



Detailed Air Quality Assessment

Site: Proposed Development at
Kingscote Place, Imberhorne Lane, East Grinstead RH19 1TX

Prepared for:
TSA Riley

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Kingscote Place, Imberhorne Lane, East Grinstead

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NON-TECHNICAL CLIENT SUMMARY

KINGSCOTE PLACE

The purpose of this report is to quantitatively review air quality in and around the proposed development of Kingscote Place, Imberhorne Lane, East Grinstead. This proposal forms part of a reserved matters application pursuant to hybrid planning permission, for which air quality only relates to the care element of this permission. This report is required to assess whether any new risks will be introduced and then outline possible measures which can minimise any harmful emissions.

- The area surrounding the site currently experiences generally good air quality, with annual mean nitrogen dioxide (NO₂) concentrations at nearby monitoring locations remaining well below the national air quality objective between 2020 and 2024. This pollutant being most commonly associated with road traffic emissions. A Detailed Air Quality Assessment has been undertaken to assess the potential impacts of the development on existing nearby receptors, as well as future residents and users of the proposed development.
- Currently, the site predominantly consists of undeveloped agricultural land. The proposed development comprises up to 550 residential dwellings, a care village of up to 150 extra-care dwellings, associated community facilities, communal landscaped gardens, parking, access roads, and land for a new primary school.
- During the construction phase A 'negligible' impact is anticipated, provided that the recommended mitigation measures are implemented. The potential for dust emissions and construction traffic associated with a major scheme of this nature will be effectively controlled through the implementation of appropriate dust mitigation measures, including a Construction Environmental Management Plan (CEMP), as outlined in this report.
- During the operational phase, detailed dispersion modelling indicates that the additional traffic generated by the development would result in 'negligible' changes in pollutant concentrations at existing sensitive receptors. Predicted concentrations of nitrogen dioxide (NO₂) remain well below the relevant air quality objectives at all assessed locations, and the development is not expected to give rise to any significant adverse air quality effects.
- The incorporation of Low Emission Design into both phases of the development is still encouraged at this early stage as described in this report and EPS would recommend these measures are considered from the outset.

By their very nature, the above bullet points represent a simplified summary of our work and should not be relied upon to form the basis for key decisions for the proposed development. A full picture is provided in the following report or alternatively give us a call and we'll talk you through it.

The above points represent a simplified summary of the findings of this assessment and must not form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.

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The report has been written, reviewed and authorised by the persons listed on page iii. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

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1 INTRODUCTION

In April 2026, Environmental Protection Strategies Ltd (EPS) was commissioned by TSA Riley to undertake an Air Quality Assessment for the proposed major development at Kingscote Place, Imberhorne Lane, East Grinstead, West Sussex, RH19 1TX.

The proposal is as a reserved matters application pursuant to hybrid planning permission (ref: DM/23/2699) it should be noted this air quality only relates to the care element of this permission, specifically in reference to condition 25 in the permission which states:

“Prior to the commencement of any residential phase of the development hereby permitted, the details of a scheme of mitigation measures to improve air quality relating to the development, within that phase, shall be submitted and approved in writing by the Local Planning Authority. The scheme shall be in accordance with, and to a value derived in accordance with, the Air quality and emissions mitigation guidance for Sussex which is current at the time of the reserved matters application. All works which form part of the approved scheme, for any phase, shall be completed before any part of the development, in that particular phase, is occupied and shall thereafter be maintained in accordance with the approved details.”

The overall development comprises up to 550 residential dwellings, a care village of up to 150 extra-care dwellings, associated community facilities, communal landscaped gardens, parking, access roads, and land for a new primary school.

The development has the potential to increase traffic on the surrounding road network, which could affect air quality at existing receptors and introduce new sensitive receptors within the site. This assessment considers the potential impacts of road traffic emissions, focusing on nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}), to determine whether the development would result in significant adverse air quality effects. The report also identifies appropriate mitigation measures and low-emission design principles to minimise air pollutant emissions and ensure the development accords with relevant local and national planning policy.

1.1 Background to Approach

An Air Quality Assessment (AQA) is included within this report. It is quantitative (i.e. ‘Detailed’) in nature and involves numerical modelling through quantitative analysis. EPS encourage the adoption of mitigation through the inclusion of appropriate low emission measures (which would be the intention regardless of the assessment’s conclusion), and relevant details are included within this report.

It is a recognised shortcoming of the air quality assessment process that when typical AQA’s simply relate the predicted or modelled significance of impacts during construction and operational phases to nationally prescribed air quality pollutant limit values, the need for

mitigation is invariably not identified. This was not the overarching intention of trying to reduce air pollution (or wider carbon emissions) through the planning system.

The basis for a conventional AQA is to review the existing (baseline) conditions and then predict the future conditions with and without the development. Just adopting the current 'baseline' as a justification for 'do nothing' is not particularly sustainable though. This issue in how the Local Air Quality Management Framework is implemented has also been highlighted at a national level. In 2014-15, DEFRA consulted on the proposed overhaul of the regime, and within the associated Impact Assessment they stated:

"The objective and intended effect is to transform local air quality management so that local authorities focus more on actions to improve air quality and to achieve better public health and environmental outcomes rather than on the monitoring and reporting process" (Review of Local Air Quality Management (England) - regulatory and guidance changes). This in turn led to revised policy guidance encouraging further involvement of relevant stakeholders particularly those working in public health, to ensure real-world improvement through the regime.

The cost and implications of employing low emission measures within a development should not be onerous, or even negative. It is much easier and less costly to consider low emission measures (i.e. mitigation) at the forefront of the design process and may afford long-term financial savings, for instance the inclusion of higher-grade insulation. Other tangible secondary benefits are also clear, such as the potential to market a property with three-phase EV charging points. Retrofitting these measures to existing developments, or even into approved schemes, is usually more difficult. Where worsening air quality can be avoided through improved planning and building design, it is generally in everyone's interests. In terms of wider carbon emissions, there seems little reason to focus on certain aspects of air pollution without taking advantage of the wider carbon reduction opportunities presented by the planning process (e.g. cycling is preferable to car usage for many reasons, not just the prevention of pollution).

The National Planning Policy Framework (2026)(1a) encourages this approach in Policy P3 where it states that living conditions and pollution states that development proposals should be appropriate for their 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 wider area to impacts arising from the development. Development proposals should also provide healthy living conditions for occupiers and users, including avoiding exposure to levels of air pollution that could have an unacceptable adverse effect on health and wellbeing.

With specific regard to air quality, Policy P3 states that development proposals should sustain and contribute to compliance with relevant limit values or national objectives and targets for air pollutants, including PM_{2.5}, considering the presence of Air Quality Management Areas and NO₂ Clean Air Plans. Where a development proposal falls within or could affect an Air Quality

Management Area or Clean Air Plan, including any Clean Air Zone, it should be consistent with the objectives of these plans and the local air quality action plan.

1.2 Regulatory Position of Low Emission Design

The intention of incorporating low emission design is to present a clear set of measures which the developer can incorporate into the scheme at the earliest opportunity and without disproportionate cost or delay.

It is not the intention to impose or enforce certain design criteria on the client or the project team/contractor (unless the AQA outcomes mandate it). Rather the aim is to highlight certain features which could have a demonstrable benefit in terms of emissions and would be worthwhile considering for inclusion in the design of the scheme. These measures will only be mandatory where defined based upon the significance analysis in the AQA and in those circumstances that would be clearly stated in Section 8 & 9 of this report.

1.3 Definitions and Abbreviations

AADT	Annual Average Daily Traffic/Trips
AQAL	Air Quality Assessment Level – Typically the Air Quality Objective, EU Limit/Target, or Environment Agency ‘Environmental Assessment Level’
AQAP	Air Quality Action Plan
AQA/AQIA	Air Quality Assessment / Air Quality Impact Assessment (same meaning)
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
ASR	Annual Status Report
AURN	Automatic Urban and Rural Network
BREEAM	Building Research Establishment Environmental Assessment Method
CEMP	Construction Environmental Management Plan
CO_{2e}	Carbon Dioxide equivalent – All gaseous emissions are converted to the amount of CO ₂ needed to create the same effect from other emissions including NO _x , methane, SO _x etc.
DEFRA	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
EPS	Environmental Protection Strategies Limited
EPUK	Environmental Protection UK
EV	Electric Vehicle
HDV	Heavy-duty vehicle
IAQM	Institute of Air Quality Management
kg/CP/yr	Kilogram per charging point per year
kg/Hse/yr	Kilogram per household per year
LAQM	Local Air Quality Management
LDV	Light-duty vehicle

NGR	National Grid Reference
NO_{2/x}	Nitrogen Dioxide or Oxides
PM_{10/2.5}	Particulate matter (less than 10 or 2.5 micrometres in diameter)

1.4 Air Quality Objectives/Air Quality Limit Values

At a national level, the UK Government and the devolved administrations (except Northern Ireland) are required under the Environment Act 1995 to produce a national air quality strategy.

The UK Air Quality Strategy (AQS)(1e) was published in July 2007 by the Department for Environment, Food and Rural Affairs (DEFRA). The strategy includes standards, objectives and measures for improving ambient air quality in England, Scotland, Wales and Northern Ireland; including a number of Air Quality Objectives (AQOs) which are detailed within the below table. Pollutants not relevant to this assessment have been omitted. These objectives represent either maximum pollutant concentrations which cannot be exceeded, or maximum pollutant concentrations which have a number of permitted exceedances per year. The original target dates for these objectives to be met, and maintained thereafter have all lapsed but these AQO's are still considered relevant (in England) for the most common pollutants:

Table 1-1 UK Air Quality Objectives

Pollutant	Objective	Averaging period (Measured as)
NO₂	40 µg/m ³	Annual mean
	200 µg/m ³	1-hour mean not to be exceeded more than 18 times a year (DEFRA have advised an indicator for potential exceedances of the hourly mean is an annual mean higher than 60 µg/m ³)
PM₁₀	40 µg/m ³	Annual mean
	50 µg/m ³	24-hour mean not to be exceeded more than 35 times a year
PM_{2.5}	12 µg/m ³	Annual Mean (Interim Target to be achieved by end of January 2028)

Within the Local Air Quality Management Technical Guidance(1c), updated by DEFRA in 2022, guidance is provided for the scenarios where the AQOs should and should not apply. The example circumstances provided by DEFRA are summarised in the below table.

Table 1-2 Scenarios where AQOs apply

Averaging period	Objectives should apply at:	Objectives should not apply at:
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Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless used as a permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean (& 8-hr mean)	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where the public exposure is expected to be shorter than the 24-hour mean (or 8-hour relevant mean).
1-hour mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). 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 expect to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	

1.5 Key Sections of the Annual Status Report (ASR) and the Air Quality Action Plan

Mid Sussex District Council (MSDC) 2025 ASR is available online. The ASR highlights the progress which has been made against their Air Quality Action Plan from 2024, a selection of which is highlighted below:

- Following five consecutive years of compliance, the Stonepound Crossroads AQMA was formally revoked on 10 December 2024, and the Council's focus has shifted to a district-wide Air Quality Strategy, which is currently in draft.
- Completion of the Hurstpierpoint to Hassocks section of the Sayers Common to Hassocks cycle route, with the remaining section subject to future funding.
- Continued roll-out of EV charge points through the West Sussex Chargepoint Network with Connected Kerb, with 13 car park sites and 8 on-street sites now connected in Mid Sussex, supported by the new government LEVI fund for on-street installations.
- Increased frequency of bus route 273 and a renewed contract for route 33, including a planned fleet upgrade.

- Real-time traffic light optimisation trial at the former AQMA site progressed to implementation stage in 2024, using pollution sensor data collected with West Sussex County Council (WSCC).
- Upgrade of the East Grinstead real-time monitor from PM10 to PM2.5 monitoring, completed in January 2025.

1.6 Significance Definitions

Throughout this report qualitative references are made to the ‘significance’ of impacts on local air quality brought about through new sources or receptors introduced by the development, these have been defined below. These definitions take into account the impact descriptors in the EPUK & IAQM (2a) guidance, as well as the practical implications as interpreted through EPS’ professional judgement.

The impact descriptors used in this report by EPS are intended to convey the following definitions:

Table 1-3 Monitoring Details

Impact Descriptor	Definition	Mitigation Requirement
BENEFICIAL	Proposed development may be able to bring about a reduction in emissions compared to existing.	VOLUNTARY (FOR GUIDANCE ONLY – NOT MANDATORY UNLESS SPECIFICALLY REQUIRED BY PLANNING)
NEGLIGIBLE	AQAL clearly not at risk due to sources or receptors introduced by the development. There will be no appreciable impact or any need to model it.	
SLIGHT ADVERSE	AQAL not at risk due to sources or receptors introduced by the development, although localised decreases in air quality may be noticeable. Modelling to quantify the impact is unlikely to add value.	
MODERATE ADVERSE	AQAL is unlikely to be at risk due to sources or receptors introduced by the development, although decreases in air quality will probably be noticeable. Modelling may assist in targeting or refining scope of mitigation.	NECESSARY (UNLESS DETAILED AQIA & DISPERSION MODELLING DEMONSTRATES OTHERWISE)
SUBSTANTIAL ADVERSE	AQAL may be at risk due to sources or receptors introduced by the development, further modelling will be needed to quantify the impact and design mitigation accordingly.	NECESSARY

2 SITE SUMMARY

2.1 Current Land Use

The site is located on the western edge of East Grinstead and comprises predominantly undeveloped agricultural land and green space.

2.2 Adjacent Land Use

To the east of the site lies the urban area of East Grinstead, which is predominantly residential and includes St Peter's Catholic Primary School. The land immediately to the south, and west is primarily agricultural, with a wooden area and the residential estate including Kingscote and Newick Way. Further north, roughly 500m from site, is Imberhorne School. A small cluster of commercial buildings around Imberhorne Cottages is located northwest, which includes a lawnmower repair business with a lake located south of these buildings. Approximately 1 km north of the site lies the village of Felbridge, which includes the Birches Industrial Estate. The site context is outlined in Figure 2-1 below.

