Air Quality Assessment

Land West of Bines Road, Partridge Green

February 2026

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1. Introduction

Background

1.1 Phlorum Limited has been commissioned by ECE Planning, on behalf of Croudace Homes Limited, to undertake an Air Quality Assessment (AQA) in support of a proposed development comprising the construction of 101 new residential dwellings, with associated roads, parking and landscaping ("the proposed development") located on a parcel of land west of Bines Road, Partridge Green, Horsham ("the site"). The site is centred on national grid reference 496590, 104220. The site's location is displayed in Figure 1.

1.2 Land use in the vicinity of the site comprises predominantly residential, agricultural and commercial uses. Residential uses bound sections of the northern and eastern boundary, with commercial uses to the east of the site. Agricultural uses bound the site to the south, and greenspaces cover the majority of the land directly north and west of the site.

1.3 The main sources of air pollution in the vicinity of the site are vehicles travelling on the local road network, particularly the B2135 Bines Road, which bounds the site to the east.

1.4 Air quality is managed locally by Horsham District Council (HDC), who currently operate two Air Quality Management Areas (AQMAs) within the district. The closest AQMA to the site, the Horsham Cowfold AQMA, is located 4.3km to the north-east of the site and was established in 2011 due to exceedances of the annual mean Air Quality Standard (AQS) for nitrogen dioxide (NO_2).

Scope of Assessment

1.5 The focus of this report is the assessment of the suitability of the site, in air quality terms, for its proposed residential end use, considering both construction and operational phases and recommending mitigation where necessary. Further assessment of the potential for traffic generated by the proposed development to impact local air quality is also presented.

1.6 An Emissions Mitigation Assessment was also undertaken, in line with guidance from the Sussex-Air Partnership, including details of the proposed development's mitigation package to reduce the proposed development's potential impact on local air quality.

2. Policy Context

The UK Air Quality Strategy

2.1 The UK Air Quality Strategy[1] sets out Air Quality Standard (AQS) concentrations for a number of key pollutants that are to be achieved at sensitive receptor locations across the UK by corresponding air quality objective (AQO) dates. The sensitive locations at which the standards and objectives apply are those where the population is reasonably expected to be exposed to said pollutants over a particular averaging period.

2.2 For those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to compare concentrations against the standards are areas of residential housing. It is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time.

2.3 Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to the pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time. A summary of the AQSs and AQOs relevant to this assessment are included in Table 2.1, below.

Table 2.1: UK Air Quality Standards and Objectives

Pollutant	Averaging Period	Air quality standard (µg.m^{-3})	Air quality objective
Nitrogen dioxide (NO_2)	1 hour	200	200 µg.m^{-3} not to be exceeded more than 18 times a year
	Annual	40	40 µg.m^{-3}
Particulate Matter (PM_{10})	24-hour	50	50 µg.m^{-3} not to be exceeded more than 35 times a year
	Annual	40	40 µg.m^{-3}
Particulate Matter ($PM_{2.5}$)	Annual	20	20 µg.m^{-3}

1 Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) July 2007.

2.4 The objectives adopted in the UK are based on the Air Quality (England) Regulations 2000[2], as amended, for the purpose of Local Air Quality Management. These Air Quality Regulations have been adopted into UK law from the limit values required by European Union Daughter Directives on air quality.

2.5 The UK AQS for $PM_{2.5}$ was amended in 2020, as part of the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[3].

2.6 The Department for Environment, Food & Rural Affairs' (Defra) *Environmental Improvement Plan 2025*[4] outlines a legal target of 10 $\mu g.m^{-3}$ for annual mean $PM_{2.5}$ concentrations, to be achieved by December 2030.

2.7 Obligations under the Environment Act 1995 require local authorities to declare an AQMA at sensitive receptor locations where an objective concentration has been predicted to be exceeded. In setting an AQMA, the local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below the objective levels.

2.8 As stated above, air quality is managed locally by HDC, who operate two AQMAs within the district. The declaration of these AQMAs has resulted in the formulation of two AQAPs, the Storrington AQAP[5] and the Cowfold AQAP[6] in an effort to improve air quality in and around HDC's AQMAs.

National Planning Policy Framework

2.9 The National Planning Policy Framework (NPPF)[7], which was updated in February 2025, sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. A core principle in the NPPF that relates to air quality effects from development is that planning should "contribute to conserve and enhance the natural and local environment" as demonstrated at Paragraph 187:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and

2 The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043.
3 The Environment (Miscellaneous Amendment) (EU Exit) Regulations 2020.
4 Department for Environment, Food & Rural Affairs. (2025). *Environmental Improvement Plan 2025.*
5 Horsham District Council. (2020). *Storrington Air Quality Action Plan.*
6 Horsham District Council. (2020). *Cowfold Air Quality Action Plan.*
7 Department for Levelling Up, Housing and Communities. (2025). *National Planning Policy Framework.*

other benefits of the best and most versatile agricultural land, and of trees and woodland;

c) maintaining the character of the undeveloped costs, while improving public access to it where appropriate;

d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."

2.10 The NPPF goes on to state the following at Paragraph 198:

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

2.11 With regard to compliance with relevant limit values and national objectives for air pollutants, along with assessing cumulative effects, the NPPF states the following at Paragraph 199:

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

2.12 Regarding potential adverse impacts generated by development, the NPPF states the following:

"[...] Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

2.13 The NPPF offers a broad framework but does not afford a detailed methodology for assessments. Specific guidance for air quality continues to be provided by organisations such as the Department for Environment, Food and Rural Affairs (Defra), Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM).

National Planning Practice Guidance

2.14 Reference ID 32 (Air Quality) of the National Planning Practice Guidance (PPG)[8], which was updated in November 2019, provides guiding principles on how planning can take account of the impact of new development on air quality. The PPG summarises the importance of air quality in planning and the key legislation relating to it.

2.15 As well as describing the importance of International, National and Local Policies (detailed elsewhere in this report), it summarises the key sources of air quality information. It also explains when air quality is likely to be relevant to a planning decision, stating:

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

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*

8 Planning Practice Guidance (PPG) 32. (Updated November 2019). Air Quality. Available from: http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/.

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value."*

2.16 Details are also provided as to what should be included within an AQA. Key considerations include:

- Baseline local air quality;
- Whether the proposed development could significantly affect local air quality during construction/operation; and
- Whether the development is likely to expose more people to poor air quality.

2.17 Examples of potential air quality mitigation measures are also provided in the PPG.

Local Planning Policy

2.18 HDC's local plan, the *Horsham District Planning Framework*[9] was adopted in 2015 and currently acts as the primary document concerning and guiding development within the borough up to 2031. The local plan contains two policies with direct relevance to air quality, including:

2.19 Policy 24: *Environmental Protection*:

"The high quality of the district's environment will be protected through the planning process and the provision of local guidance documents. Taking into account any relevant Planning Guidance Documents, developments will be expected to minimise exposure to and the emission of pollutants including noise, odour, air and light pollution and ensure that they: [...]

4. *Minimise the air pollution and greenhouse gas emissions in order to protect human health and the environment;*
5. *Contribute to the implementation of local Air Quality Action Plans and do not conflict with its objectives;*
6. *Maintain or reduce the number of people exposed to poor air quality including odour. Consideration should be given to development that will result in new*

9 Horsham District Council. (2015). *Horsham District Planning Framework*. Available at: [Horsham District Planning Framework 2015]

public exposure, particularly where vulnerable people (e.g. the elderly, care homes or schools) would be exposed to the areas of poor air quality; and

7. *Ensure that the cumulative impact of all relevant committed developments is appropriately assessed".*

2.20 Policy 33: *Development Principes*:

"In order to conserve and enhance the natural and built environment developments shall be required to: [...]

- *Ensure that it is designed to avoid unacceptable harm to the amenity of occupiers/users of nearby property and land, for example through overlooking or noise, whilst having regard to the sensitivities of surrounding development [...]"*

2.1 HDC are also in the process of developing their new Local Plan[10], including new planning policies, with direct reference to air quality, including:

2.2 Strategic Policy 12: *Air Quality*:

"The Council recognises the direct effects air quality has on public health, natural habitats and biodiversity, including its contribution to climate change, and the importance of the management of air quality. Taking into account any relevant Planning Guidance Documents and / or policies within this Plan, proposals will be required to:

1. *Adhere to the Air Quality and Emissions Mitigation Guidance for Sussex (2021), or any future updates, to identify if an Air Quality Impact Assessment and / or an Emissions Mitigation Statement is required;*

2. *Contribute to the implementation of local Air Quality Action Plans, and not conflict with the set objectives;*

3. *Minimise traffic generation and congestion through access to sustainable transport modes, maximising the provision for cycling and pedestrian facilities;*

4. *Encourage the use of cleaner transport fuels, including through the provision of electric car charging points.*

5. *Take into account habitats or biodiversity designations that are sensitive to air quality changes, including ancient woodland. Habitats identified as sensitive to such changes, including proposals within 7km of The Mens, will require a relevant impact assessment and appropriate mitigation measures to be put in place.*

10 Horsham District Council. (2024). *Horsham District Local Plan 2023-2040*.

6. *Mitigate the impact on the amenities of users of the site and surrounding land to an appropriate level, during both construction and operation where development creates or results in pollution including particulates, dust, smoke, pollutant gases or odour, as outlined in the Air Quality and Emissions Mitigation Guidance for Sussex (2021), or any future updates; and*

7. *Ensure that the cumulative impact of all relevant permitted and allocated developments, including associated traffic impacts, is appropriately assessed."*

2.3 Strategic Policy 11: *Environmental Protection*:

"The high quality of the District's environment will be protected through the planning process and the provision of local guidance documents. Taking into account any relevant Planning and Technical Guidance Documents, developments will be expected to minimise exposure to, and the emission of, pollutants including noise, odour, vibration, air and light pollution arising from all stages of development. Development proposals must ensure that they: [...]

