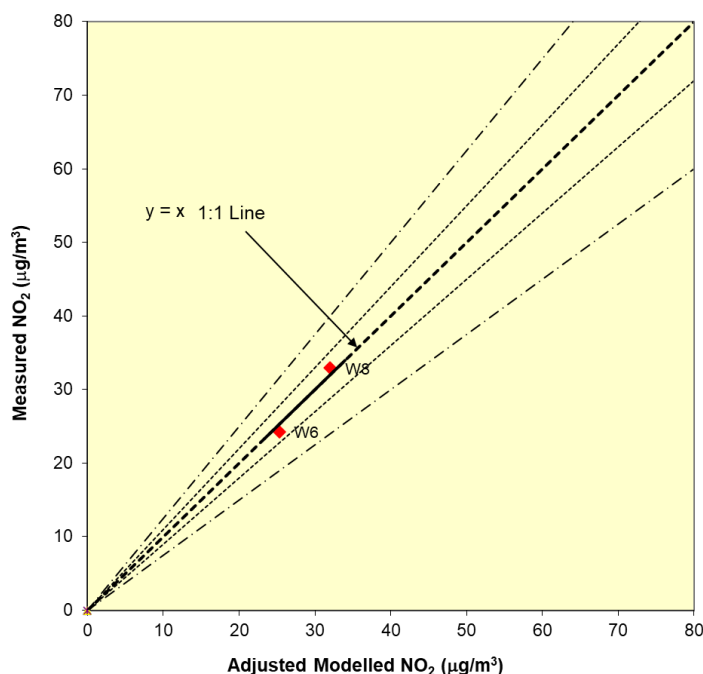


Figure E-3 Measured and Final Adjusted Modelled NO₂ Comparison

The calculated adjustment factors imply that overall, the model has under-predicted the road-NO_x contribution. This is a common experience with this and most other models. The calculated Root Mean Square Error (RMSE) for this verification (1 µg/m³) lies within the range considered to be good by DEFRA (DEFRA, 2022) (0 – 4).

PM₁₀ and PM_{2.5}

WDC does not currently undertake any monitoring of PM₁₀ or PM_{2.5} within its administrative area. Therefore, the adjustment factor calculated of NO₂ has been applied to the modelled road-PM₁₀ and road-PM_{2.5} concentrations.