2.3 Proposed Land Use

The proposals form part of a wider hybrid planning application comprising up to 550 residential dwellings, a care village of up to 150 dwellings, land for a new two-form entry primary school, a mixed-use neighbourhood centre, public open space, allotments, sustainable drainage infrastructure, and approximately 42ha of Suitable Alternative Natural Greenspace.

2.4 Site Location

National Grid Reference: **X 537500, Y 138253**



Figure 2-1 Site Context

Image from Google Images, Imagery ©2025 Airbus, © 2025 Airbus, Maxar Technologies

3 BASELINE CONDITIONS

Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following sections.

3.1 Existing & Future Pollutant sources

3.1.1 Proximity to AQMAs

Air Quality Management Areas (AQMAs) are locations designated by local authorities where air quality objectives are being, or are likely to be, exceeded, and where measures are therefore required to improve air quality.

There are currently no nearby AQMAs near the proposed development, the closest of which is over 7km away.

3.1.2 Nearby Local Authority Monitoring Data (Local Authority)

Mid Sussex District Council published its most recent Air Quality Annual Status Report (ASR) in 2025.

Table 3-1 below outlines annual mean nitrogen dioxide (NO₂) concentrations recorded at the six closest active monitoring locations (MSAQ36, MSAQ3, MSAQ37, MSAQ38, MSAQ29 and MSAQ43), situated approximately 0.73km and 1.66km from the proposed development site.

Monitoring data indicate a general improvement in local air quality between 2020 and 2024, with annual mean NO₂ concentrations generally across monitoring locations. No exceedances of the annual mean NO₂ objective of 40µg/m³ having been recorded between 2020-2024. The highest concentration was found at roadside site MSAQ36 in 2022 (33.5 µg/m³).

Overall, the monitoring data indicate reasonable local air quality conditions in the vicinity of the proposed site.

Annual mean concentrations for all monitoring locations are presented in Table 3-1 below, with the monitoring site locations illustrated in Figure 3-1.

Table 3-1 NO₂ Monitoring Details

Monitoring Station	Distance from proposed site (km)	Monitoring site type	Pollutant Objective				
			NO ₂ Annual mean: >40 µg/m ³				
			2020	2021	2022	2023	2024
MSAQ36	0.73	Roadside	31.6	32.7	33.5	29.8	30.1
MSAQ3	1.21	Roadside	22.7	23.4	22.8	19.7	18.6
MSAQ37	1.53	Roadside	29.8	31.9	31	27.7	28.2
MSAQ38	1.66	Roadside	20.4	20.6	21	17	17.7
MSAQ29	1.63	Roadside	32.5	33.4	31.6	29.6	27.9
MSAQ43 (a/b/c)	1.64	Roadside / Co-location with Automatic	-	-	27.4	22.5	22.3
MSAQ43	1.64	Roadside / Automatic	-	-	24.3	21.1	18.7

Results bias/adjusted/ratified figures taken from Mid Sussex 2025 ASR.

Years 2020 and 2021 have been included for completeness. These years are not representative of typical air quality conditions due to reduced traffic volumes during the covid-19 pandemic.

3.1.3 Local PM Monitoring

PM₁₀ monitoring is conducted at one location in the vicinity of the site at roadside unit MSAQ43.

PM₁₀ concentrations have remained relatively consistent between 2022 and 2024 at Roadside monitoring site MSAQ43. Annual mean concentrations have ranged between 18.7 µg/m³ and 24.3 µg/m³ during this period, well below the annual mean objective, with no recorded exceedances since 2022. See Table 3-2 below for more details.

Table 3-2 PM₁₀ Authority Monitoring Details

Monitoring Station	Distance from proposed site (km)	Monitoring site type	Pollutant Objective				
			PM ₁₀ Annual mean: >40 µg/m ³				
			2020	2021	2022	2023	2024
MSAQ43	7.6	Roadside / Automatic	-	-	24.3	21.1	18.7

Results bias/adjusted/ratified figures taken from Mid Sussex 2025 ASR.

Years 2019- 2021 have been included for completeness. These years are not representative of typical air quality conditions due to reduced traffic volumes during the covid-19 pandemic.

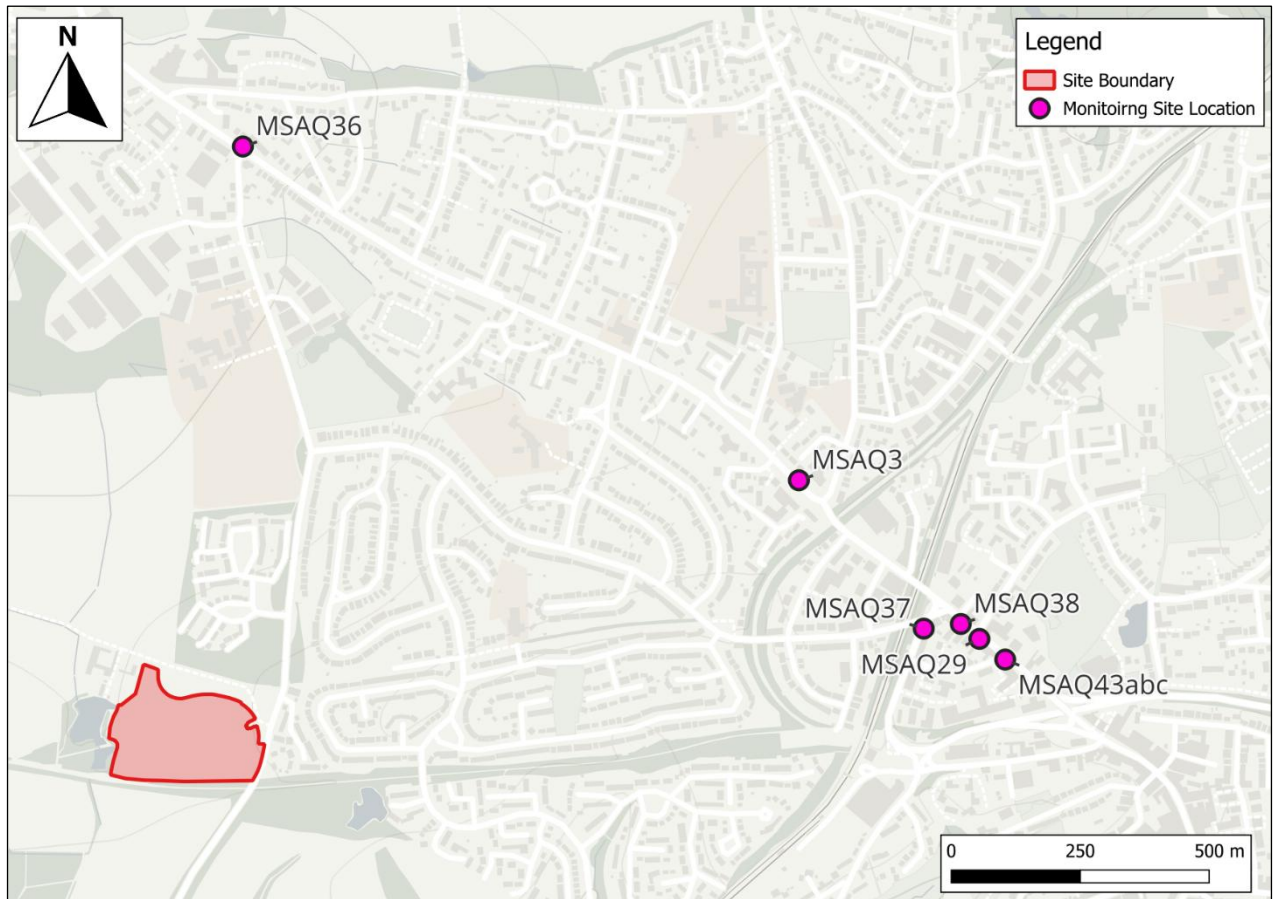


Figure 3-1 Local Air Quality Monitoring Sites

3.1.4 Local point source emissions

The National Atmospheric Emissions Inventory (NAEI) maintains a register of emissions from individual industrial and commercial facilities, referred to as 'point sources'. One registered point source is located within 5km of the proposed development, approximately 1 km north of the site within the Birches Industrial Estate. This source is associated with carbon dioxide emissions only and is not considered likely to have a significant influence on local air quality conditions at the proposed development.

MSDC also maintains a public register of environmental permits issued under the Environmental Permitting Regulations. The nearest permitted installations are two petrol filling stations located approximately 1 km north of the site. These permitted activities are classified as low risk and are not expected to give rise to significant air quality impacts at the proposed development. The locations of these facilities are illustrated in Figure 3-2 below.

A pet crematorium is located around 2.2km northwest and Surrey & Sussex Crematorium is located around 7.5km west.

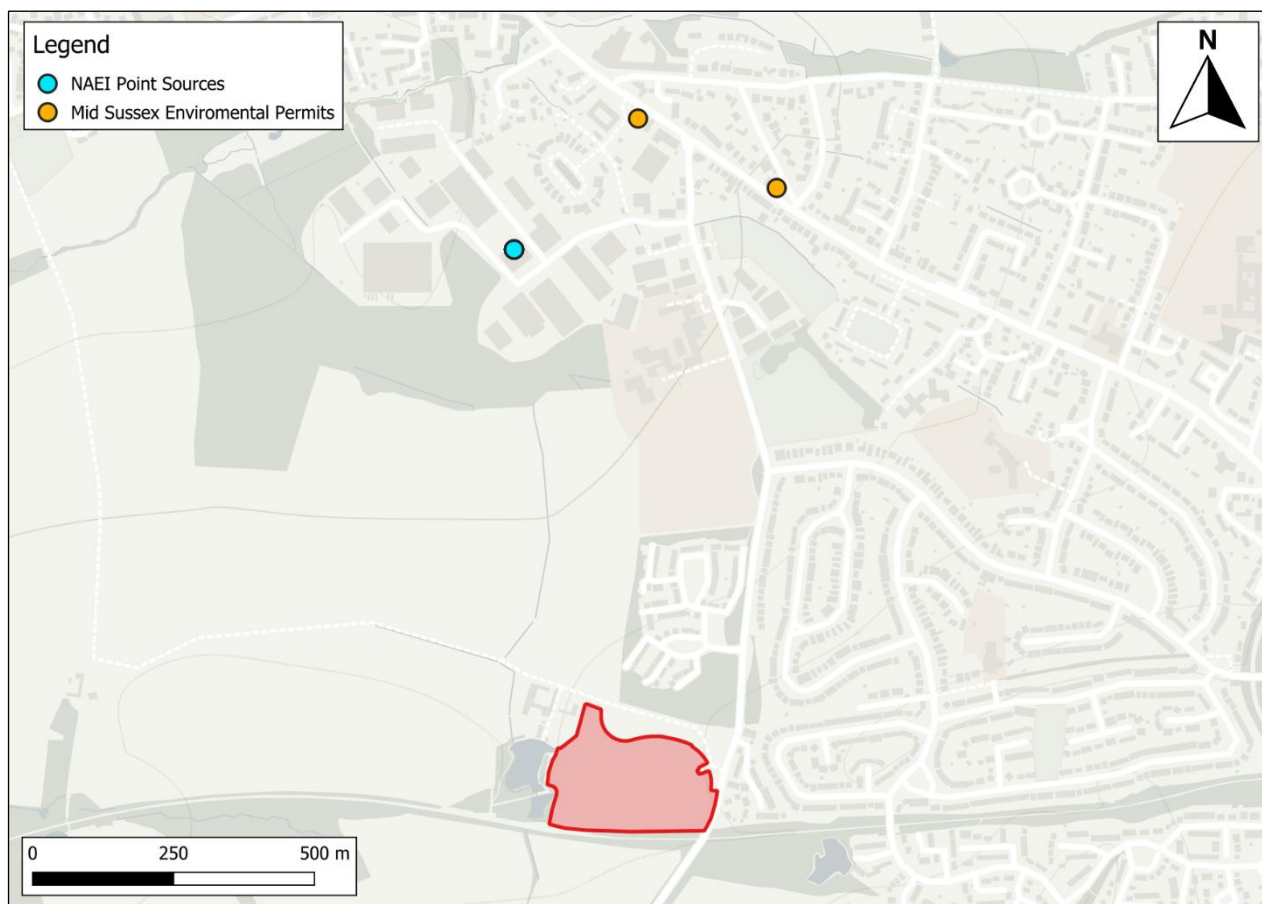


Figure 3-2 Local Environmental Permits for Industrial Emissions

3.1.5 Prevailing Wind Direction

In East Grinstead there is a strong predominant wind direction from the South-West, as is the case for most of England. A modelled wind rose for the local area can be seen in Figure 3-3 below.