6. *Minimise air pollution and greenhouse gas emissions in order to protect human health and the natural environment.*

7. *Contribute to the implementation of local Air Quality Action Plans and do not conflict with their objectives.*

8. *Maintain or reduce human exposure to odour and poor air quality, with specific consideration given to development that will result in new public exposure, particularly vulnerable people (e.g. the elderly, care homes or schools); and*

9. *Ensure that the cumulative impact of all relevant permitted and allocated developments, is appropriately assessed.*

Proposals for new development within the vicinity of an existing business or community facility will not be supported where it is considered that the current use could have a significant adverse environment impact on the new development, unless it can be demonstrated that suitable mitigation will be implemented prior to the occupation or use of the new proposal."

3. Baseline Air Quality

Establishing Baseline Conditions

3.1 This chapter is intended to establish prevailing air quality conditions in the vicinity of the site. Baseline air quality conditions in the vicinity of the site are established through the compilation and review of appropriately sourced background concentration estimates and local monitoring data.

3.2 Defra provides estimated background concentrations of the UKAQS pollutants at the UK Air Information Resource (UK-AIR) website[11]. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km^2 National Grid square locations across the UK. At the time of writing, the most recent background maps were from November 2024 and based on air quality monitoring data from 2021.

3.3 Being background concentrations, the UK-AIR data are intended to represent a homogenous mixture of all emissions sources within the general area of a particular grid square location. Concentrations of pollutants at various sensitive receptor locations can, therefore, be calculated by modelling the emissions from a nearby pollution source, such as a busy road, and then adding this to the appropriate UK-AIR background datum.

3.4 Monitoring at roadside and background locations from local air quality monitoring networks is also considered an appropriate source of data for the purposes of describing baseline air quality. To this end, HDC's automatic and non-automatic monitoring data were reviewed to establish baseline air quality. The most recent available data at the time of writing, from HDC's *2025 Air Quality Annual Status Report (ASR)*[12], have been reviewed and discussed, where relevant.

UK-AIR Background Pollution

3.5 UK-AIR predicted annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for 2021 to 2030 are presented in Table 3.1. These data were taken from the central grid square location within which the site is located (i.e. UK-AIR Grid Reference: 518500, 118500).

11 Defra. (2024). *UK-AIR*. Available from: https://uk-air.defra.gov.uk/data/pcm-data
12 Horsham District Council. (2025). *2025 Air Quality Annual Status Report (ASR)*.

Table 3.1: Predicted Background Concentrations of Pollutants at the Site

Pollutant	Predicted Annual Mean Background Concentration (μg.m^{-3})									
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
NO_2	8.0	7.7	7.5	7.3	7.1	6.9	6.6	6.4	6.2	5.9
PM_{10}	11.0	10.9	10.9	10.8	10.7	10.6	10.5	10.5	10.4	10.3
$PM_{2.5}$	6.2	6.2	6.1	6.0	6.0	5.9	5.8	5.7	5.7	5.6

3.6 The data in Table 3.1 show that annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$, at and in the vicinity of the site between 2021 and 2030, are predicted to be well below their respective AQSs.

3.7 The data show that in 2026 (the current assessment / reporting year), NO_2, PM_{10} and $PM_{2.5}$ concentrations are predicted to be well below their respective annual mean AQSs by approximately 83%, 74% and 71%, respectively.

3.8 Furthermore, in the proposed development's opening year of 2028, background NO_2, PM_{10} and $PM_{2.5}$ concentrations are predicted to be well below their respective annual mean AQSs by approximately 84%, 74% and 72%, respectively.

3.9 Background annual mean $PM_{2.5}$ concentrations are anticipated to be consistently below the 10 μg.m^{-3} legal target, to be achieved by 2030, from 2021 to 2030.

3.10 Therefore, annual mean background pollutant concentrations are likely to be well below their respective AQSs and the $PM_{2.5}$ legal target at, and in the vicinity of, the site.

3.11 Concentrations of all pollutants are predicted to decline each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles, but also due to UK national and international plans to reduce emissions across all sectors.

Local Sources of Monitoring Data

3.12 Local air quality monitoring is also considered an appropriate source of data for the purposes of describing baseline air quality.

3.13 At the time of writing, the most recent ASR[12] released by HDC included local pollutant monitoring data from the year 2024.

Automatic Monitoring

3.14 HDC undertook automatic (continuous) monitoring at three locations within their authoritative boundary in 2024. Of these monitoring stations, all three monitored NO_2, two monitored PM_{10}, and one monitored $PM_{2.5}$.

3.15 The most recent available NO_2 monitoring data from local automatic monitoring stations are included in Table 3.2, below.

Table 3.2: HDC's Automatic NO_2 Monitoring Data

Monitor	Type	Distance from the Site (km)	Annual mean NO_2 concentration (µg.m^{-3})				
			2020	2021	2022	2023	2024
HO5	R	4.4	23.6	20.3	21.0	24.6	16.2
HO4 (AURN)	R	10.5	17.4	20.1	17.6	17.4	16.6
HO2	R	11.8	18.8	21.1	17.7	16.2	15.7

Note: "R" = Roadside.

3.16 The data in Table 3.2 show that the annual mean NO_2 concentrations recorded at all three automatic monitoring stations were consistently below the respective 40 µg.m^{-3} AQS for NO_2 between 2020 and 2024.

3.17 The closest automatic monitoring station to the site, HO5, is located in a roadside setting, adjacent to the A272 Bolney Road, approximately 4.4km to the north-east of the site. This monitor recorded an annual mean NO_2 concentration of 16.2 µg.m^{-3} in 2024, which is below the 40 µg.m^{-3} AQS by 59.5%.

3.18 Automatic monitor HO4 is located in a roadside position with respect to the A283 Manley's Hill, approximately 10.5km south-west of the site, and recorded the highest annual mean NO_2 concentration in 2024 (16.6 µg.m^{-3}); which is 58.5% below the long-term AQS.

3.19 The most recent available PM_{10} monitoring data from local automatic monitoring stations are included in Table 3.3, below.

Table 3.3: HDC's Automatic PM_{10} Monitoring Data

Monitor	Type	Distance from the Site (km)	PM_{10} annual mean concentration (µg.m^{-3})				
			2020	2021	2022	2023	2024
HO4 (AURN)	R	10.5	-	-	14.0	13.7	12.6
HO2	R	11.8	15.7	17.5	19.3	20.5	16.1

Note: "R" = Roadside.

3.20 The data in Table 3.3 show that automatic monitors HO4 and HO2 recorded PM_{10} concentrations well below the 40 µg.m^{-3} annual mean AQS between 2020 and 2024.

3.21 The closest automatic monitoring station to the site, HO4, recorded an annual mean PM_{10} concentration of 12.6 µg.m^{-3} in 2024, which is below the 40 µg.m^{-3} AQS by 68.5%.

3.22 Automatic monitor HO2 is located in a roadside setting, 11.8km north of the site, adjacent to the A281 Park Way and B2195 Park Street junction. Automatic monitor HO2 recorded the highest annual mean PM_{10} concentration of 16.1 µg.m^{-3}, in 2024, which is 59.8% below the respective AQS.

3.23 Automatic monitoring of $PM_{2.5}$ was conducted at one site (HO4) between 2020 and 2024. Annual mean $PM_{2.5}$ concentrations for automatic monitor HO2 were estimated from the collated PM_{10} data and presented by HDC, in the latest ASR. These data are included in Table 3.4 below.