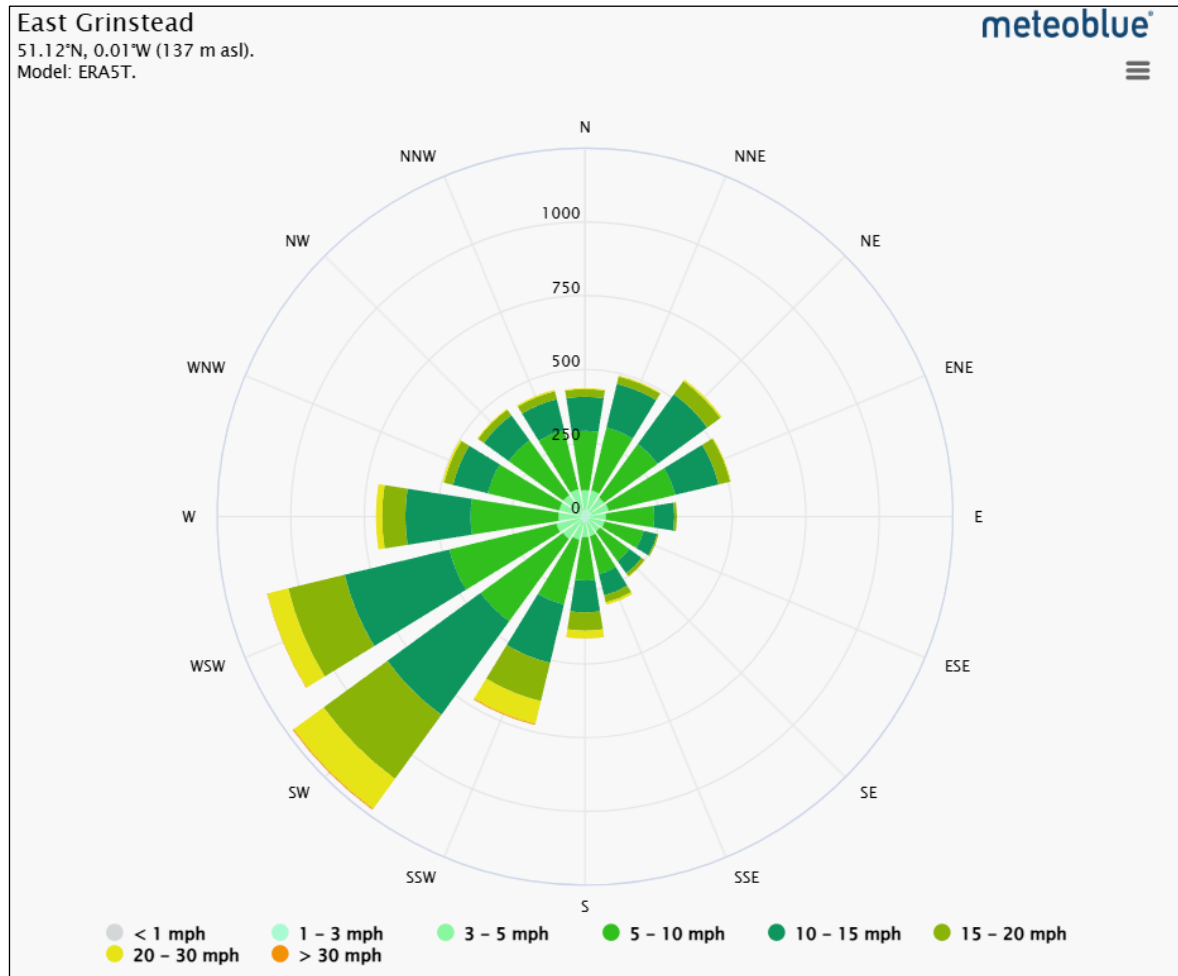


Figure 3-3 Prevailing Wind Direction

From: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/east-grinstead_united-kingdom_2650435

3.1.6 Key Future Emission Sources (NO_x /PM)

Construction phase:

- Emissions from construction vehicles working on site.
- Although the planned route for construction traffic has not yet been confirmed, it is likely that vehicles delivering materials to the site and removing waste will Imberhorne Lane along with the wider local road network. These vehicle movements have the potential to contribute to roadside emissions along these routes.

Operational Phase

- Diffuse traffic sources from private vehicle usage for residents as well as general operational traffic.
- Point sources from new boilers, although these will likely be low NO_x and have therefore not been modelled. Some renewables may also be introduced.

- *There is potential for limited emissions from domestic wood-burning stoves if installed within new dwellings; however, any new installations would be required to comply with DEFRA’s standards for “exempt appliances” and “ready-to-burn” fuel regulations. As such, any contribution to local particulate concentrations is expected to be negligible.*
- *Secondary Power supplies or backup generators may be present in the final strategy of the development. The flues of which should extend above any nearby receptors and should only be used when testing or in emergency circumstances. In this instance the effects of which are expected to be negligible although this may need to be confirming once the final strategy for heating/energy is available for the development.*

3.1.7 Site walkover & Traffic Observations

A site walkover by an EPS operative was conducted in June 2026 (See Appendix B). The following observations were recorded during 10-minute traffic surveys:

- Imberhorne Lane (12:45–12:55): Moderate traffic flow recorded with 68 vehicle movements.
- Heathcote Drive (13:10–13:20): Low traffic flow recorded with 25 vehicle movements.
- London Road (13:49–13:59): High Traffic flow, with 115 vehicles movement recorded.

Annual Average Daily Traffic (AADT) data was provided by traffic consultants (TPHS Ltd), for various, relevant road links. Details of which are outlined in Appendix C.

3.1.8 Background Concentrations

The background (i.e. both man-made and natural sources) concentrations of pollutants have been published by DEFRA for 2026, the most comparable recent year and forecasted to 2030, shown as a potential year for when the development may become operational are outlined in Table 3-3 below.

Table 3-3 Background Concentrations

Pollutant	Year		Objective
	2026	2030	
NO ₂	8.3	7.3	40
NO _x	10.7	9.3	-
PM ₁₀	10.4	10.0	40
PM _{2.5}	6.3	6.0	12^a

^a interim target to be met by 2028, not legally binding

Concentrations collated for national grid reference **X:537500 Y: 138253**

3.2 Future Emissions Sources and Receptors

The regulatory context and guidance upon which this quantitative AQA is based is outlined in Appendix A.

3.3 Sensitive Receptors (With Development)

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of the development. Sensitive receptors have been defined for dust and road vehicle emissions in the following table.

3.3.1 Construction Phase

- Neighbouring residents.
- Pupils/staff of nearby Imberhorne School and St Peter's Catholic Primary School.

3.3.2 Operational Phase

- Future residents of the site.
- Future Attendees of a potential Primary School on-site.
- Neighbouring residents.
- Pupils/staff of nearby Imberhorne School and St Peter's Catholic Primary School.

4 EMISSIONS MITIGATION ASSESSMENT

4.1 Development traffic emissions calculations

As outlined in the Sussex Air Quality and Emissions Mitigation Guidance, an emissions mitigation calculation has been undertaken using the latest DEFRA Emissions Factor Toolkit (EFT). The assessment inputs the forecast number of additional vehicle trips generated by the proposed development into the EFT, using the parameters summarised in Table 4-1 below, to estimate the transport-related emissions associated with the operational phase of the development.

Table 4-1 Emissions Factor Toolkit inputs

	Traffic flow	% HDV	Speed (Kph)	No of Hours	Link Length
EFT Input	244	1.6	50	24	10

The outputs of the EFT calculator and emissions mitigation calculations are outlined in Table 4-2 below. This table also demonstrates the damage cost calculations for both NO_x and PM_{2.5} done in accordance with Defra's Air quality appraisal: damage cost guidance. Overall, the development has a total damage cost of £14,349 for both NO_x and PM_{2.5}.

Table 4-2 Damage Costs

Pollutant	All Vehicles (Annual Emissions (tonne/yr)	Damage cost per tonne ^a	Years	Total damage costs
NO _x	0.0885	£10,193	5	£4,510
PM _{2.5}	0.0172	£114,411	5	£9,839
Total:				£14,349

^a Values are central damage costs for road transport from DEFRA's Air quality appraisal: damage cost guidance (2023)

^b There's a potential overestimation of PM impacts through the damage costs. This is because air pollutants are typically emitted in mixtures, so there's likely to be a degree of overlap between NO_x and PM.

4.2 Mitigation

An itemised mitigation list is presented in Table 4-3 below. This outlines that the mitigation target has been met for the proposed development.

Table 4-3 Mitigation Costs

Mitigation Type	Mitigation target: £14,349		
	Mitigation		
	£/Unit	NO of units:	Value
eV Charge points	£2,000 ^a	14	£28,000
	Total Value:		£28,000

^a EPS estimate based on industry standards, figures may need to be revised when designs finalised

The proposed scheme includes 14 active EV charging bays, representing 10.4% of the total parking provision. This falls below the West Sussex County Council Parking Guidance, which recommends EV charging provision for 20% of parking spaces.

However, as demonstrated in Table 4-3 above, the proposed number of charging bays still exceeds the calculated mitigation requirement by almost twice the required amount. This is therefore considered to represent a minor departure from the measures set out in the ES, while still providing suitable mitigation.

5 CONSTRUCTION DUST RISK ASSESSMENT

This CDRA describes the measures to be implemented to minimise the risk of dust impacts during construction works. These measures, outlined in Section 2, are based on a Construction Dust Risk Assessment of potential dust and fine particulate (PM₁₀) emissions arising from the activities described in Section 2. The risk assessment has been undertaken in accordance with the methodology published by the Institute of Air Quality Management (2b).

The IAQM construction dust methodology considers the potential for impacts within 250m of the site boundary and within 50m of roads used by construction vehicles. The assessment follows the IAQM's structured sequence of steps:

Step 1: *Screening to determine whether a detailed assessment is required;*

Step 2a: *Determining the potential for dust to be generated by on-site works and vehicles leaving the site;*

Step 2b: *Assessing the sensitivity of the surrounding area to dust;*

Step 2c: *Combining the outcomes of Steps 2a and 2b to define the unmitigated dust risk; and*

Step 3: *Identifying the appropriate level of mitigation required to ensure that significant dust impacts do not occur.*

Further detail on the IAQM methodology is provided in Appendix C. The proposed works have the potential to give rise to dust emissions during demolition and earthworks, as well as from 'Trackout' of dust and dirt onto the local road network. As sensitive receptors are located within the screening distances defined in the IAQM guidance, a detailed assessment is required. The following section sets out Step 2 of the assessment procedure. A summary of the dust mitigation details can be found below:

5.1 Assessment

5.1.1 Demolition

There are no withstanding structures to be demolished in this area of site. Demolition will therefore not be considered further within this CDRA.

5.1.2 Construction

The volume of buildings constructed is expected to be between 12,000m² – 75,000m², some dusty material such as concrete may also be used in construction. Some on-site concrete batching may take place. Based on the definitions set out in the dust-emission magnitude is considered to be medium.

5.1.3 Earthworks

Soil characteristics for the Site have been reviewed using data from the UK Soil Observatory, as summarised in Table 5-1 below.

Table 5-1 Impact Descriptors

Property	Description
Grain Size	Argillic – Argillaceous
Soil Layer Depth	Deep-Intermediate
Soil Parent Material	Sandstone and Mudstone
Soil Texture	Sandy Loam to Silty Loam

From UK Soil Observatory: <https://mapapps2.bgs.ac.uk/ukso/home.html>

The Site area is below 55,000m². Earthworks are unlikely to extend across the entire area simultaneously, and some areas may require minimal or no earthworks. Taking into account the soil characteristics, the limited spatial extent of earthworks and comparison with the example definitions in the dust-emission magnitude for earthworks is considered to be medium.

5.1.4 Trackout

Construction-related vehicle activity is expected to generate a maximum of approximately two heavy-duty vehicle movements per day. These vehicles may travel over more than 100 metres of unpaved ground, creating a limited potential for the tracking of material onto the public highway. However, the total number of vehicles exiting the site is anticipated to remain below 50 per day. In accordance with the criteria set out in the magnitude of dust emissions associated with trackout is therefore classified as medium.

These dust emissions magnitudes are summarised in Table 5-2 below.

Table 5-2 Impact Descriptors

Source	Dust Emission Magnitude
Construction	Medium
Earthworks	Medium
Trackout	Medium

5.2 Sensitivity of the Area

5.2.1 Dust Soiling Sensitivity from on-site Works

According to IAQM guidance residential properties are classified as high-sensitivity receptors, while commercial uses are considered medium-sensitivity receptors.

There are between 1 and 10 residential properties within 20m of the site boundary. On this basis, the area surrounding the proposed demolition and earthworks is assessed as having a medium sensitivity to dust-soiling effects. Receptor sites at various distances from the site's boundary are illustrated in Figure 5-1 below.

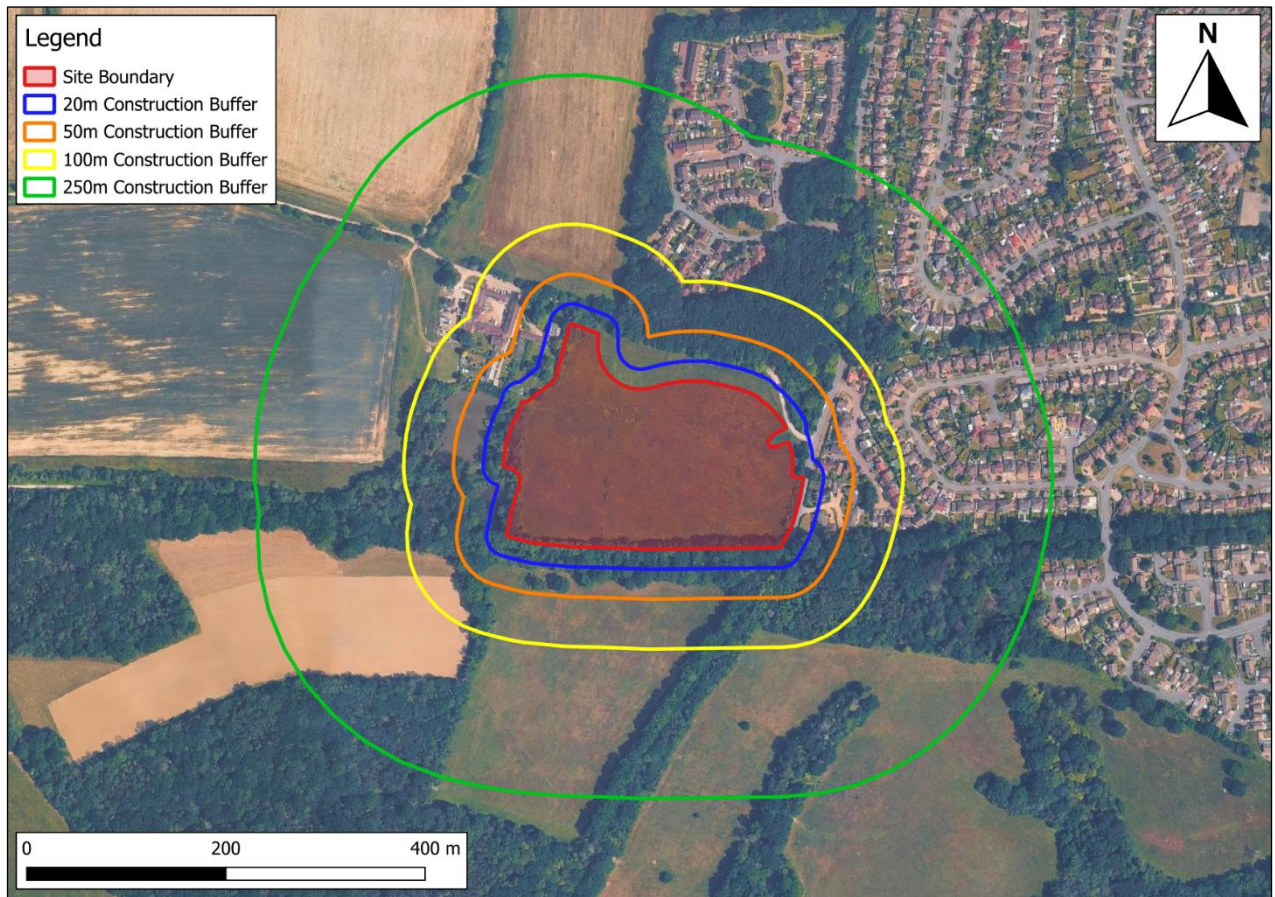


Figure 5-1 Site Work Buffer Rings

Image from Google Images, Imagery ©2025 Airbus, © 2025 Airbus, Maxar Technologies

5.2.2 Dust Soiling Sensitivity from Trackout

The IAQM guidance explains that there is a risk of material being tracked 250m from the site exit. Vehicles exiting the site will leave site from the southwestern boundary. There are between 1 and 10 residential properties within 20m of the roads along which material could be tracked thus indicates that the area is of medium sensitivity to dust soiling due to Trackout. These areas are outlined in Figure 5-2 below.

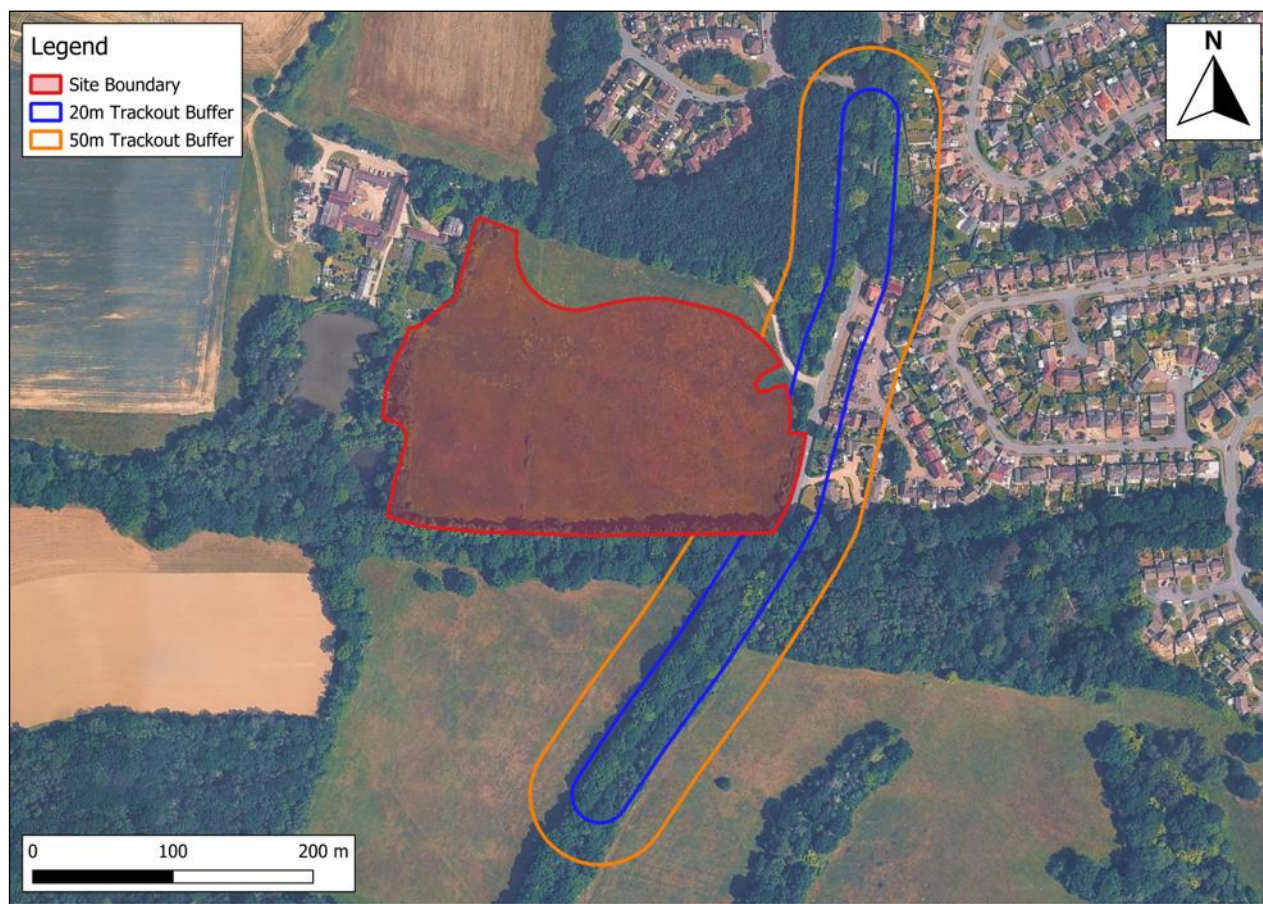


Figure 5-2 Trackout Buffer Rings

Image from Google Images, Imagery ©2025 Airbus, © 2025 Airbus, Maxar Technologies

5.2.3 Sensitivity of the Area to any Human Health Effects

Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. The matrix in Table 9-4 requires information on the baseline annual mean PM_{10} concentration in the area. The existing annual mean PM_{10} concentration is best described by the local background concentrations in 2026, this was $10.4\mu\text{g}/\text{m}^3$.

5.2.4 Sensitivity of the Area to Ecology

There are no sensitive ecological areas or Sites of Special Scientific Interest (SSSI) in the vicinity of the site. Ecological sensitivity will therefore not be discussed further.

5.2.5 Sensitivity of the Area Summary

The summary of Area Sensitivity is summarised below:

Table 5-3 Impact Descriptors

Potential Impact	On-site works	Trackout
Dust Soiling	Medium	Medium
Human Health	Medium Sensitivity	Medium Sensitivity

5.3 Risk and Significance

The dust-emission magnitudes presented in Table 5-3 have been combined with the sensitivities of the surrounding area using the risk-classification matrix outlined in Appendix C in order to assign a risk category for each activity. The resulting unmitigated risk levels for demolition, earthworks and trackout are summarised in Table 5-4. These classifications form the basis for determining the level of mitigation required, as outlined in section 6, which corresponds to Step 3 of the IAQM assessment methodology.

Table 5-4 Risk of Impacts

Category	Dust Soiling	Human Health
Construction	Medium Risk	Medium Risk
Earthworks	Medium Risk	Medium Risk
Trackout	Medium Risk	Medium Risk

The IAQM guidance does not provide a methodology for determining the significance of effects prior to mitigation and specifically advises that pre-mitigation significance should not be assessed. Once appropriate mitigation measures are implemented, the guidance confirms that any residual effects are expected to be not significant.

6 DUST MITIGATION MEASURES

The dust mitigation measures outlined in this section are based primarily on the best-practice recommendations set out in the IAQM guidance (2b). These measures should be refined and supplemented where appropriate following discussions with the contractor. The mitigation proposed is considered sufficient to ensure that dust impacts during the works remain not significant.

6.1 Preparing and Maintaining the Site

- The site layout will be planned so that machinery and dust-causing activities are located away from receptors, as far as is possible;
- Site runoff of water or mud will be avoided;
- Solid screens or barriers will be erected around dusty activities;
- Where there is a high potential for dust production and the site is active for an extensive period, the site or specific operations will be fully enclosed;
- Site fencing, barriers and scaffolding will be kept clean using wet methods; and
- Materials that have a potential to produce dust will be removed from site as soon as possible, unless being re-used on site.
- Cover, seed or fence stockpiles to prevent wind whipping.

6.2 Operating Vehicle/ Machinery and Sustainable Travel

- All vehicles will have their engines switched off when stationary; and
- The use of diesel- or petrol-powered generators will be avoided and mains electricity or battery-powered equipment will be used where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph 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).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials

6.3 Operations

- Cutting, grinding or sawing equipment will only be used where fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- An adequate water supply on the site for effective dust/particulate matter suppression/mitigation will be ensured, using non-potable water where possible and appropriate;

- Enclosed chutes, conveyors and covered skips will be used;
- ‘Scabbing’ of concrete surfaces should be avoided;
- Drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment will be minimised, and fine water sprays will be used on such equipment wherever appropriate; and
- Equipment will be 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.

6.4 Waste Management

- bonfires and burning of waste materials will be avoided; and
- a site waste management plan will be produced to manage waste throughout all stages of construction.

6.5 Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible; and
- 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.

6.6 Measures Specific to Trackout

- Water-assisted dust sweeper(s) will be used on the access and local roads, to remove, as necessary, any material tracked out of the site;
- dry sweeping of large areas will be avoided;
- vehicles entering and leaving sites will be covered to prevent escape of materials during transport;
- access gates will be located at least 10 m from receptors, where possible;
- all inspections of haul routes and any subsequent action will be recorded in a site log book; and
- a traffic management plan will be enforced to avoid lots of routes being used over potentially dusty ground.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- 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.

6.7 Adverse Weather

During periods of extreme weather such as particularly extended dry spells or episodes of high wind, there is an increased risk that dust may become entrained and travel further from the

source. During any such conditions, water suppression will be applied generously across all active work areas to prevent dust emissions from leaving the site boundary.

7 OPERATIONAL PHASE ASSESSMENT

7.1 NO₂ Predicted Concentrations

An assessment was undertaken using dispersion modelling provided by the ADMS-Roads model and as outlined in the methodology in Appendix E, to quantify the potential changes in pollutant concentrations at sensitive locations near to the site. Any exceedances of the AQOs are highlighted in bold. Assessment input details and locations of each sensitive receptor can be found in Appendix E.

Sensitive receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)			
		Without Development	With Development	Change in concentration (%)	Impact Descriptor
R1	Ramblers Cottage	13.25	13.25	0.00	Negligible
R2	Imberdene	13.22	13.23	0.08	Negligible
R3	Highgrove Cottage	15.04	15.05	0.07	Negligible
R4	Greenacres	12.93	12.94	0.08	Negligible
R5	Green Oaks	13.05	13.05	0.00	Negligible
R6	West Lodge	14.15	14.16	0.07	Negligible
R7	1 Bluebell Close	14.2	14.25	0.35	Negligible
R8	145 Imberhorne Lane	13.91	13.95	0.29	Negligible
R9	128 Heathcote Drive	14.03	14.06	0.21	Negligible
R10	101 Heathcote Drive	13.18	13.19	0.08	Negligible
R11	89 Heathcote Drive	13.15	13.15	0.00	Negligible
R12	Imberhorne School	14.65	14.67	0.14	Negligible
R13	10 Standen Close	14.61	14.62	0.07	Negligible
R14	DT MSAQ36	23.72	23.77	0.21	Negligible
R15	DT MSAQ3	18.21	18.23	0.11	Negligible

As indicated in the above table, predicted annual mean NO₂ concentrations were below 75% of the annual mean objective for NO₂ of 40µg/m³ (30µg/m³) at all sensitive receptors for both 'Without Development' and 'With Development' scenarios. Assessing the impact descriptor at individual receptors in accordance with the EPUK guidance(2a) indicates that all changes in modelled concentrations at receptors are considered 'negligible'.

The contour plot for the 2030 'With Development' scenario is included below along with the sensitive receptor locations and the site boundary. Receptor locations are detailed further in Appendix C.