Table 3.4: HDC's Automatic $PM_{2.5}$ Monitoring Data

Monitor	Type	Distance from the Site (km)	$PM_{2.5}$ annual mean concentration (µg.m^{-3})				
			2020	2021	2022	2023	2024
HO4 (AURN)	R	10.5	-	-	7.3	7.7	7.7
HO2	R	11.8	11.0	12.3	13.1	14.6	10.1

Note: "R" = Roadside. $PM_{2.5}$ values for HO2 were estimated from the PM_{10} data using a nationally derived correction multiplying ratio for each year.

3.24 The data in Table 3.4 show that automatic monitors HO4 and HO2 recorded $PM_{2.5}$ concentrations well below the respective 20 µg.m^{-3} annual mean AQS between 2020 and 2024.

3.25 The closest automatic monitor, HO4, recorded an annual mean $PM_{2.5}$ concentration of 7.7 µg.m^{-3} in 2024; 61.5% below the annual mean AQS and 23.0% below the future 10 µg.m^{-3} legal limit, to be achieved by 2030.

3.26 Automatic monitor HO2 measured the highest annual mean $PM_{2.5}$ concentration in 2024 of 10.1 µg.m^{-3}; which is 49.5% below the 20 µg.m^{-3} AQS and 1.0% above the future 10 µg.m^{-3} legal limit, to be achieved by 2030.

Non-Automatic Monitoring

3.27 HDC operates a non-automatic NO_2 diffusion tube monitoring network comprising 47 sites positioned in strategic locations across the district.

3.28 The most recent annual mean NO_2 data for the ten closest monitoring locations to the site, from HDC's latest ASR, are included in Table 3.2, below.

Table 3.2: Monitoring data from Local NO_2 Diffusion Tubes

Monitor	Type	Distance from the site (km)	NO_2 annual mean concentration (µg.m^{-3})				
			2020	2021	2022	2023	2024
Henfield 1n	R	3.6	19.9	20.9	18.2	18.2	16.6
Cowfold 6n	R	4.1	21.7	20.5	20.3	19.6	16.5
Cowfold 7n	R	4.4	30.2	31.2	31.7	28.3	24.9
Cowfold 5n	R	4.4	20.4	21.3	20.3	18.7	-
Cowfold AU (A, B, C)	R	4.4	19.2	19.9	20.0	17.5	15.8
Cowfold 1 and 2	R	4.5	26.8	26.5	26.4	24.1	21.5

Monitor	Type	Distance from the site (km)	NO_2 annual mean concentration (μg.m^{-3})				
			2020	2021	2022	2023	2024
Cowfold 3	R	4.5	24.6	26.5	25.5	24.1	21.9
Cowfold 8n	UB	4.5	10.9	10.5	10.3	8.9	8.1
Cowfold 9n	R	4.5	19.3	18.3	18.7	-	-
Cowfold 4	R	4.5	22.5	22.2	20.3	19.5	17.5

Note: "R" = Roadside; "UB" = Urban Background.

3.29 The data in Table 3.2 show that all measured annual mean concentrations of NO_2 at the ten closest diffusion tube monitoring locations to the site were below the 40 μg.m^{-3} AQS between 2020 and 2024.

3.30 Diffusion tube Henfield 1n is the closest diffusion tube to the site, located in a roadside setting at the A281 High Street, Henfield, approximately 3.6km south-east of the site. This diffusion tube recorded an annual mean NO_2 concentration of 16.6 μg.m^{-3} in 2024; which is 58.9% below the long-term AQS.

3.31 Diffusion tube Cowfold 7n is located in a roadside position with respect to the A272 Bolney Road, Cowfold, approximately 4.4km north-east of the site. This diffusion tube recorded the highest annual mean NO_2 concentration in 2024 (24.9 μg.m^{-3}); which is 37.8% below the long-term AQS.

3.32 From 2020 to 2024, there is a general decline in annual mean NO_2 concentrations at the ten closest diffusion tubes to the site, which follows the national trend for a general improvement in air quality with time.

Summary of Baseline Air Quality

3.33 The UK-AIR background projections and local monitoring data indicate that annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ are well below their respective long-term AQSs. UK-AIR background projections and automatic monitor HO4 indicate that annual mean $PM_{2.5}$ concentrations are likely to be below the 2030-based legal target for $PM_{2.5}$, in the area around and at the site.

3.34 Whilst automatic monitor HO2 recorded an annual mean $PM_{2.5}$ concentration that is 1.0% above this future legal limit, concentrations recorded at this monitor have shown a general decline from 2020 to 2024, which can be considered likely to decline further, in future years, in-line with UK-AIR background projections.

3.35 Both UK-AIR and local monitoring data show a general decline in pollutant concentrations over recent years, which is expected and which follows national trends.

4. Assessment Methodology

Guidance

4.1 Defra's *Local Air Quality Management Technical Guidance* (LAQM.TG(22))[13] was followed in carrying out the assessment.

4.2 The latest Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) guidance on *'Planning for Air Quality'*[14] was also referred to throughout the assessment. The criteria used to describe impacts were derived from this guidance.

4.3 Guidance published by the IAQM on the *Assessment of Dust from Demolition and Construction*[15] was also used to assess the risk of dust emissions during the construction phase of the proposed development. The Greater London Authority's (GLA) Supplementary Planning Guidance on the control of dust from construction[16] has also been referred to, which is considered best practice guidance for London and the wider UK. It details a number of mitigation measures that should be adopted to minimise adverse impacts from dusts and fine particles.

4.4 ADC is a member of the Sussex-Air partnership, and so the *Air Quality and Emissions Mitigation Guidance for Sussex*[17] (AQEMGFS) has been followed in the emissions mitigation assessment.

Construction Phase

4.5 The construction phase of the proposed development will involve a number of activities that could potentially produce polluting emissions to air. Predominantly, these will be emissions of dust. However, they could also include releases of odours and/or more harmful gases and particles.

4.6 The IAQM's guidance to assess the impacts of construction dust emissions on human and ecological receptors has been followed in carrying out this air quality assessment. The guidance suggests that where a receptor is located within 250m (50m for statutory ecological receptors) of a site boundary and / or 50m of a route used by construction vehicles, up to 250m from the site entrance, a dust assessment should be undertaken. High sensitivity receptors are considered particularly sensitive when located within 20m of a works area. Figure 2 shows receptors that could be sensitive to dust that are located within 250m of the site boundary.

13 Defra. (2022). *Local Air Quality Management Technical Guidance* (LAQM.TG(22)).
14 Environmental Protection UK & Institute of Air Quality Management. (2017). *Land-Use Planning & Development Control: Planning For Air Quality*.
15 Institute of Air Quality Management. (2024). *Guidance on the Assessment of Dust from Demolition and Construction*.
16 Greater London Authority. (2014). *The Control of Dust and Emissions During Construction and Demolition*.
17 Sussex-Air (2021). *Air Quality and Emissions Mitigation Guidance for Sussex (2021)*.

4.7 The Multi Agency Geographic Information for the Countryside (MAGIC) website[18], which incorporates Natural England's interactive maps, has been reviewed to identify whether any statutory ecological sensitive receptors are situated within 50m of the site boundary or within 50m of any routes used by construction vehicles on the public highway, up to 250m from the site entrance.

Construction Significance

4.8 The IAQM guidance suggests that Demolition, Earthworks, Construction and Trackout should all be assessed individually to determine the overall significance of the construction phase.

4.9 In the IAQM dust guidance, the first step in assessing the risk of impacts is to define the potential dust emission magnitude. This can be considered 'Negligible', 'Small', 'Medium' or 'Large' for each of the construction stages. Whilst the IAQM provides examples of criteria that may be used to assess these magnitudes, the vast number of potential variables mean that every site is different and therefore professional judgement must be applied by what the IAQM refer to as a "technically competent assessor". The construction phase assessment therefore relies on the experience of the appraiser.

4.10 As such, attempts to define precisely what constitutes a negligible, small, medium or large dust emission magnitude should be treated with caution. Factors such as the scale of the work, both in terms of size and duration, the construction materials and the plant to be used must be considered.

4.11 The second step is to define the sensitivity of the area around the construction site. As stated in the IAQM guidance:

"the sensitivity of the area takes account of a number of factors:

- *the specific sensitivities of receptors in the area;*
- *the proximity and number of those receptors;*
- *in the case of PM_{10}, the local background concentration; and*
- *site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust."*

4.12 Based on these factors, the area is categorised as being of 'Low', 'Medium' or 'High' sensitivity.

18 Natural England and MAGIC partnership organisations. *Multi Agency Geographic Information for the Countryside*. [Accessed January 2026].

4.13 When dust emission magnitudes for each stage and the sensitivity of the area have been defined, the risk of dust impacts can be determined. The IAQM provides a risk of impacts matrix for each construction stage. The overall significance for the construction phase can then be judged from the stages assessed. Again, this is subject to professional judgement.

4.14 Combustion exhaust gases from diesel-powered plant and construction vehicles accessing the site will also be released. However, the volumes and periods over which these releases will occur are unlikely to result in any long-term impacts on local air quality and therefore this has been scoped out of the assessment.