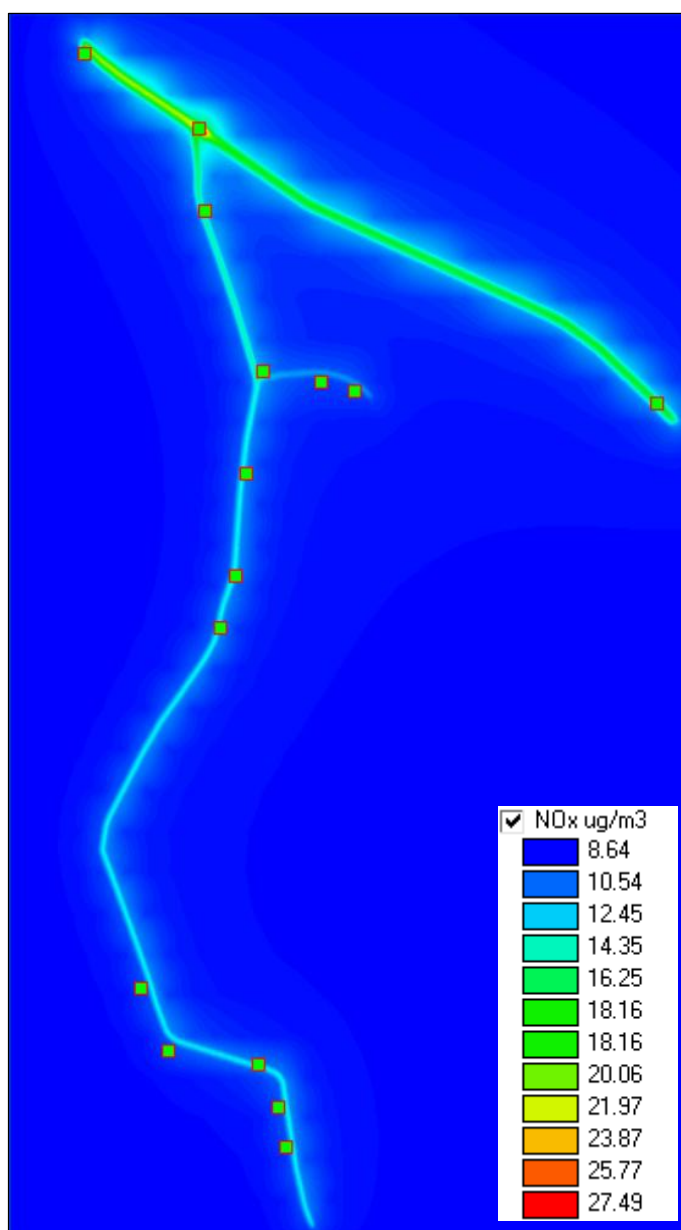


Figure 7-1 NOx Contour Plot

Legend values have not been adjusted with verification factor

7.2 PM₁₀ Predicted Concentrations

Sensitive Receptor		Predicted Annual Mean PM10 Concentration (µg/m ³)			
		Without Development	With Development	Change in concentration (%)	Impact Descriptor
R1	Ramblers Cottage	12.30	12.3	0.00	Negligible
R2	Imberdene	12.29	12.29	0.00	Negligible
R3	Highgrove Cottage	13.24	13.25	0.08	Negligible
R4	Greenacres	12.14	12.14	0.00	Negligible
R5	Green Oaks	12.20	12.2	0.00	Negligible
R6	West Lodge	12.77	12.78	0.08	Negligible
R7	1 Bluebell Close	12.81	12.84	0.23	Negligible
R8	145 Imberhorne Lane	12.66	12.68	0.16	Negligible
R9	128 Heathcote Drive	12.72	12.74	0.16	Negligible
R10	101 Heathcote Drive	12.27	12.27	0.00	Negligible
R11	89 Heathcote Drive	12.25	12.26	0.08	Negligible
R12	Imberhorne School	13.05	13.06	0.08	Negligible
R13	10 Standen Close	13.03	13.04	0.08	Negligible
R14	DT MSAQ36	16.75	16.78	0.18	Negligible
R15	DT MSAQ3	15.01	15.02	0.07	Negligible

As indicated in the above table, predicted annual mean PM10 concentrations were below 50% of the annual mean objective for PM10 of 40µg/m³ (20µg/m³) at all sensitive receptors for both 'Without Development' and 'With Development' scenarios. Assessing the impact descriptor at individual receptors in accordance with the EPUK guidance (2a) indicates that all changes in modelled concentrations at individual receptors are considered 'negligible'.

The contour plot for the 2030 'With Development' scenario is included below along with the sensitive receptor locations and site boundary. Receptor locations are detailed further in Appendix C.

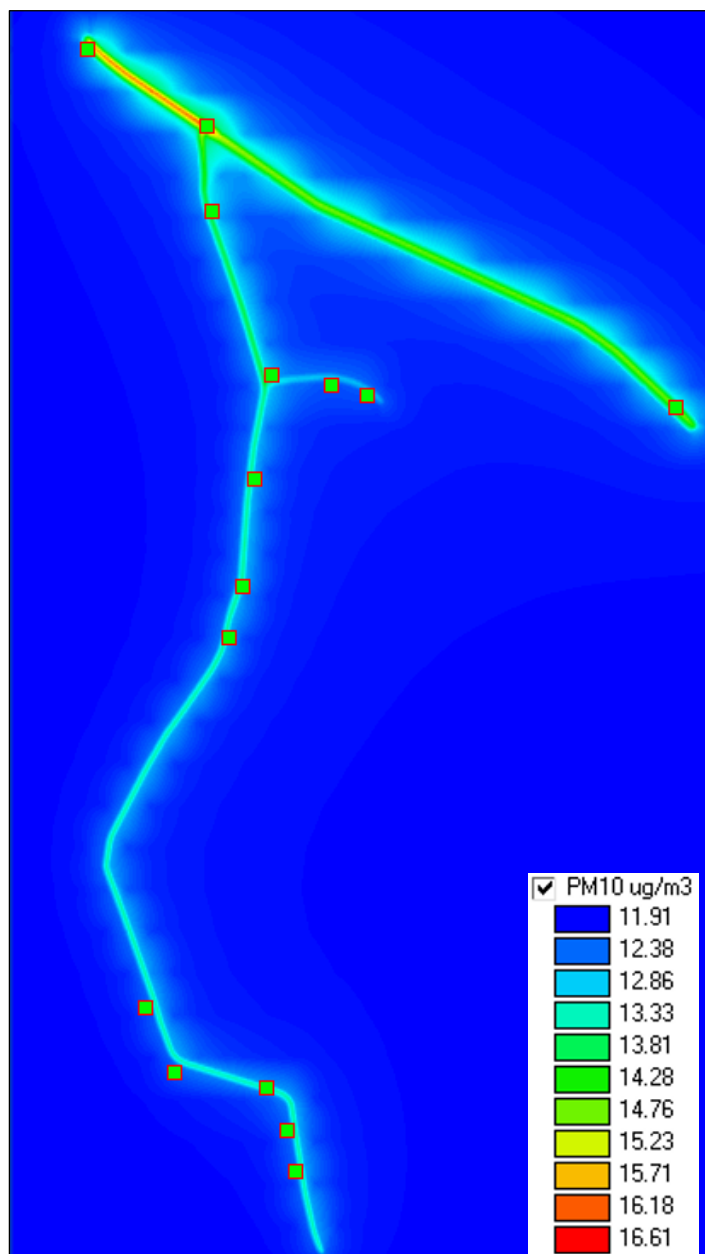


Figure 7-2 PM₁₀ Contour Plot

7.3 PM_{2.5} Predicted Concentrations

Sensitive Receptor		Predicted Annual Mean PM2.5 Concentration (µg/m ³)			
		Without Development	With Development	Change in concentration (%)	Impact Descriptor
R1	Ramblers Cottage	6.51	6.51	0.00	Negligible
R2	Imberdene	6.5	6.5	0.00	Negligible
R3	Highgrove Cottage	7	7.01	0.14	Negligible
R4	Greenacres	6.42	6.42	0.00	Negligible
R5	Green Oaks	6.46	6.46	0.00	Negligible
R6	West Lodge	6.76	6.76	0.00	Negligible
R7	1 Bluebell Close	6.78	6.79	0.15	Negligible
R8	145 Imberhorne Lane	6.7	6.71	0.15	Negligible
R9	128 Heathcote Drive	6.73	6.74	0.15	Negligible
R10	101 Heathcote Drive	6.49	6.49	0.00	Negligible
R11	89 Heathcote Drive	6.48	6.49	0.15	Negligible
R12	Imberhorne School	6.9	6.91	0.14	Negligible
R13	10 Standen Close	6.89	6.9	0.15	Negligible
R14	DT MSAQ36	8.85	8.86	0.11	Negligible
R15	DT MSAQ3	7.93	7.93	0.00	Negligible

As indicated in the above table, predicted annual mean PM2.5 concentrations were below 50% of the annual mean objective for PM2.5 of 20µg/m³ (10µg/m³) at the majority of sensitive

receptors for both 'Without Development' and 'With Development' scenarios. Assessing the impact descriptor at individual receptors in accordance with the EPUK guidance(2a) indicates that all changes at modelled concentrations at individual receptors are considered 'negligible'.

The contour plot for the 2030 'With Development' scenario is included below along with the sensitive receptor locations and site boundary. Receptor locations are detailed further in Appendix C

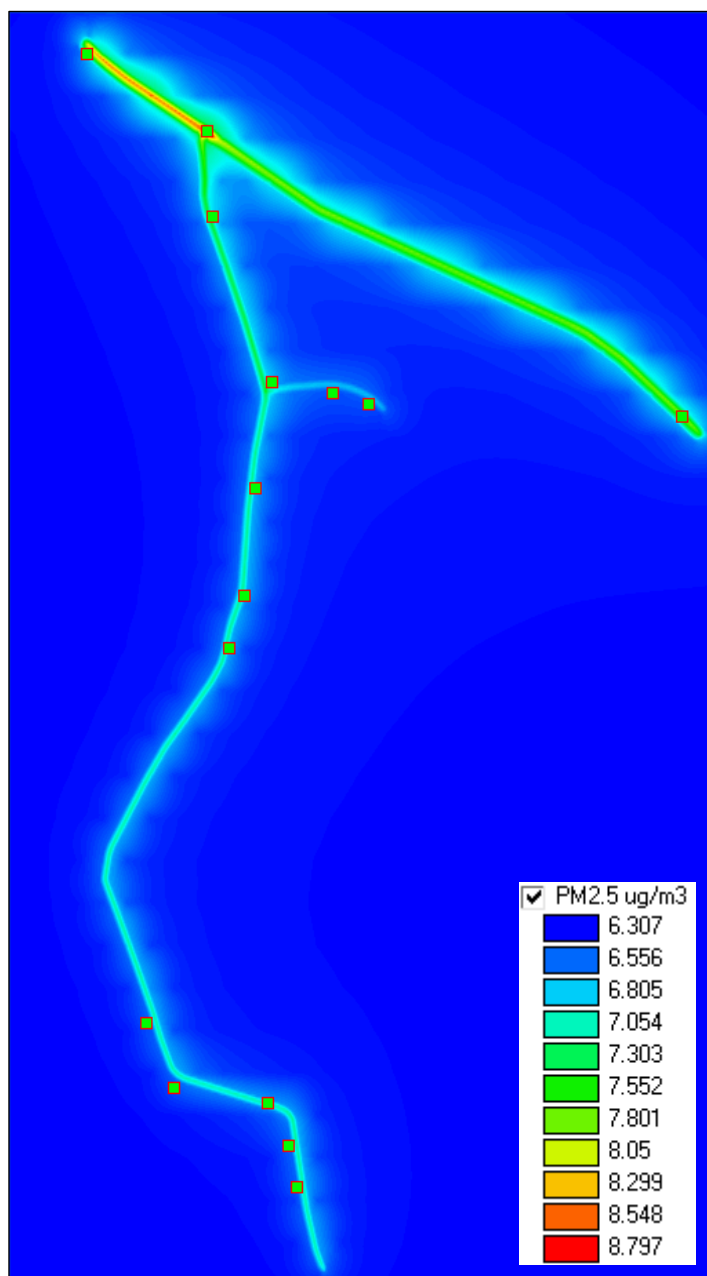


Figure 7-3 PM_{2.5} Contour Plot

8 EPS SIGNIFICANCE ANALYSIS

This assessment uses the following impact significance rankings; the full definitions can be found in Table 1-3.

IMPACT				
BENEFICIAL	NEGLIGIBLE	SLIGHT ADVERSE	MODERATE ADVERSE	SUBSTANTIAL ADVERSE

8.1 Receptors

Sensitive receptors in the vicinity of the proposed development include existing residential properties surrounding the site, particularly those located immediately adjacent to the Eastern site boundary within East Grinstead.

Other sensitive receptors include Imberhorne School to the north, and St Peter's Catholic Primary School to the east, both of which are located around 500m from site. Additional medium-sensitivity receptors in the wider area include nearby commercial and employment uses.

8.2 Without Development

Air quality in the vicinity of the site is currently considered to be reasonable to good, with relatively low background pollutant concentrations and no Air Quality Management Areas (AQMA) located within 7 km of the proposed development. Annual mean NO₂ concentrations recorded at nearby monitoring locations remain well below the national objective of 40 µg/m³, with a general trend of declining concentrations observed across the local monitoring network between 2020 and 2024.

The nearest monitoring location to the site, MSAQ36, is situated approximately 0.73km to the north and recorded annual mean NO₂ concentrations ranging from 29.8µg/m³ to 33.5µg/m³ over the recent monitoring period. This roadside monitoring site is located at a busy junction that experiences substantially higher traffic volumes and congestion than the roads immediately surrounding the proposed development. As concentrations at this more location are comfortably below the annual mean objective, pollutant concentrations at roadside locations closer to the proposed site are expected to also be lower than those at MSAQ36.

8.3 Cumulative Development

The traffic data used in this assessment, provided by THPS Ltd, incorporates anticipated traffic contributions from relevant nearby committed developments within the future assessment years. As the predicted effects remain negligible with these cumulative traffic flows included, cumulative development effects are not considered to be significant.

8.4 With Development

8.4.1 Construction Phase

Impact Rating
Negligible

As there are no Air Quality Management Areas (AQMAs) within the immediate vicinity of the Site, it is considered unlikely that construction-related vehicle movements would exceed the relevant screening criteria outlined in Section 5. As such, significant effects associated with construction traffic emissions are not expected.

There is the potential for the generation of dust and particulate matter during construction activities, which may give rise to temporary amenity effects (e.g. soiling) and, in some instances, minor health effects at nearby sensitive receptors, including existing residential properties and future occupants of the development as phases are completed and occupied.

However, provided that appropriate mitigation measures are implemented in accordance with the construction dust risk assessment accompanying this report, the risk of significant adverse effects would be effectively controlled. With these mitigation measures in place the effects of the construction phase are predicted to be negligible.

8.4.2 Operational Phase

Impact Rating
Negligible

The information presented above shows that the proposed site area has good overall air quality. There have been no exceedances of the national air quality objectives between 2020 and 2024 in this district with a trend of overall improvement across this this period. The specific monitoring station results have been discussed above, with the latest available data showing the nearby monitoring being below 75% of the national objective for NO₂ and PM₁₀. While the proposed development will introduce additional vehicle trips, the changes in roadside NO₂ produced by these vehicles can be considered negligible in accordance with IAQM guidance (2a).