Operational Phase

Pollutant Sources

4.15 Vehicle emissions will arise from the combustion of fossil fuels in vehicle engines and their subsequent release to atmosphere via tailpipe exhausts. The most significant pollutants released by cars and other vehicles are oxides of nitrogen (NO_2/NO_x) and particulate matter (PM_{10} and $PM_{2.5}$). Releases of carbon monoxide (CO) and some volatile hydrocarbons (e.g. benzene and 1,3-butadiene) are of less significance and are not assessed further in this report.

4.16 As it is elevated concentrations of NO_2 and PM_{10} that have resulted in the declaration of most AQMAs across the UK, these are the pollutants of most concern and they have therefore been the focus of this air quality assessment. $PM_{2.5}$, which is another fraction of particulate matter, has also been considered.

4.17 Other (background) air pollutant sources contribute to local pollution. These include emissions from domestic, commercial, industrial, marine, or transboundary emissions/sources. These emissions are accounted for in this assessment within the background estimates.

4.18 The NO_2, PM_{10} and $PM_{2.5}$ background concentrations referred to in this assessment are based on UK-AIR predictions for the UK-AIR grid square within which the site is situated for 2024, which is the same year as the latest available monitoring data. A summary of the background pollutant concentrations used in this assessment are provided in Table 4.1, below.

Table 4.1: Background Pollutant Concentrations used in this Assessment

Pollutant	Concentration ($\mu g.m^{-3}$)	Data Source
NO_2	7.3	UK-AIR Grid Square (518500, 118500)
PM_{10}	10.8	
$PM_{2.5}$	6.0	
NO_2	7.3	UK-AIR Grid Square (518500, 119500)
PM_{10}	10.3	

Pollutant	Concentration ($\mu g.m^{-3}$)	Data Source
$PM_{2.5}$	6.0	
NO_2	8.7	UK-AIR Grid Square (521500, 122500)
PM_{10}	11.4	
$PM_{2.5}$	7.1	
NO_2	8.1	UK-AIR Grid Square (521500, 115500)

Roads Assessment

4.19 The latest EPUK & IAQM planning guidance[14] provides indicative thresholds for changes in traffic flows which would require a detailed air quality assessment. Within an AQMA, these are a change in 24-hour annual average daily traffic (AADT) flows of >100 light duty vehicles (LDVs) and / or >25 heavy duty vehicles (HDVs) on any specific road link within an AQMA, or >500 LDVs and / or >100 HDVs on any specific road link outside of an AQMA. Changes below these thresholds can be reasonably considered to have an insignificant impact on air quality.

4.20 Traffic data provided by Paul Basham Associates, the project transport consultants, predict that the proposed development would generate a total AADT flow of 669 (inclusive of 7HDVs), once operational. As the predicted traffic generation from the development is above the threshold criterion outlined above, the indication is that detailed pollutant dispersion modelling is necessary.

4.21 The traffic data also indicate that the LDV threshold for links within an AQMA would be exceeded, with there being a prediction of more more 100 LDVs into the Horsham Cowfold AQMA.

4.22 A detailed dispersion modelling assessment has therefore been undertaken to evaluate air quality at the site and at sensitive receptors in the vicinity of the site. This is to identify whether the site is suitable for the introduction of new, highly sensitive (residential) receptors, and to assess the impacts of the proposed development on local air quality.

4.23 Traffic data provided by Paul Basham Associates were used as inputs in the dispersion model to assess pollutant concentrations at proposed receptor locations in 2028, which is the year the proposed development would become operational.

Model Specification

4.24 The model used was ADMS-Roads (version 5.1.0.2), which is produced by Cambridge Environmental Research Consultants (CERC) Limited and has been validated and approved by Defra for use as an assessment tool for calculating the dispersion of pollutants from traffic on UK roads. The latest Defra Emissions Factor Toolkit (EFT)[19] was used within the model to estimate vehicle emissions. Details on model inputs are provided in Appendix A.

Meteorological Data

4.25 Detailed, hourly sequential, meteorological data are used by the model to determine pollutant transportation and levels of dilution by the wind and vertical air movements. Meteorological data used in the model were obtained from Thorney Island, as it was considered to provide the most representative data of similar conditions to the site. The meteorological data used for this assessment were from 2024, for which air quality monitoring and traffic data were also available for model verification purposes. The surface roughness applied to the model for the study area was 0.5m (representative of parkland / open suburbia), whilst a factor of 0.2m was applied to the meteorological site (representative of agricultural areas).

Model Verification

4.26 It is recommended, following guidance set out in LAQM.TG(22)[13], that the model results be compared with measured data to determine whether they might need adjusting to reflect local air quality more accurately. This process is known as verification, which reduces the uncertainty associated with local effects on pollution dispersion and allows the model results to be more site-specific.

4.27 A verification study has been undertaken using HDC air quality monitoring data from 2024 across the nearby area. Full details of this study are included in Appendix B.

4.28 The model was found to be over-predicting NO_2 concentrations at five of the six modelled local monitoring sites to a small degree and, consequently, it was decided to proceed without an adjustment of the model in order to ensure conservative and locally accurate results. All modelled NO_2 concentrations were within 25% of monitored concentrations at monitoring locations used within the model verification study.

4.29 Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(22)[13], the RMSE is acceptable where it is within 25% of the AQS. The model verification process calculated a post-adjusted RMSE of 1.6 $\mu g.m^{-3}$, which equates to 4.0% of the annual mean AQS for NO_2 and is therefore considered to be suitable, being within the 'ideal' 10% range.

19 Defra. (2025). *Emissions Factor Toolkit version 13.1*.

Modelled Sensitive Receptors

4.30 Model receptors were positioned at the façade of existing and proposed (E1-E7 and P1-P3, respectively) residential units adjacent to roads that are anticipated to experience an AADT increase of >500 LDVs outside of the Horsham Cowfold AQMA or >100LDVs within the AQMA, to represent locations of maximum exposure to road-source pollution. Receptors are, therefore, positioned at worst-case locations, for a conservative approach. The receptors were modelled at a height of 1.5m ("breathing height").

4.31 The locations of sensitive receptors are displayed in Figure 3 and are included in Table 4.2, below.

Table 4.2: Modelled Receptors

Receptor		Height (m)	UK Grid Reference	
ID	Details		X	Y
E1	Existing Residential Dwelling	1.5	518983.2	118962.0
E2	Existing Residential Dwelling	1.5	518918.3	119082.2
E3	Existing Residential Dwelling	1.5	521340.8	122523.7
E4	Existing Residential Dwelling	1.5	521323.5	122604.5
E5	Existing Residential Dwelling	1.5	521253.8	122661.7
E6	Existing Residential Dwelling	1.5	521133.1	122658.5
E7	Existing Residential Dwelling	1.5	521397.9	122506.2
P1	Proposed Residential Dwelling	1.5	518957.7	118727.9
P2	Proposed Residential Dwelling	1.5	518940.3	118763.7
P3	Proposed Residential Dwelling	1.5	518939.9	118794.6

Model Uncertainty

4.32 There are a number of inherent uncertainties associated with the modelling process, including:

- Model uncertainty – due to model formulations;
- Data uncertainty – due to inaccuracies in input data, including emissions estimates, background estimates and meteorology; and
- Variability – randomness of measurements used.

4.33 Using a validated air quality model such as ADMS-Roads, combined with performing model verification, addresses much of this uncertainty. In addition, the most detailed available input data have been used and reviewed to ensure accuracy.

4.34 Defra's latest Emissions Factors Toolkit[19] for road transport emissions provides forecasts of NO_x, PM_{10} and $PM_{2.5}$ emissions up to 2050. This is widely used as an input for dispersion models such as ADMS-Roads to estimate future pollutant concentrations close to/at new developments.

4.35 The latest version of Defra's EFT (version 13.1) was released in April 2025 and is expected to provide a far more reasonable match for real world emissions in the current UK fleet than previous versions.

4.36 Background pollutant concentrations are predicted to continuously decline up to 2030, as evidenced by the decreasing trends in background pollutant concentrations displayed in Table 3.1. Therefore, by using 2024 baseline background concentrations within the model, this provides a conservative approach by assuming there will be no future improvement in background pollutant concentrations beyond 2024. Furthermore, for added conservatism, vehicle emission factors for 2024 were used to predict pollutant concentrations in the proposed development's projected opening year of 2028, thereby not accounting for projected improvements in vehicle emissions.

Emission Mitigation Assessment

4.37 The Sussex-air Partnership's AQEMGFS[17] advocates that an Emissions Mitigation Assessment should be undertaken to demonstrate how air quality impacts from development can be minimised.