As indicated in the above tables, the predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant objectives at all sensitive receptor locations in the 'With Development' scenario. Impacts on the annual means for NO₂, PM₁₀ and PM_{2.5} following completion of the development are considered to be minimal, therefore the impact at each receptor location is concluded to be negligible. The proposed development is not predicted to adversely affect the residents surrounding the site by causing an exceedance of any AQO, nor is there a prediction that any future residents/commercial site users would be introduced into an area of poor air quality, so EPS cannot see a reason the proposed development cannot go ahead on the basis of air quality. With the above in mind, the overall significance of operational phase road traffic emissions is considered negligible for NO₂, PM₁₀ and PM_{2.5}, and following the IAQM guidance(2a) the overall effects are considered to be not significant. There is no need for any further monitoring or modelling, in terms of air quality management.

Low emission design is still recommended and encouraged, although the inclusion of design measures are likely to be voluntary, given the results of this Air Quality Assessment. To aid that process, details on what form of low emission design could be employed are included in the following sections.

9 MITIGATION & LOW EMISSION DESIGN

To ensure an effective low emission approach is adopted, and the right aspects prioritised if the client wishes to employ them at the earliest stage of the design, EPS have prepared an inventory of low emissions measures and cited publicly available references in order to generate approximate emission savings of both nitrogen oxides and carbon. These are not exact predictions, or site-specific but they may be useful in determining the relative benefit of each measure.

There is a wide range of variables and uncertainty which restricts the accuracy of determining these emission benefits to a high level of accuracy so they should not be viewed in that context, but the inventory does show clear quantifiable relative benefits for each measure to highlight where it's worth focussing resources. The Low Emissions Inventory is included in Appendix F and includes the relevant references for the sources of information used. EPS' workings for the inventory are included in Appendix G.

It is important to note that the inventory is largely based on generic household emissions generated by a typical residential development. It does not account for site-specific factors and there will be differences when applied to a school or place of work. If needed, at a later stage further site-specific assessment could be applied using EPUK & IAQM's approach to 'Offsetting Emissions' in their 2017 guidance(2a), for NOx and PM10.

The Low Emission Design is split into the following four areas covered by the inventory:

1. Low Emission Private Transport & Travel Planning
2. Energy Efficiency of the Built Environment
3. Optimised Development
4. Construction Phase

The specific measures for each category, with comments and an approximate emission benefit specific to this site are included in the following tables. Each Low Emission Measure has been given a 'Low Emission point' which is scored out of three. This is based on the measure's qualitative benefit to the proposed scheme and local air quality, based on EPS' judgement and reference calculations, with three being the highest benefit and one being the lowest benefit.

A more detailed analysis of different aspects within each Low Emissions Measure can be found in Appendix F, EPS would recommend Appendix F is used when deciding which Low Emission Measures will benefit your project.

Impact Significance	EPS Low Emission Points Recommendation	Mitigation Requirement
BENEFICIAL	5	VOLUNTARY (FOR GUIDANCE ONLY – NOT MANDATORY)
NEGLIGIBLE	5	
SLIGHT ADVERSE	10	
MODERATE ADVERSE	12	NECESSARY
SUBSTANTIAL ADVERSE	15+	NECESSARY

9.1 Low Emission Private Transport & Travel Planning

1. LOW EMISSION PRIVATE TRANSPORT & TRAVEL PLANNING				
		EMISSIONS BENEFIT		
Low Emission Vehicle Support	Cabling and wiring/consumer unit infrastructure could be installed to facilitate at least Rapid (43/50KW) charging points. Ideally at least 10% should have a dedicated Electric Vehicle (EV) charging point which the Council may also require. It is important to install cabling/capacity for future-proofing wider scale EV charging, if possible.	High		

9.2 Energy Efficiency Of The Built Environment

2. ENERGY EFFICIENCY OF THE BUILT ENVIRONMENT				
		EMISSIONS BENEFIT		
Solar Photovoltaic/ Solar Thermal	Typically, at least 10% of the buildings total predicted energy requirement should be from on-site renewable energy sources, a local planning requirement may stipulate a higher proportion. This could be achieved through solar panels and/or small wind turbines.	High		
Air source/Ground source heat pumps/Exhaust Air Heat Pump	This form of heating is beneficial in terms of NO _x and carbon emissions along with using very little electricity to operate. Heat pumps have an energy output of up to 300% and homeowners are able to earn money back under the Renewable Heat Incentive Scheme.	Moderate		
Combined Heat & Power (CHP) / Boiler Efficiency	Developments should use low NO _x boilers to minimise emissions. Typically, a low NO _x boiler would meet a dry NO _x emission rating of 40mg/kWh. There may also be a planning requirement for achieving this.	Moderate		

9.3 Optimised Development

3. OPTIMISED DEVELOPMENT			
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		EMISSIONS BENEFIT
Site layouts & proximity of housing to roads	There are negligible reductions in emissions, but design layouts which reduce exposure of receptors to pollutants are preferable, particularly in terms of proximity to busy roads and introducing any 'canyon' effect.	Low
Sealed fascias/active (artificial) ventilation or active air filtration (NO _x filters etc.)	Sealed fascias or mechanical ventilation would not be needed in this location (on air quality grounds). It is always a 'last resort' to use physical infrastructure to manage risks from air quality as it will require oversight, enforcement and maintenance throughout its operational lifespan.	Low
Building Design	Favourable design measures include the avoidance of tight/tall streets (canyons) and increasing sustainable/well-insulated building design.	High

9.4 Construction Phase

4. CONSTRUCTION PHASE				
		EMISSIONS BENEFIT		
Construction Vehicles	All commercial road vehicles used in the construction should meet the European Emission Standards (commonly known as Euro standards) of Euro 5 during any works that take place wherever possible.	Low		
Construction Road Layout	Favourable design measure including speed restrictions & traffic management.	Low		
Construction Environmental Management Plan (CEMP)	If a CEMP is produced it should cover site activities such as plant emissions, switch-off policy and plant maintenance. Dust management will also be a key, a Dust Management Plan can be used to supplement CEMP with the measures presented in this report forming the basis of dust management.	Moderate		

END

APPENDICES

Appendix A – Regulatory Context

Appendix B – Selected Site Photographs and Walkover Notes

Appendix C – Operational Phase Methodology and Model Inputs

Appendix D – Construction Dust Methodology

Appendix E – Low Emission Design – Inventory

Appendix F – Low Emission Design – Inventory Calculations

APPENDIX A – REGULATORY CONTEXT

REGULATORY CONTEXT OF DETAILED AIR QUALITY ASSESSMENT – KINGSCOTE PLACE

The following sources of information have formed the basis for the AQA:

- 1. NATIONAL POLICY & TECHNICAL GUIDANCE**
 - a. NPPF – National Planning Policy Framework (August 2026)
 - b. DEFRA – Planning Practice Guidance: Air Quality (2019)
 - c. DEFRA – Local Air Quality Management: Technical Guidance TG22 (2022)
 - d. DEFRA – Local Air Quality Management: Policy Guidance PG22 (2022)
 - e. DEFRA – Clean Air Strategy 2019
 - f. DEFRA – UK Air Information Resource (2020)
- 2. INDUSTRY GUIDANCE & BEST PRACTICE**
 - a. EPUK & IAQM – Land-Use Planning & Development Control: Planning for Air Quality (2017)
 - b. IAQM – Guidance on the assessment of dust from demolition and construction – Version 2.2 (2024)
- 3. LOCAL POLICY/STATUTORY REPORTING**
 - a. Mid Sussex District Council –Air Quality Annual Status Report (2025)
 - b. Mid Sussex District Council – Air Quality Strategy (2026)
 - c. Air quality and Emissions Mitigation Guidance for Sussex (2021)

APPENDIX B – SELECTED SITE PHOTOGRAPHS AND WALKOVER NOTES

1: Imberhorne Lane Facing North	2: Imberhorne Lane Facing South
	
3: Eastern Site Boundary	Photo 4: Road Adjacent to North of Site
	

Site Walkover Notes				
What is the land currently used for?	Grassland/ agricultural			
What are the obvious sources of emissions on site? (i.e. traffic, idling cars, boilers, industrial). Include details about boiler emissions rating or stack height, if known.	Imberhorne Lane			
Are the source areas close to sensitive areas such as playgrounds?	none			
How many parking spaces currently onsite?	none			
What is the adjacent land currently used for?	Residential, Agricultural			
How many parking spaces on adjacent land?	Street Parking nearby			
How busy are the nearby roads? Observe for 10 mins and record start/finish time and traffic volume		Road 1	Road 2	Road 3
	Road name	Imberhorne Lane	Heathcote Drive	London Road
	Start time	12:45	13:49	13:10
	Finish time	12:55	13:59	13:20
	Vehicle movements observed	68	25	115
Any congestion or traffic calming/lights on nearby roads?	Not observed on survey			

Any street canyons or dense buildings on site or in the surrounding area? If so, estimate width of road and distance between buildings	No street canyons
Any stacks or evidence of industrial emissions in surrounding area?	No
Any obvious monitoring stations in the vicinity? (i.e. diffusion tubes, continuous stations).	None observed
Are there any pedestrian crossings near the site?	none
Any existing low emission measures? EV charging points, cycling infrastructure?	none
Is there any existing public transport provision for the new development? Nearby bus stops, cycle lanes, paths etc.?	none

APPENDIX C – OPERATIONAL PHASE METHODOLOGY AND MODEL INPUTS

Road traffic exhaust emissions associated with vehicles travelling to and from the site can potentially affect existing air quality in the area. The air dispersion model ADMS-Roads (v. 5.0.1.3) created by Cambridge Environmental Research Consultants (CERC) Ltd. has been used to assess the potential impact of the traffic generated by the development at sensitive receptor locations. The dispersion model has been used to predict NO₂, PM₁₀ and PM_{2.5} concentrations with all three pollutants being monitored by MC so the model can be clearly verified.

The potential impacts have been defined by predicting the pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2026 as a verification year
- Assessment year “Without Development” which uses predicted traffic flows in 2030 to predict pollutant concentrations should the development not proceed.
- Assessment year “With development” which uses predicted traffic flows in 2030 to predict pollutant concentrations should the development be completed.

The maximum number of vehicles generated by the operational phase will occur once the proposed development is completed so the baseline year of 2026 has been chosen, along with 2030 as the future year scenario as this represents the year the proposed development could be expected to be completed.

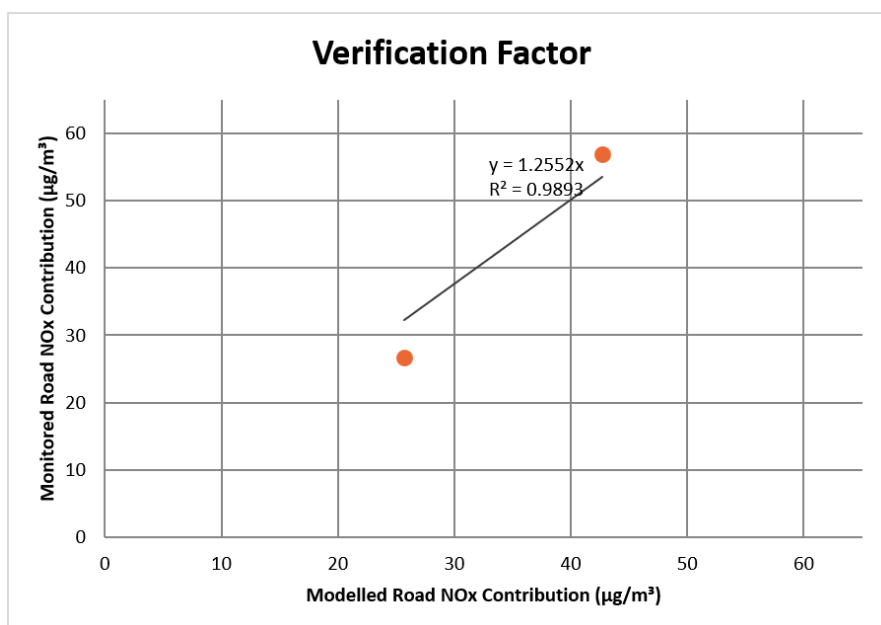
Further details of the ADMS-Roads model inputs are included below.

Scenarios	Baseline year	2026
	Assessment year (without development)	2030
	Assessment year (with development)	2030
Emissions Factors Toolkit	UK EFT v14.1	
Surface Roughness	Site: 0.5m – Representing a typical surface roughness for ‘parkland & open suburbia’. Meteorological station: 1.0m – Representing a typical surface roughness for ‘cities & woodland’.	
Minimum Monin-	Site / Meteorological station: 30m	

Meteorological data	Observed meteorological data was sourced from Atmospheric Dispersion Modelling (ADM) Ltd from Northolt meteorological station for period 1 st January 2019 to 31 st December 2019 (inclusive). Northolt weather station is located at NGR: X:510002 / Y:184551 approximately 55km north of the site. It is anticipated the weather conditions will be reasonably similar to the proposed site.		
Street 'Canyons'	There are not considered to be any street 'canyons' present near this site.		
NO_x NO₂ calculations	DEFRA's NO _x to NO ₂ calculator was used to convert predicted annual mean NO _x concentrations to NO ₂ concentrations as per the LAQM Technical Guidance ^(1c) (NO_x to NO₂ Calculator LAQM (defra.gov.uk))		
Model Verification	Predicted concentrations from air dispersion models can differ from measured concentration for a number of reasons, including: – Estimated background concentrations – Uncertainties in source activity data (particularly, traffic flows and emissions factors) – Variations in meteorological conditions – Overall model limitations and model input parameters (particularly, surface roughness length and minimum Monin-Obukhov length) – Uncertainties associated with monitoring data Model verification is carried out to investigate, and where possible, minimise, uncertainties in modelled predictions. Any witnessed differences between modelled and monitored concentrations are likely to be a combination of the abovementioned reasons.		
	Sensitive Receptor /Monitoring Location	Monitored NO₂ (µg/m³)	Monitored road NO_x (µg/m³)
	DT MSAQ36	30.1	42.7
	DT MSAQ3	18.6	25.7
		Modelled road NO_x (µg/m³)	
		56.9	
		26.7	

The monitored and modelled road NO_x concentrations were compared using a scatter plot, and a trendline constrained through the origin was used to derive a verification factor. This analysis indicated that a verification factor of 1.2552 should be applied to all modelled road NO_x concentrations to improve agreement with monitored data.

It should be noted that the traffic model uses 2026 baseline traffic data, representing the most recent comparable assessment year. However, Mid Sussex District Council has not yet published diffusion tube monitoring data beyond 2024. As monitored NO₂ concentrations have generally declined in recent years, and the verification exercise indicates that the model under-predicts concentrations, it is likely that the verification factor would be lower if more recent (2026) monitoring data were available. Consequently, the adopted verification factor is considered to represent a worst-case approach.



Sensitive Receptor Locations	Receptor		Receptor type	National Grid Reference	
				Easting	Northing
	R1	Ramblers Cottage	Residential	537815	137009
	R2	Imberdene	Residential	537798	137104
	R3	Highgrove Cottage	Residential	537750	137202
	R4	Greenacres	Residential	537539	137236
	R5	5 Green Oaks	Residential	537475	137383
	R6	West Lodge	Residential	537663	138232

	R7	1 Bluebell Close	Residential	537697	138351
	R8	145 Imberhorne Lane	Residential	537724	138595
	R9	128 Heathcote Drive	Residential	537760	138834
	R10	101 Heathcote Drive	Residential	537899	138810
	R11	89 Heathcote Drive	Residential	537979	138785
	R12	Imberhorne School	Residential	537627	139211
	R13	Standen Close	Residential	537342	139580
	R14	DT MSAQ36	Monitoring Site	537612	139405
	R15	DT MSAQ3	Monitoring Site	538690	138759
Traffic Data	Annual Average Daily Traffic (AADT) data was provided by traffic consultants (TPHS Ltd), for various, relevant road links. Details of which are outlined below.				
Road	Stretch	2026 Baseline Vehicles (HGV %)	2030 Baseline (HGV %)	2030 With development (HGV %)	
A22 London Road	W. of Imberhorne Lane	22,562 (3.99%)	23,251 (3.87%)	23,368 (3.86%)	
	E. of Imberhorne Lane	15,395 (4.56%)	15,304 (4.59%)	15,322 (4.58%)	
Imberhorne Lane	By A22 London Road	9,409 (2.75%)	10,443 (2.48%)	10,578 (2.47%)	
	N. of Heathcote Drive	8,364 (1.72%)	9,482 (1.52%)	9,617 (1.52%)	
	Heathcote Drive - Site Access (4)	6,681 (1.27%)	8,371 (1.02%)	8,566 (1.03%)	
	S. of Site Access (4)	6,681 (1.27%)	6,936 (1.23%)	6,985 (1.23%)	
Heathcote Drive	E. of Imberhorne Lane	3,411 (2.26%)	3,947 (1.95%)	4,007 (1.95%)	
Details on the predicted average speed and road width are outlined below. Road speeds have been assed using speed limits and professional judgment. Road width was measured using satellite photography.					

Road	Road Link	Average Vehicle Speed (km/h)	Road Width (m)
A22 London Road	W. of Imberhorne Lane	30	8.6
	E. of Imberhorne Lane	30	8.6
Imberhorne Lane	By A22 London Road	30	6
	N. of Heathcote Drive	30	6
	Heathcote Drive - Site Access	30	6
	S. of Site Access	45	5.4
Heathcote Drive	E. of Imberhorne Lane	28	5.7

APPENDIX D – CONSTRUCTION DUST METHODOLOGY

The criteria developed by the IAQM (2b), divide the activities on construction sites into four types to reflect their potential impacts. These are:

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

The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

An assessment is required where a human receptor is located within 250 m of the site boundary and/or within 50 m of any public highway used by construction vehicles, up to 250 m from the site entrances. An assessment is also required where an ecological receptor is situated within 50 m of the site boundary and/or within 50 m of construction vehicle routes on the public highway, again up to 250 m from the site access points.

Where the screening process confirms that a more detailed assessment is not necessary, the overall level of risk is considered to be negligible. In such cases, any potential effects are expected to be not significant, and no mitigation measures are required beyond those already mandated by legislation.

STEP 2: Assess the Risk of Dust Impacts

A site is allocated to a risk category based on two factors:

the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and

the sensitivity of the area to dust effects (Step 2B).

These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

Dust emission magnitude is defined as either ‘Small’, ‘Medium’, or ‘Large’. The IAQM guidance explains that this classification should be based on professional judgement but provides the examples in Table 8.

Table 9-1 Magnitude Classifications

Class	Sensitivity of the Surrounding Area
Demolition	
Large	Total building volume >75,000 m ³ , potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >12 m above ground level
Medium	Total building volume 12,000 m ³ – 75,000 m ³ , potentially dusty construction material, demolition activities 6-12 m above ground level
Small	Total building volume <12,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >110,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height.
Medium	Total site area 18,000 m ² – 110,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3 m – 6 m in height.
Small	Total site area <18,000 m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height.
Construction	
Large	Total building volume >75,000 m ³ , on site concrete batching; sandblasting
Medium	Total building volume 12,000 m ³ – 75,000 m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching
Small	Total building volume <12,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

Step 2B – Define the Sensitivity of the Area

The sensitivity of the area is defined taking account of a number of factors:

- *the specific sensitivities of receptors in the area;*

- the proximity and number of the receptors;
- in the case of PM10, the local background concentration; and
- site-specific factors, such as whether there are natural shelters to reduce the risk of wind-blown dust.

The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in. Your assessment should be based on the actual guidance rather than the summary. These receptor sensitivities are then used in the matrices set out in Table 10, Table 11 and Table 12 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc, and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table 13 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Section 2.

STEP 4: Determine Significant Effects

The IAQM guidance does not provide a method for assessing the significance of effects before mitigation and explicitly advises that pre-mitigation significance should not be determined. When appropriate mitigation measures are implemented, the guidance states that the residual effects will normally be ‘not significant’.

The IAQM guidance also acknowledges that, even with a well-designed and proactively managed Dust Management Plan, it is not possible to guarantee that mitigation will be fully effective under all circumstances. Adverse weather conditions, such as high winds or prolonged dry periods, may occasionally reduce the effectiveness of controls. As a result, the local community may experience short-term, intermittent episodes of dust annoyance.

However, these isolated events are not normally of a scale or duration that would alter the overall conclusion of the assessment. Provided that the Dust Management Plan is

followed and mitigation is adapted promptly in response to site or weather conditions, the e Table 9: Principles to be Used When Defining Receptor Sensitivities

Table 9-2 Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivity of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and 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	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or 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	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or 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	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivity of People to the Health Effects of PM₁₀		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers

		occupationally exposed to PM10
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust-sensitive species	Special Areas of Conservation with dust sensitive features
Medium	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	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table 9-3 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
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 9-4 Sensitivity of the Area to Human Health Effects

Receptor Sensitivity	Annual Mean PM ₁₀	Number of Receptors	Distance from the Source (m)			
			<20	<50	<100	<50
High	>32 µg/m³	High	High	High	Medium	Low
		High	High	Medium	Low	Low
		High	Medium	Low	Low	Low

	28-32 $\mu\text{g}/\text{m}^3$	High	High	Medium	Low	Low
		High	Medium	Low	Low	Low
		High	Medium	Low	Low	Low
	28-32 $\mu\text{g}/\text{m}^3$	High	Medium	Low	Low	Low
		High	Medium	Low	Low	Low
		Medium	Low	Low	Low	Low
	<24 $\mu\text{g}/\text{m}^3$	Medium	Low	Low	Low	Low
		Low	Low	Low	Low	Low
		Low	Low	Low	Low	Low
Medium	>32 $\mu\text{g}/\text{m}^3$	High	Medium	Low	Low	Low
		Medium	Low	Low	Low	Low
	28-32 $\mu\text{g}/\text{m}^3$	Medium	Low	Low	Low	Low
		Low	Low	Low	Low	Low
	24-28 $\mu\text{g}/\text{m}^3$	Low	Low	Low	Low	Low
		Low	Low	Low	Low	Low
	<24 $\mu\text{g}/\text{m}^3$	Low	Low	Low	Low	Low
		Low	Low	Low	Low	Low
Low	-	Low	Low	Low	Low	Low

Table 9-5 Sensitivity of the Area to Ecological Effects

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

Table 9-6 Matrix of Sensitivity Paired with Magnitude

Receptor Sensitivity	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
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

APPENDIX E - LOW EMISSION DESIGN – INVENTORY

Low Emission Design – Inventory

The Low Emissions Inventory is split into the following categories:

1. Low Emission Private Transport & Travel Planning
2. Energy Efficiency of Built Environment
3. Optimised Development
4. Construction Phase

Categories 1-3 relate to the operational phase of the development. Category 4 relates to the construction phase.

For each measure, EPS have utilised publicly available reference documents to generate a quantitative benefit in terms of emissions coupled with a range of assumptions. To accurately determine the cost for each of these measures for a specific development would contain too many variables, so a qualitative description will be added where relevant. The basis for these calculations and assumptions is included at the end of this Appendix. If any third party or Environmental Health team have comments to make which could add value to this process, such as where better reference materials could be utilised, EPS would welcome that input and should be contacted on 01954 710666 / info@epstrategies.co.uk and ask to speak to a member of the Air Quality Team.

Other measures may have minimal direct impact on emissions, but do have associated public health effects such as encouraging walking or cycling instead of private car usage. There is an intrinsic but intangible link between local air quality management and public health, and it may be any area to further quantify in future although currently EPS have added a qualitative comment where relevant.

Certain measures, such as public transport infrastructure will invariably have emissions benefits which may often be significant, but a generic quantitative emission saving is not possible to determine so they are denoted as 'NA'.

Wherever possible, EPS have utilised reference documents which apply ideally to England and Wales if not the whole UK. However, in certain instances publicly available data from South Cambridgeshire has been incorporated as the process was borne out of collaborative working between EPS and the Council. All references are included on the figures at the end of this Appendix.

Units

Kg/CP/YR - kilograms per charging point per year

Kg/Hse/YR - kg per household/year

mg/kWh – Milligram per Kilowatt Hour

1) Low Emission Private Transport & Travel Planning

Low Emission Measure	Comment	Detail		Approx. Emissions Saved		Low Emission Points Based on EPS' Recommendation
				NO _x (mg/kWh)	CO ₂ (Kg/Hse/YR)	
Building Sustainability	Aim to maximise the sustainability of the built environment to achieve mutually beneficial air quality objectives. Utilising the BREEAM rating for the Code for a Sustainable Built Environment or BRE's Home Quality Mark is one approach, others may be suggested.	BREEAM Rating	Outstanding	110	2850	3
			Excellent	80	1825	2
			Pass/Very Good	50	775	1
		Home Quality Mark		125	5200	3
		Other demonstrable energy efficiency measures such as insulation, cavity wall insulation, double-glazing, high-energy performance certification etc.		30	1025	2
Renewables	At least 10% of the buildings' total predicted energy requirement will be from on-site renewable energy sources.			150	Up to 5200	3
Biomass Boilers	A local requirement or checklist may be applicable from Local Environmental Health Dept.			-100**	2400	2
Air-source/ Ground-source Heat Pumps	No emission saving information currently available.			N/A	N/A	2
Combined Heat & Power (CHP) / Boiler Efficiency	Developments should utilise low NOx boilers/CHP to minimise emissions from the development that may impact on air quality. Typically, a low NOx boiler would meet a dry NOx emission rating of 40mg/kWh.	Boiler Efficiency Achieved		110	2600	3
	Any gas-fired CHP shall meet an emissions standard of: - Spark ignition engine: less than 150mgNOx/Nm ³ - Compression ignition engine: less than 400 mgNOx/Nm ³ - Gas turbine: less than 50mgNOx/Nm ³ CHP's best application is in facilities with high electric load such as hospitals, schools, industrial facilities and hotels.	CHP Efficiency Achieved		-950	1550	2

**NO_x emissions for Biomass Boilers is a negative value as such boilers emit more nitrogen oxides and particulates than a traditional gas-fired boiler.

2) Energy Efficiency of Built Environment

Low Emission Measure	Comment	Detail		Approx. Emissions Saved		Low Emission Points Based on EPS' Recommendation
				NO _x (mg/kWh)	CO ₂ (Kg/Hse/YR)	
Building Sustainability	Aim to maximise the sustainability of the built environment to achieve mutually beneficial air quality objectives. Utilising the BREEAM rating for the Code for a Sustainable Built Environment or BRE's Home Quality Mark is one approach, others may be suggested.	BREEAM Rating	Outstanding	110	2850	3
			Excellent	80	1825	2
			Pass/Very Good	50	775	1
		Home Quality Mark		125	5200	3
		Other demonstrable energy efficiency measures such as insulation, cavity wall insulation, double-glazing, high-energy performance certification etc.		30	1025	2
Renewables	At least 10% of the buildings' total predicted energy requirement will be from on-site renewable energy sources.		150	Up to 5200	3	
Biomass Boilers	A local requirement or checklist may be applicable from Local Environmental Health Dept.		-100**	2400	2	
Air-source/ Ground-source Heat Pumps	No emission saving information currently available.		N/A	N/A	2	
Combined Heat & Power (CHP) / Boiler Efficiency	Developments should utilise low NOx boilers/CHP to minimise emissions from the development that may impact on air quality.	Boiler Efficiency Achieved		110	2600	3
	Typically, a low NOx boiler would meet a dry NOx emission rating of 40mg/kWh.					
	Any gas-fired CHP shall meet an emissions standard of: - Spark ignition engine: less than 150mgNOx/Nm ³ - Compression ignition engine: less than 400 mgNOx/Nm ³ - Gas turbine: less than 50mgNOx/Nm ³ CHP's best application is in facilities with high electric load such as hospitals, schools, industrial facilities and hotels.	CHP Efficiency Achieved		-950	1550	2

**NO_x emissions for Biomass Boilers is a negative value as such boilers emit more nitrogen oxides and particulates than a traditional gas-fired boiler.