4.38 The purpose of an Emissions Mitigation Assessment is to determine an appropriate level of mitigation required from a proposed development. An Emissions Mitigation Assessment sets out a methodology to assess the impact of a development's associated emissions on air quality and provides an approach to mitigating emissions for developments, even those that are predicted to have no significant impact on air quality.

4.39 As the proposed development is classified as '*Major*' with reference to *The Town and Country Planning (Development Management Procedure) (England) Order 2015*[20] (i.e. where the number of dwellinghouses to be provided is 10 or more), an Emissions Mitigation Assessment with an emissions cost calculation is required. The emissions cost calculation was undertaken following the AQEMGFS[17] and Defra's Damage Cost guidance[21]. The latest Defra air quality Damage Cost Appraisal Toolkit[22] was also utilised within the assessment.

20 Department for Communities and Local Government. (2015). *The Town and Country Planning (Development Management Procedure) (England) Order 2015, Article 2*. Available at: https://www.legislation.gov.uk/uksi/2015/595/article/2
21 Defra. (2025). *Air Quality Appraisal: Damage Cost Guidance.*
22 Defra. (2025). *Air Quality Damage Cost Appraisal Toolkit*.

Emissions Cost Calculation

4.40 The emissions calculation utilised the latest Defra Emission Factor Toolkit (EFT) (version 13.1)[19] to determine the total transport related emissions (NO_X and $PM_{2.5}$) that would be generated by the proposed development.

4.41 Defra provides 'damage costs'[21], which are a set of impact values, defined per tonne of pollutant for use in this calculation. Damage costs estimate the societal costs associated with changes in pollutant emissions and are then combined with the forecasted emissions changes to provide an approximate valuation of the cost (or benefit) to society caused by a development.

4.42 Defra's Appraisal Toolkit[22], which incorporates the latest damage cost values, was used in the calculation. The principle of the calculation is summarised in the equation below:

EFT output × Damage costs × 5 years = 5 year exposure cost value (in £)

4.43 As a number of the inputs are based on assumptions, the resulting figure should be treated with caution, but it can be used to give an idea of the scale of a development in terms of total generated transport emissions and therefore a gauge of what level of mitigation might be appropriate.

4.44 It is usual for costs established in this way to be apportioned to low emission measures associated with a proposed development. In doing this it should be possible for damage costs to be offset.

5. Construction Phase

5.1 The construction phase of the proposed development will involve a number of activities that could produce polluting emissions to air. Predominantly, these will be emissions of dust.

5.2 The estimates for the dust emission magnitude for demolition, earthworks, construction and trackout (discussed below) are based on the professional experience of Phlorum's consultants, information provided by the client and Google Earth imagery.

Dust Emission Magnitude

Demolition

It is understood that there will not be any demolition works at the site.

Earthworks

5.3 Where the total area of the site is between 18,000m^2 and 110,000m^2, the dust emission magnitude category for earthworks can be defined as *Medium*, according to the IAQM guidance[15]. The total site area is approximately 63,300m^2, therefore falling into the IAQM's *Medium* dust emission category for earthworks.

5.4 During the earthworks phase it is expected that fewer than 5 heavy-earth moving vehicles will operate at any one time, falling into the IAQM's *Small* category.

5.5 It is understood that there is no land contamination, and no bunds will be formed on site.

5.6 Based on the total area of the site and based on professional judgement, the overall dust emission magnitude of the earthworks stage is considered to be *Medium* with reference to the IAQM guidance[15].

Construction

5.7 During construction, activities that have the potential to cause emissions of dust may include piling, sandblasting and concrete batching. Localised use of cement powder and general handling of construction materials (such as aggregate for road construction) also have the potential to generate dust emissions, as does the effect of wind-blow from stockpiles of friable materials. It is anticipated that some cement powder will be used on site; however, the full details of construction processes are not yet known.

5.8 It is estimated that the total building volume of the proposed residential development is between 12,000m^3 and 75,000m^3, falling into the IAQM's *Medium* dust emission magnitude category for construction[15].

5.9 Therefore, based on the above, the overall dust emission magnitude for the construction phase is considered to be *Medium*[15].

Trackout

5.10 Construction traffic, when travelling over soiled road surfaces, has the potential to generate dust emissions and to also add soil to the local road network. During dry weather, soiled roads can lead to dust being emitted due to physical and turbulent effects of vehicles.

5.11 The site entrance of the site will utilise Bines Road, to the east of the site. It is not yet clear as to whether unpaved road surfaces will be used on-site during construction.

5.12 As the information regarding the trackout phase is limited, the overall dust emission magnitude for the trackout phase is conservatively considered to be *Medium*, with reference to the IAQM guidance[15].

Emission Magnitude Summary

5.13 A summary of the dust emission magnitude as a result of the activities of Earthworks, Construction, and Trackout as specified in the IAQM guidance, and discussed above, are listed in Table 5.1 below.

Table 5.1: Dust Emission Magnitude for the construction activities, based on the IAQM's guidance

Activity	Dust Emission Magnitude
Earthworks	Medium
Construction	Medium
Trackout	Medium

Sensitivity of the Area

5.14 Having established the emission magnitudes for each phase, the sensitivity of the area must be considered to establish the significance of effects. The effect of dust emissions depends on the sensitivity of each receptor.

5.15 High sensitivity human receptors include residential dwellings, schools and hospitals, but can include locations such as car showrooms when considering the impacts of dust soiling.

5.16 The impacts of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20m of the site boundary there is a high risk of dust impacts, regardless of the prevailing wind direction. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the dust source.

5.17 With the exponential decline in dust levels with distance from dust generating activities, it is considered that for receptors more than 250m from the site boundary, the risk is negligible. Furthermore, the risks at over 100m only have the potential to be significant in certain weather conditions, e.g. downwind of the source during dry periods.

5.18 The approximate number of high sensitivity human receptors in the vicinity of the site is detailed in Table 5.2 below and shown in Figure 2.

Table 5.2: Approximate number of High Sensitivity Receptors close to the site

Distance to site (m)	Approximate number of receptors	Receptor Details
<20	6	Adjacent residential dwellings on Bines Road
<50	22	Surrounding residential dwellings on Bines Road
<100	40	Surrounding residential dwellings, namely those on Bines Road and Lock Lane
<250	84	Surrounding residential dwellings in Partridge Green

5.19 Figure 3 shows that the predominant wind direction at Charlwood (2023), the closest relevant meteorological station, is from the south-west, with occasional winds from the north-east. As shown in Table 5.2 (above), there are 6 high sensitivity residential receptors within 20m of the site. As such, the sensitivity of the area to dust soiling impacts is defined as *Medium*, with reference to the IAQM guidance[15].

5.20 Local monitoring data and UK-AIR predicted annual mean concentrations of PM_{10} are below 24 μg.m^{-3} at the site[23]. This provides a good indication that PM_{10} concentrations for both annual mean and daily mean are likely to be below the respective AQSs at the site and adjacent uses. Therefore, the sensitivity of the area to human health impacts is defined as *Low*, according to the IAQM guidance[15].

5.21 Review of the MAGIC website[18], which incorporates Natural England's interactive maps, has identified no statutory ecological receptors within 50m of the site, or 50m of roads to be used by construction traffic, up to 250m from the site entrance. The closest statutory ecological site is the South Downs National Park, located approximately 5.4km to the north of the site. Therefore, based on distance alone, the construction of the proposed development can be considered to have a *Negligible* impact on local ecological sites.

23 The 24.0μg.m^{-3} 'threshold' is taken from Table 3 of the IAQM's construction dust guidance. This threshold, along with the number of receptors, their sensitivity, and their distance from source (construction site), helps establish the sensitivity of an area in terms of potential human health impacts from exposure to PM_{10}. According to the guidance, baseline annual mean PM_{10} concentrations below 24.0μg.m^{-3} indicate that the sensitivity of the area in terms of human health impacts is *Low* in all cases except when there are a large number (>100) of highly sensitive receptors within 20m of the construction site.

Risk of Impacts

5.22 Having established the potential dust emission magnitudes and sensitivity of the area, the risk of impacts can be determined in accordance with the IAQM guidance. These are summarised in Table 5.3.

Table 5.3: Summary of Impact Risk by Construction Stage based on the IAQM's dust guidance.

Stage	Impact Risk		
	Nuisance Dust	Ecology	PM_{10} Effects on Health
Earthworks	*Medium Risk*	*Negligible Risk*	*Low Risk*
Construction	*Medium Risk*	*Negligible Risk*	*Low Risk*
Trackout	*Medium Risk*	*Negligible Risk*	*Low Risk*

5.23 Overall, and using professional judgement, the proposed development is considered to be *Medium Risk* for nuisance dust soiling effects, *Low Risk* for PM_{10} health effects and *Negligible Risk* for ecological impacts, in the absence of mitigation.

Site Specific Mitigation

5.24 The GLA guidance[16] suggests a number of mitigation measures that should be adopted in order to minimise impacts from dusts and fine particles. Appropriate measures that could be included during construction of the proposed development include:

- ideally cutting, grinding and sawing should not be conducted on-site and pre-fabricated material and modules should be brought in where possible;
- where such work must take place, water suppression should be used to reduce the amount of dust generated;
- skips, chutes and conveyors should be completely covered and, if necessary, enclosed to ensure that dust does not escape;
- no burning of any materials should be permitted on site;
- any excess material should be reused or recycled on-site in accordance with appropriate legislation;
- developers should produce a waste or recycling plan;
- following earthworks, exposed areas and soil stockpiles should be re-vegetated to stabilise surfaces, or otherwise covered with hessian or mulches;
- stockpiles should be stored in enclosed or bunded containers or silos and kept damp where necessary;

- hard surfaces should be used for haul routes where possible;
- haul routes should be swept/washed regularly;
- vehicle wheels should be washed on leaving the site;
- all vehicles carrying dusty materials should be securely covered; and
- delivery areas, stockpiles and particularly dusty items of construction plant should be kept as far away from neighbouring properties as possible.

5.25 In addition, the IAQM[15] lists recommended mitigation measures for low, medium and high dust impact risk sites. The highly recommended mitigation measures for *Medium Risk* sites are included in Appendix A of this report.

5.26 Where dust generation cannot be avoided in areas close to neighbouring properties, additional mitigation measures should be put in place, such as: windbreaks, sprinklers, and/or time/weather condition limits on the operation of some items of plant or the carrying out of activities that are likely to generate a particularly significant amount of dust.

Residual Effects

5.27 After the implementation of the mitigation measures listed above and in Appendix A, the significance of each phase of the construction programme will be reduced and the residual significance of impact for the construction phase is expected to be *Negligible*, thus complying with the requirements of the National Planning Policy Framework[7] by directly and appropriately mitigating the "*potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations*".

6. Operational Phase

6.1 As the proposed development is set to introduce new, sensitive (residential) receptors into the local area, it was considered necessary to assess the suitability of the site, in air quality terms, using a detailed dispersion model.

6.2 Results from the ADMS-Roads assessment for the proposed development are presented below. Modelled receptor points and modelled road links are displayed in Figure 3, with further details of the receptor points modelled in this assessment provided in Table 4.2.

Air Quality Impacts at Existing Local Receptors

6.3 As the proposed development is expected to generate volumes of traffic in excess of the traffic generation thresholds prescribed by the EPUK & IAQM guidance[14] on roads in the surrounding area of the site, namely on the B2135 Bines Road and several A-roads within the Cowfold AQMA, it was necessary to assess the impact of traffic generated by the proposed development on existing sensitive receptor locations adjacent to the affected roads.

Nitrogen dioxide (NO_2)

6.4 Modelled annual mean NO_2 concentrations at local existing receptors, located at the closest façades of existing sensitive uses to the adjacent road network, in the areas surrounding the site, are shown in Table 6.1, below.

Table 6.1: Predicted Annual Mean Concentrations of NO_2 at Local Receptors

Receptor	Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)			Changes due to Proposed Development		
	2024 Baseline	2028 Without	2028 With	$\mu g.m^{-3}$	As a % of the AQS	EPUK & IAQM Significance
E1	9.9	11.1	11.3	0.2	0.6	Negligible
E2	10.2	10.5	10.7	0.2	0.5	Negligible
E3	17.3	17.5	17.7	0.2	0.5	Negligible
E4	29.5	30.1	30.2	0.1	0.2	Negligible
E5	29.4	30.0	30.0	0.0	0.1	Negligible
E6	16.1	16.4	16.4	0.0	0.0	Negligible
E7	25.3	25.8	25.9	0.1	0.2	Negligible

Note: Concentrations are presented to one decimal place. Any discrepancies are due to rounding.

6.5 The data in Table 6.1 show that traffic expected to be generated by the proposed development is predicted to have a *Negligible* impact on annual mean NO_2 concentrations at all existing modelled receptors, with reference to the EPUK & IAQM impact descriptors.

6.6 The results also show that modelled annual mean NO_2 concentrations are predicted to be below the 40 μg.m^{-3} annual mean AQS at all modelled receptors across all modelled scenarios.

6.7 The highest predicted annual mean NO_2 concentration in the 2028 'with' scenario is 30.2 μg.m^{-3}, predicted at receptor E4, which represents a residential receptor adjacent to the A272 The Street, Cowfold. This is below the annual mean AQS by approximately 25%.

6.8 Receptor E1 shows the largest modelled increase in annual mean NO_2 concentration as a result of the operation of the proposed development; which is 0.6% with respect to the 40 μg.m^{-3} AQS. The change in annual mean NO_2 concentration predicted at this receptor is considered to be *Negligible* with reference to the EPUK and IAQM impact descriptors, as displayed in Appendix A.

6.9 The LAQM.TG(22)[13] guidance states that where annual mean NO_2 concentrations are below 60 μg.m^{-3}, the short-term AQS for NO_2 (200 μg.m^{-3} not to be exceeded more than 18 times per year) is not likely to be exceeded. The data in Table 6.1 show that modelled annual mean NO_2 concentrations are well below this threshold at all modelled receptors and, therefore, it is expected that the hourly AQS for NO_2 will not be exceeded at the modelled receptor locations.

Particulate Matter (PM_{10} and $PM_{2.5}$)

6.10 Modelled results for annual mean PM_{10} concentrations at local receptor locations are shown in Table 6.2, below.

Table 6.2: Predicted Annual Mean Concentrations of PM_{10} at Local Receptors

Receptor	Annual Mean PM_{10} Concentration (μg.m^{-3})			Changes due to Proposed Development		
	2024 Baseline	2028 Without	2028 With	μg.m^{-3}	As a % of the AQS	EPUK & IAQM Significance
E1	11.6	12.0	12.1	0.1	0.2	Negligible
E2	11.1	11.2	11.2	0.1	0.2	Negligible
E3	14.0	14.0	14.1	0.1	0.2	Negligible
E4	17.1	17.3	17.3	0.0	0.1	Negligible
E5	18.8	19.0	19.0	0.0	0.0	Negligible
E6	13.9	14.0	14.0	0.0	0.0	Negligible
E7	17.6	17.8	17.8	0.0	0.1	Negligible

Note: Concentrations are presented to one decimal place. Any discrepancies are due to rounding.

6.11 The data in Table 6.2 show that traffic expected to be generated by the proposed development is predicted to have a *Negligible* impact on annual mean PM_{10} concentrations at all existing modelled receptors, with reference to the EPUK & IAQM impact descriptors.

6.12 Furthermore, annual mean PM_{10} concentrations are predicted to be well below the 40 μg.m^{-3} annual mean AQS at all existing receptors across all modelled scenarios.

6.13 The highest predicted annual mean PM_{10} concentration in the 2028 'with' scenario is 19.0 µg.m^{-3}, predicted at receptor E5; which is below the annual mean AQS by approximately 53%.

6.14 The largest increase in annual mean PM_{10} concentration predicted as a result of the operation of the proposed development was 0.2% with respect to the 40 µg.m^{-3} AQS, at receptors E1, E2 and E3.

6.15 For PM_{10}, the following equation can be used to derive the number of days that the daily mean AQS of 50 µg.m^{-3} is likely to be exceeded (35 exceedances of the daily mean AQS are allowed per year):

$$\text{No. 24 hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left(\frac{206}{\text{annual mean}}\right)$$

6.16 Using this equation, an annual mean concentration of approximately 32 µg.m^{-3} or above may indicate an exceedance of the short-term (daily mean) AQS. The data in Table 6.2 show that the highest predicted annual mean PM_{10} concentration is below this threshold and, therefore, it is unlikely that the short-term AQS would be exceeded at any of the modelled locations.

6.17 Modelled results for annual mean $PM_{2.5}$ concentrations at local receptor locations are shown in Table 6.3, below.

Table 6.3: Predicted Annual Mean Concentrations of $PM_{2.5}$ at Local Receptors

Receptor	Annual Mean $PM_{2.5}$ Concentration (µg.m^{-3})			Changes due to Proposed Development		
	2024 Baseline	2028 Without	2028 With	µg.m^{-3}	As a % of the AQS	EPUK & IAQM Significance
E1	6.5	6.7	6.7	0.0	0.2	Negligible
E2	6.4	6.5	6.5	0.0	0.2	Negligible
E3	8.5	8.6	8.6	0.0	0.2	Negligible
E4	10.2	10.3	10.3	0.0	0.0	Negligible
E5	11.1	11.2	11.2	0.0	0.1	Negligible
E6	8.5	8.5	8.5	0.0	0.0	Negligible
E7	10.4	10.6	10.6	0.0	0.1	Negligible

Note: Concentrations are presented to one decimal place. Any discrepancies are due to rounding.