3) Optimised Development

Low Emission Measure	Comment	Detail	Approx. Emissions Saved		Low Emission Points Based on EPS' Recommendation
			NO _x (mg/ kWh)	CO ₂ (kg per unit/year)	
Site layouts & proximity of housing to roads	Although not a specific requirement of air quality policy, design layouts which reduce exposure of receptors to pollutants are preferable, particularly in terms of proximity of housing to busy roads.		<0.01	N/A	1
Sealed fascias/active (artificial) ventilation or active air filtration (NO _x filters etc.)	Only to be used in cases where few other options are available, for example, only in very sensitive areas and around AQMAs, or for other reasons such as noisy areas.		<0.1	N/A	1
Building Design	Favourable design measures include designs to avoid the creation of tight/tall streets (canyons) & increasing sustainable/well-insulated building design.		110	2850	3

4) Construction Phase

Low Emission Measure	Comment	Approx. Emissions Saved		Low Emission Points Based on EPS' Recommendation
		NO _x	CO ₂	
Construction Vehicles	All commercial road vehicles used on the construction project must meet the European Emission Standards (commonly known as Euro standards) of Euro 5 during any works that take place. All non-road mobile vehicles with compression ignition engines used within the site must comply with emission standards set in EC directive 97/68/EC. Vehicles must meet Stage IIIa and b emission limits. Any diesel-powered machines used on, or otherwise serving the site, must be run on ultra-low sulphur diesel (also known as ULSD 'cleaner diesel' or 'green diesel'). "Ultra-low sulphur diesel" means fuel meeting the specification within BS EN 590.	6500 (mg/kWh)		1
Construction Road Layout	Favourable design measure including speed restrictions & traffic management.	20%***	20%***	1
Construction Environmental Management Plan (CEMP)	A CEMP would cover impacts to air quality mainly associated with dust and odour. The CEMP will also cover more general environmental health issues such as noise and light pollution. Site activities include plant emissions – switch-off policy, plant maintenance & alternative fuel use.	40%***	40%***	1

***A precise number of emissions saved cannot be calculated as each project will emit different levels of NO_x and CO₂ due to varying scope and size.

APPENDIX F – LOW EMISSION DESIGN – INVENTORY CALCULATIONS

Definitions and abbreviations:

CHP = Combined Heat & Power

CO₂e = Carbon Dioxide equivalent

All gaseous emissions are converted to the amount of CO₂ needed to create the same effect from other emissions including NO_x, methane, SO_x etc.

DERV = Diesel Engine Road Vehicle

GCV = Gross Calorific Value

The gross calorific value (Ho or Hs) is the energy released during a complete combustion when the flue gas is cooled back to the reference temperature at a constant pressure and the entire quantity of water produced is condensed. The gross calorific value therefore also contains the condensation heat, also referred to as “latent heat”.

HEPR = Home Energy Performance Ratio

NCV = Net Calorific Value

The net calorific value is the energy released during a full combustion when the flue gas is cooled back to the reference temperature at a constant pressure. In this case the water vapour produced during combustion remains in gaseous form. The net calorific value therefore only specifies the quantity of sensible heat in the flue gases and is directly related to temperature, and not the quantity of condensation heat bound in the water vapour.

Low Emission Private Transport & Travel Planning

Low Emission Measure	Detail	Explanation	NO _x emissions saved	CO ₂ e emissions saved	Units
Low Emission Vehicle Support	Superfast EV charging point	Assume 2400km km of range provided per day (5 hrs at 480 km/hr)	262.8	1550.52	kg per charging point/year
	Rapid EV charging point	Assume 1152 km of range provided per day (6 hrs at 192 km/hr)	126.14	744.25	
	Fast EV charging point	Assume 192km of range provided per day (4 hrs at 48 km/hr)	21.02	124.04	
	Slow EV charging point	Assume 48 km of range provided per day (2 hrs at 24 km/hr)	5.26	31.01	
	Hydrogen Fuel Cell charging point	Assume only 10% of vehicles in area would be Hydrogen Fuel Cell	0.141	0.833	kg per household/year
	Wiring for future upgrade to EV charging	Assume 1 vehicle per household with charger is an EV	3.29	19.38	kg per household/year

Travel Plans & Car Share Schemes	Secure cycle racks with EV charging facilities	Estimating 20% of local residents will choose lower emission transport	<0.001	<0.001	kg per household/year
	Dedicated cycle ways				
	Travel planning aids				
	Minimal car parking provision				
	Measures discouraging car use				
	Provision of low emission pool car				
	Measures encouraging casual cyclists				
Public Transport Infrastructure	Bus stops, guided busways, train stations etc.	Estimating 50% of local residents will choose public transport	N/A	N/A	kg per household/year

Petrol and diesel car NO_x emissions in 2020:

Pollutant	Source	Vehicle emissions (g/km)
NO_x	Petrol cars	0.1
	DERV cars	0.5

Source: UK Informative Inventory Report (1990 to 2020), Ricardo Energy & Environment, March 2022

Assume average distance travelled of 10km per trip

Source: Land-Use Planning & Development Control: Planning for Air Quality, Institute of Air Quality Management, January 2017

Assume average trips per day of 3 trips

Source: Assumption

CO₂e emissions for all domestic transport: 122 metric tonnes

Source: Transport and environment statistics: Autumn 2021, Department for Transport, 2021 [Transport and environment statistics: Autumn 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/transport-and-environment-statistics/autumn-2021)

Cars and taxis made up 68% of all domestic emissions in 2019, which totalled 82.96 metric tonnes CO₂e

Source: Transport and environment statistics: Autumn 2021, Department for Transport, 2021 [Transport and environment statistics: Autumn 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/transport-and-environment-statistics/autumn-2021)

Total petrol and diesel car vehicle km in 2019: 467,400,000,000km

Source: UK Informative Inventory Report (1990 to 2020), Ricardo Energy & Environment, March 2022

CO₂e emissions from petrol and diesel cars in 2019 = 1.77g/km

Disclaimer: CO₂ equivalent includes all pollutants found in car exhaust fumes, which includes NO_x

Emissions saved from hydrogen fuel cell vs. combustion engines: 43%

Source: Road to Zero, Department for Transport, 2018

Energy Efficiency of Built Environment

NO_x

Low Emission Measure	Detail		Explanation	Calculation of NO _x emissions saved (mg/kWh)
Building Sustainability	BREEAM Rating	Outstanding	Assuming NO _x Class 3 gas-fired heating would be installed as standard	110
		Excellent	Assuming NO _x Class 3 gas-fired heating would be installed as standard	80
		Pass/Very Good	Assuming NO _x Class 3 gas-fired heating would be installed as standard	50
	Home Quality Mark		Assuming NO _x Class 3 gas-fired heating would be installed as standard	126
	Insulation, cavity wall insulation, double-glazing etc.		Assume these measures will improve home heat efficiency by 20%	30
Renewables			100% electricity from local renewable source	150
Biomass Boilers			Assume lowest emission is 70 g/GJ, compared against NO _x Class 3 gas-fired heating	-102
Air-source/ground-source heat pumps	No emission saving information currently available.		–	–
	Boiler efficiency		Assuming a Class 3 gas-fired heating would be installed as standard	110

Combined Heat & Power / Boiler Efficiency	CHP	Assume the use of a gas turbine with heat recovery boiler replacing NO _x Class 3 boiler	-950
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BSEN15502 Standard NO_x concentration classes for gas-fired heating boilers

NO _x class	NO _x concentration limit (mg/kWh)	
Class 1	260	NCV
Class 2	200	
Class 3	150	
Class 4	100	
Class 5	70	
Class 6	56	GCV

Source: Domestic Boiler Emission Testing, Greater London Authority, November 2018

BREEAM NO_x Emissions Assessment Criteria

BREEAM Rating	NO _x emissions limit from heating and hot water system (mg/kWh)
Pass/Very Good	≤100
Excellent	≤70
Outstanding	≤40

Source: BREEAM Refurbishment Domestic Buildings Technical Manual, 2014

Maximum NO_x boiler emissions under Home Quality Mark: 24 mg/kWh

Source: Home Quality Mark ONE Technical Manual, Home Quality Mark, 2018

NO_x emissions from biomass boilers

Heat input (g/gj)	NO _x emissions output (mg/kWh)
70	252

150	542
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Source: Measurement of the in-situ performance of solid biomass boilers, Department for Business, Energy & Industrial Strategy, 2019

NO_x emissions for CHP systems

CHP system type and fuel used to power	NO_x emissions in mg/kWh)
Gas turbine with heat recovery boiler – Natural gas	1100
Gas turbine with heat recovery boiler and back-pressure steam turbine – Natural gas	900
Boiler and back-pressure steam turbine – Natural gas	1500
Boiler and back-pressure steam turbine – Heavy Fuel Oil	5300
Boiler and back-pressure steam turbine – Coal	5200
Compression ignition engine with heat recovery boiler – Natural gas	7500
Compression ignition engine with heat recovery boiler – Heavy Fuel Oil	11500
Lean-burn spark-ignition engine with heat recovery boiler – Natural gas	3000

Average NO_x emissions from CHP system: 3850 mg/kWh

Source: Combined Heat and Power – Environmental, Department for Business, Energy & Industrial Strategy, 2021

CO₂

Low Emission Measure	Detail		Explanation	Calculation of CO ₂ emissions saved (kg/household/year)
Building Sustainability	BREEAM Rating	Outstanding	55% average CO ₂ emissions saving	2872.37
		Excellent	35% average CO ₂ emissions saving	1827.87
		Pass/Very Good	15% average CO ₂ emissions saving	783.37
	Home Quality Mark		Highest HEPR is carbon neutral	5222.48
	Insulation, cavity wall insulation, double-glazing etc.		Assume these measures will improve home heat efficiency by 20%	1044.50
Renewables			100% electricity from local renewable source	5222.48
Biomass Boilers			Assume same emissions saving factor as NO _x (46%)	2402.34
Air-source/ground-source heat pumps	No emission saving information currently available.			
Combined Heat & Power/ Boiler Efficiency	Boiler efficiency		Assume maximum CO ₂ saving of 50%	2611.24
	CHP		Maximum 30% emissions saving	1566.74

Average CO₂ emissions savings associated with different BREEAM ratings

BREEAM Rating	Average CO ₂ emissions savings
Outstanding	55%
Excellent	35%
Very good	15%
Good	5%

Source: Assessing Carbon Emissions in BREEAM, BREEAM, 2015

CO₂ emissions generated directly from households in the UK: 143 million tonnes

Source: Carbon Footprint for the UK and England to 2019, Department for Environment, Food & Rural Affairs, 2022

Number of households in UK in 2019: 27.8 million

Source: Families and households in the UK: 2019, Office for National Statistics, 2019: [Carbon footprint for the UK and England to 2019 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/carbon-footprint-for-the-uk-and-england-to-2019)

Average CO₂ emissions per household per year in UK: 5.14 million tonnes

Maximum CO₂ emissions saving of switching to CHP: 30%

Source: Combined Heat and Power guidance, Department for Business, Energy & Industrial Strategy, 2020

3. Optimised Development

Low Emission Measure	Explanation	NO _x emissions saved (mg/kWh)	CO ₂ emissions saved (kg per household/year)
Site layout and proximity to roads	Assume savings from roadside levels to background levels	<0.01	N/A
Active ventilation/air filtration	Assume air filter works consistently at maximum efficiency	<0.1	N/A
Building design	Assume buildings achieve the highest BREAAAM rating	110	2872.4

NO_x

Increase in NO_x concentrations between Urban Background and Urban Traffic monitoring sites in the UK

Monitoring site type	Mean NO _x concentration (µg/m ³)					
	2016	2017	2018	2019	2020	2021
Urban Background	23.323	21.742	20.002	19.564	15.067	15.844
Urban Traffic	37.648	33.677	32.800	31.079	22.926	24.795

Increase in NO _x concentration in Urban Traffic compared to Urban Background (%)	61.422	54.895	63.979	58.861	52.158	56.490
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Source: Concentration of nitrogen dioxide, Department for Environment, Food & Rural Affairs, 2022, <https://www.gov.uk/government/statistics/air-quality-statistics/nitrogen-dioxide>

Average percentage increase between Urban Traffic monitoring sites and Urban Background sites: 57.97%

Monitoring site type	Mean NO _x concentration (µg/m ³)						
	2016	2017	2018	2019	2020	2021	5-year average
Urban Background	23.323	21.742	20.002	19.564	15.067	15.844	19.257
Urban Traffic	37.648	33.677	32.800	31.079	22.926	24.795	30.487

Source: Concentration of nitrogen dioxide, Department for Environment, Food & Rural Affairs, 2022, <https://www.gov.uk/government/statistics/air-quality-statistics/nitrogen-dioxide>

Mg/m³ to mg/kWh conversion factor: 0.857

Source: BREEAM Refurbishment Domestic Buildings Technical Manual, 2014

Average urban background NO_x concentration between 2016 and 2021 in the UK converted to mg/kWh: 0.0165 mg/kWh

Average urban traffic NO_x concentration between 2016 and 2021 in the UK converted to mg/kWh: 0.0261 mg/kWh

Average emissions reduction while using indoor air filtration system: 70%

Source: Indoor Air Quality Report, Camfil, 2015

4. Construction Phase

Low Emission Measure	Explanation	NO _x emissions saved	CO ₂ emissions saved
Construction Vehicles	Assume standard of Stage I, improved to Stage IIIA	6500 mg/kWh	
Construction Road Layout	Assume maximum reduction in emissions is 20%	Approximately 20%	Approximately 20%
Construction Environmental Management Plan (CEMP)	Assume maximum reduction in emissions (mainly dust) is 40%	Approximately 40%	Approximately 40%

Emission limits from Stage I to Stage V for hydrocarbon and NO_x

Emission Standard	Limit for hydrocarbon and NO _x emission (mg/kWh)
Stage I	10500
Stage II	7000
Stage IIIA	4000
Stage IIIB	2000
Stage IV	50
Stage V	50

Source: European Stage V Non-Road Emission Standards, International Council on Clean Transportation.



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