6.18 The data in Table 6.3 show that traffic expected to be generated by the proposed development is predicted to have a *Negligible* impact on annual mean $PM_{2.5}$ concentrations at all existing modelled receptors, with reference to the EPUK & IAQM impact descriptors.

6.19 Annual mean $PM_{2.5}$ concentrations are predicted to be below the 20 µg.m^{-3} AQS, at all existing receptors, across all scenarios. The 10 µg.m^{-3} future legal target was modelled to be exceeded at existing receptors E4, E5 and E7.

6.20 The highest predicted annual mean $PM_{2.5}$ concentration in the 2028 'with' scenario is 11.2 $\mu g.m^{-3}$, predicted at receptor E5; which is below the annual mean AQS by approximately 44% and above the future legal limit by approximately 12%.

6.21 It should be noted that the modelled concentrations for 2028 are representative of concentrations 2 years before the future legal limit is adopted. Additionally, considering the conservative methods utilised within the modelling approach and the anticipated over-predicting of the model, established within the verification, it can be assumed that modelled pollutant concentrations are likely representative of an upper-bound prediction, with actual concentrations likely to be lower than the modelled results.

6.22 The largest increase in annual mean $PM_{2.5}$ concentration predicted as a result of the operation of the proposed development was 0.2% with respect to the 20 $\mu g.m^{-3}$ AQS, at receptors E1, E2, and E3.

Summary of Impacts at Existing Local Receptors

6.23 Traffic expected to be generated by the proposed development is predicted to have a *Negligible* impact on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations at all existing modelled receptors, with reference to the EPUK & IAQM impact descriptors.

6.24 The highest annual mean $PM_{2.5}$ concentrations were modelled to be in exceedance of the future legal limit of 10 $\mu g.m^{-3}$; however, this will not be the legal limit at the time of the proposed development's opening year, and the modelled pollutant concentrations determined within this assessment are considered conservative and slightly overestimated.

6.25 As shown in Section 3 of this air quality assessment, pollutant concentrations are predicted to decline in future years, thus it can be considered likely that annual mean $PM_{2.5}$ concentrations at modelled receptor locations could be below the future legal limit, at the time of its adoption, in 2030.

Site Suitability

6.26 Results from the ADMS-Roads assessment for the proposed development are presented below. Modelled receptor points and modelled road links are displayed in Figure 3, with further details of the modelled receptor points provided in Table 4.2.

6.27 Table 6.4 below presents modelled annual mean pollutant concentrations in a worst-case 'Emission Factor Year' scenario, which assumes no improvement in vehicle fleet emissions beyond the baseline year of 2024. This is considered a conservative approach as fleet emissions would be expected to reduce with time as older cars are 'retired' and replaced with newer, cleaner, vehicles.

6.28 Modelled concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at three receptor locations. The receptors are representative of the façades of proposed residential units that would be closest to the B2135 Bines Road.

6.29 All other proposed receptors at the site are anticipated to be located further from major road pollution sources and are considered unlikely to exceed pollution levels modelled at receptors P1-P3.

6.30 Predicted annual mean pollution concentrations of NO_2, PM_{10} and $PM_{2.5}$ at proposed receptors are included in Table 6.4 below.

Table 6.4: Predicted Pollutant Concentrations at the Site in 2028

Receptor	X	Y	Height (m)	Annual mean PM_{10} Concentration ($\mu g.m^{-3}$)		
				NO_2	PM_{10}	$PM_{2.5}$
P1	518957.7	118727.9	1.5 ("Breathing Height")	8.5	11.1	6.2
P2	518940.3	118763.7	1.5 ("Breathing Height")	8.1	11.0	6.2
P3	518939.9	118794.6	1.5 ("Breathing Height")	8.1	11.0	6.2

Note: Concentrations are presented to one decimal place. Any discrepancies are due to rounding.

6.31 The model results presented in Table 6.4 show that annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the modelled receptor points, located at the façade of proposed residential dwellings, are all predicted to be well below their respective long-term AQSs and the future legal limit for $PM_{2.5}$, in the proposed development's projected opening year of 2028.

Nitrogen dioxide (NO_2)

6.32 The data in Table 6.4 show that the highest modelled annual NO_2 concentration is predicted to be 8.5 $\mu g.m^{-3}$ at receptor P1, which is approximately 79% below the 40 $\mu g.m^{-3}$ annual mean AQS for NO_2.

6.33 The data in Table 6.1 show that the modelled annual mean NO_2 concentrations are also well below the 60 $\mu g.m^{-3}$ indicative threshold[13] for potential exceedance of the hourly AQS for NO_2 at the proposed receptor locations and, therefore, it is predicted that the hourly AQS is unlikely to be exceeded at the proposed residences.

Particulate Matter (PM_{10} and $PM_{2.5}$)

6.34 The data in Table 6.4 show that modelled annual mean concentrations of PM_{10} are predicted to be below the 40 $\mu g.m^{-3}$ AQS at the modelled receptor locations, with the highest modelled concentration being 11.1 $\mu g.m^{-3}$ at receptor P1; which is approximately 72% below the relevant AQS.

6.35 As discussed above, an annual mean PM_{10} concentration of approximately 32 $\mu g.m^{-3}$ or above may indicate an exceedance of the short-term (daily mean) AQS for PM_{10}. As the modelled annual mean PM_{10} concentrations are predicted to be well below this threshold, it can be considered unlikely that the short-term AQS for PM_{10} would be exceeded at the proposed residences.

6.36 The data in Table 6.4 show that annual mean concentrations of $PM_{2.5}$ are predicted to be well below the 20 $\mu g.m^{-3}$ AQS at the modelled receptor locations. An annual mean concentration of 6.2 $\mu g.m^{-3}$ was modelled at receptors P1, P2 and P3, which is approximately 69% below the AQS. This is also below the 2030 legal limit for $PM_{2.5}$ of 10 $\mu g.m^{-3}$ by approximately 38%.

Summary of Site Suitability

6.37 Overall, there are no predicted exceedances of the long-term or short-term AQSs for NO_2, PM_{10} or $PM_{2.5}$ at modelled proposed receptor locations, in 2028. Modelled annual mean $PM_{2.5}$ concentrations are also predicted to be below the future legal limit, to be achieved by 2030.

Therefore, the site can be considered suitable for the proposed sensitive uses, based on assessment of the anticipated "worst-case" sensitive receptor locations.

Policy Context

6.38 Considering the above, the proposed development is not anticipated to result in a significant impact on local air quality or to introduce high sensitivity receptors to an area of poor air quality, thereby complying with The Air Quality (England) (Amendment) Regulations 2002[2], The Environment (Miscellaneous Amendment) (EU Exit) Regulations 2020[3], the NPPF[7] and the national PPG[8]. It is also anticipated that the 2030 legal target for $PM_{2.5}$, outlined by Defra's *Environmental Improvement Plan 2025*[4], will likely be achieved at the time of its adoption.

6.39 As the proposed development is not anticipated to result in a significant impact on local air quality or to introduce high sensitivity receptors to an area of poor air quality, it is also anticipated that the proposed development will comply with HDC's local Planning Policy 24: *Environmental Protection* and Planning Policy 33: *Development Principles*, as well as HDC's future Strategic Policy 11: *Environmental Protection*, where air quality is directly referenced.

6.40 The proposed development is also anticipated to comply with local Strategic Policy 12: *Air Quality*, where site suitability and impacts on local air quality are referenced, excluding elements surrounding an Emissions Mitigation Assessment, which are discussed in Section 7 of this air quality assessment.

6.41 Therefore, the proposed development is anticipated to comply with relevant national and local policies, where directly applicable to air quality, with regards to site suitability and its impact on local air quality.

7. Emissions Mitigation Assessment

Emission cost calculation

7.1 Following the December 2025 update to Defra's Emissions Cost Calculation guidance[21], the emissions cost calculation below has been carried out to estimate the value of the impact of NO_x and $PM_{2.5}$ emitted by the proposed development's operational traffic.

7.2 To evaluate the scale of a proposed development's total emissions, Defra recommends an emissions cost calculation using the following formula:

Road Transport Emission Increase (Cost, £) =

Estimated trip rate for 5 years × *Emission Rate/10km/vehicle type* × *Damage Costs*

7.3 The latest Defra Emissions Factor Toolkit[19] was used to determine the total transport related emissions that would be generated by the proposed development; the inputs used in the calculation are shown in Table 7.1 below. The anticipated opening year of the proposed development is 2028, so the five-year period used in the calculation runs from 2028 to 2032, inclusive.

Table 7.1: Calculation Inputs

Input	Value	Unit	Source/guidance
Trip Length	10	km	AQEMGFS
Development Traffic Flow	669 (7 HDVs)	AADT	Paul Basham Associates
EFT Road Type	Urban (not London)	-	EFT
EFT Year	2028 – 2032	-	In line with EFT estimates
Average Speed	50	$km.hr^{-1}$	AQEMGFS
Appraisal period	5	years	AQEMGFS

7.4 Total emission 'damage' costs were calculated using Defra's appraisal toolkit and are presented in Tables 7.2 and 7.3.

7.5 The calculation accounts for an 'uplift factor' of 2% cumulatively per annum and a 'discount rate', in line with the latest 2023 guidance[21]. Central estimate damage costs for '*Road Transport Urban Small*' were based on Defra 2026 prices.

Table 7.2: Emission Cost Calculation for NO_x

	2028	2029	2030	2031	2032
NO_X increase (tonnes)	0.310	0.265	0.225	0.190	0.159
Central Damage cost (NO_X)	£10,179	£10,179	£10,179	£10,179	£10,179
Adjusted Damage cost (NO_X)	£3,151	£2,661	£2,225	£1,849	£1,529
Total	**£11,415**				

Table 7.3: Emission Cost Calculation for $PM_{2.5}$

	2028	2029	2030	2031	2032
$PM_{2.5}$ increase (tonnes)	0.042	0.041	0.041	0.040	0.040
Central Damage cost ($PM_{2.5}$)	£86,418	£86,418	£86,418	£86,418	£86,418
Adjusted Damage cost ($PM_{2.5}$)	£3,605	£3,498	£3,400	£3,313	£3,233
Total	**£17,050**				

7.6 The total damage costs are summarised as follows:

NO_X emission 'damage' cost'	= £11,415 +
$PM_{2.5}$ emission 'damage' cost'	= £17,050
TOTAL (cost, £)	**= £28,465**

Mitigation

7.7 The resulting value of the 'emissions cost', as calculated above, is indicative of the value of an appropriate package of mitigation measures to minimise any potential impacts from the proposed development. The mitigation package should at least equate to this 'emissions cost'.

7.8 As the development is considered to be 'Major' in accordance with The Town and Country Planning guidance[20] and the Sussex-Air guidance[17], the following mitigation measures should be included as a minimum:

- all gas-fired boilers are expected to meet a minimum standard of <40mgNO_x/kWh, with consideration given to renewable energy sources.
- meet electric vehicle charging point (EVCP) guidance set out in West Sussex County Council's (WSCC) *Guidance on Parking at New Developments*[24] and the latest Part S Building Regulations.

7.9 In addition to the provision of EVCP, the developer is committed to providing the following mitigation:

24 West Sussex County Council. (2020). *Guidance on Parking at New Developments.*

- Provision of secure cycle storage;
- Improvements to cycle paths and the local cycle network;
- A Travel Plan that encourages a shift to low- or no-emissions transport modes;
- A welcome pack for new occupants to encourage the use of sustainable transport modes;
- "Cable to Property" broadband to facilitate working from home; and
- Provision of green infrastructure.

7.10 It is anticipated that the mitigation package proposed would likely offset the proposed development's calculated 'emission cost' and therefore minimise potential incremental air quality impacts arising from the proposed development's operation.

7.11 It should be noted that, if the above mitigation package does not at least equate to the above calculated 'emissions cost', additional mitigation should be employed to fully off-set this cost.

Policy Context

7.12 Considering the above, the proposed development is anticipated to meet the requirements of the AQEMGFS guidance[17], with regards to air quality pollution mitigation, so long as the mitigation package fully off-sets the 'emissions cost', calculated above.

7.13 Therefore, assuming that the developer provides a mitigation package that off-sets the 'emissions cost', the proposed development is anticipated to comply with HDC's future local Strategic Policy 12: *Air Quality*, where directly relevant to Emissions Mitigation Assessments and the subsequent proposal of suitable mitigation.

8. Conclusions

8.1 UK-AIR background concentrations and local air quality monitoring results from the local area suggest that air quality within the vicinity of the site is generally good, with background and roadside pollution concentrations across the site likely to be below relevant UK Air Quality Standard concentrations.

8.2 The construction phase of the development could give rise to emissions which could cause dust soiling effects on adjacent uses. However, by adopting appropriate mitigation measures to reduce emissions and their potential impact, residual effects should be *Negligible*, thus complying with the requirements of the National Planning Policy Framework.

8.3 The operation of the proposed development is not expected to adversely impact local air quality or to introduce new receptors into an area of poor air quality.

8.4 To mitigate future emissions, the proposed development will include mitigation measures, as listed in Section 7.9 of this report. Noting the suite of mitigation measures proposed, it is anticipated that they will provide sufficient benefit to fully offset the proposed development's calculated 'emissions cost'.

8.5 The proposed development is expected to comply with all relevant local and national air quality policy. Air quality should not, therefore, pose any significant obstacles to the planning process.

Figures and Appendices

Figure 1: Site Location

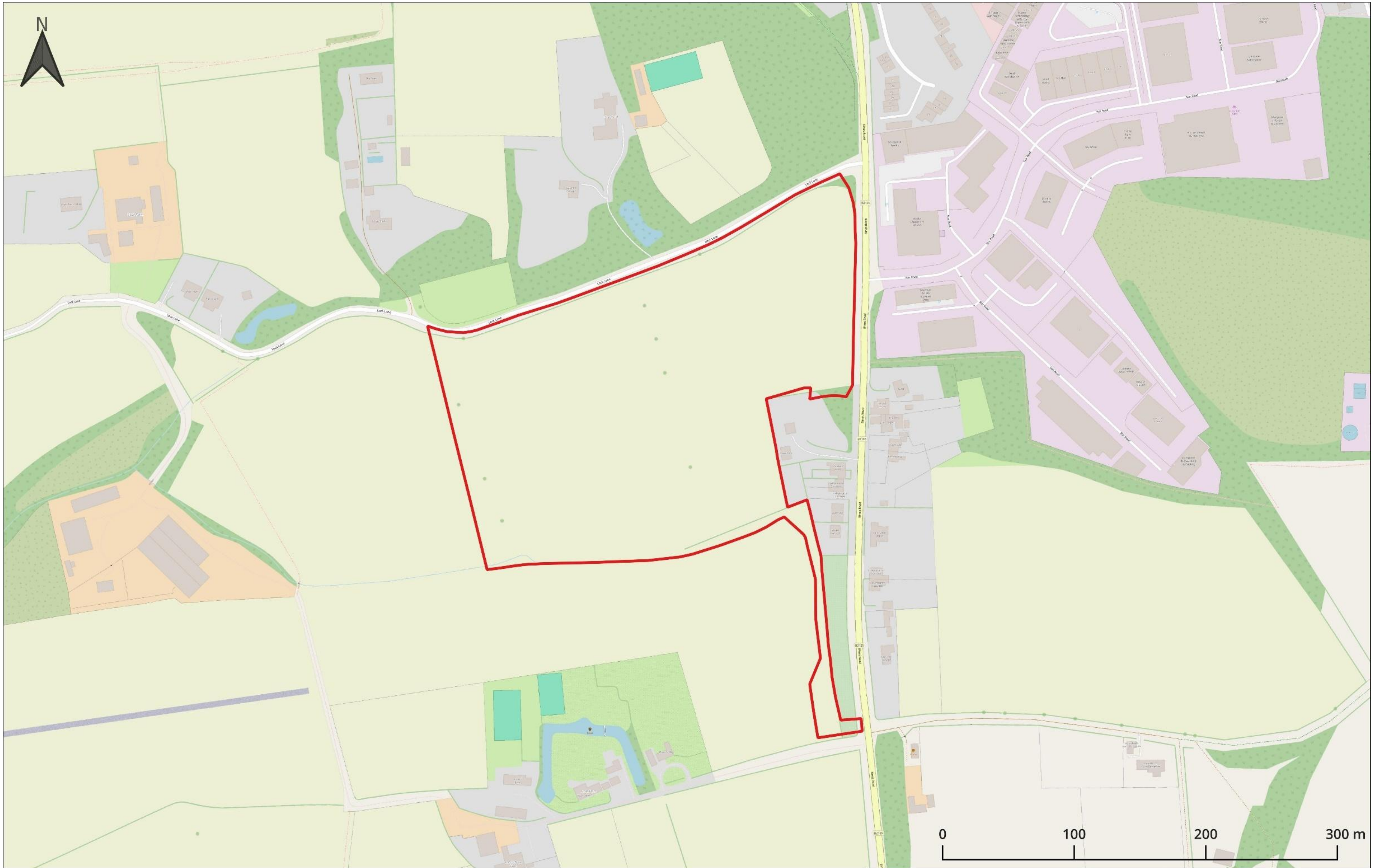

Figure 1: Site Location Plan

Job No: 12785
Author: B. McAllister
Date: 26/09/2024
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Figure 2: Construction Phase

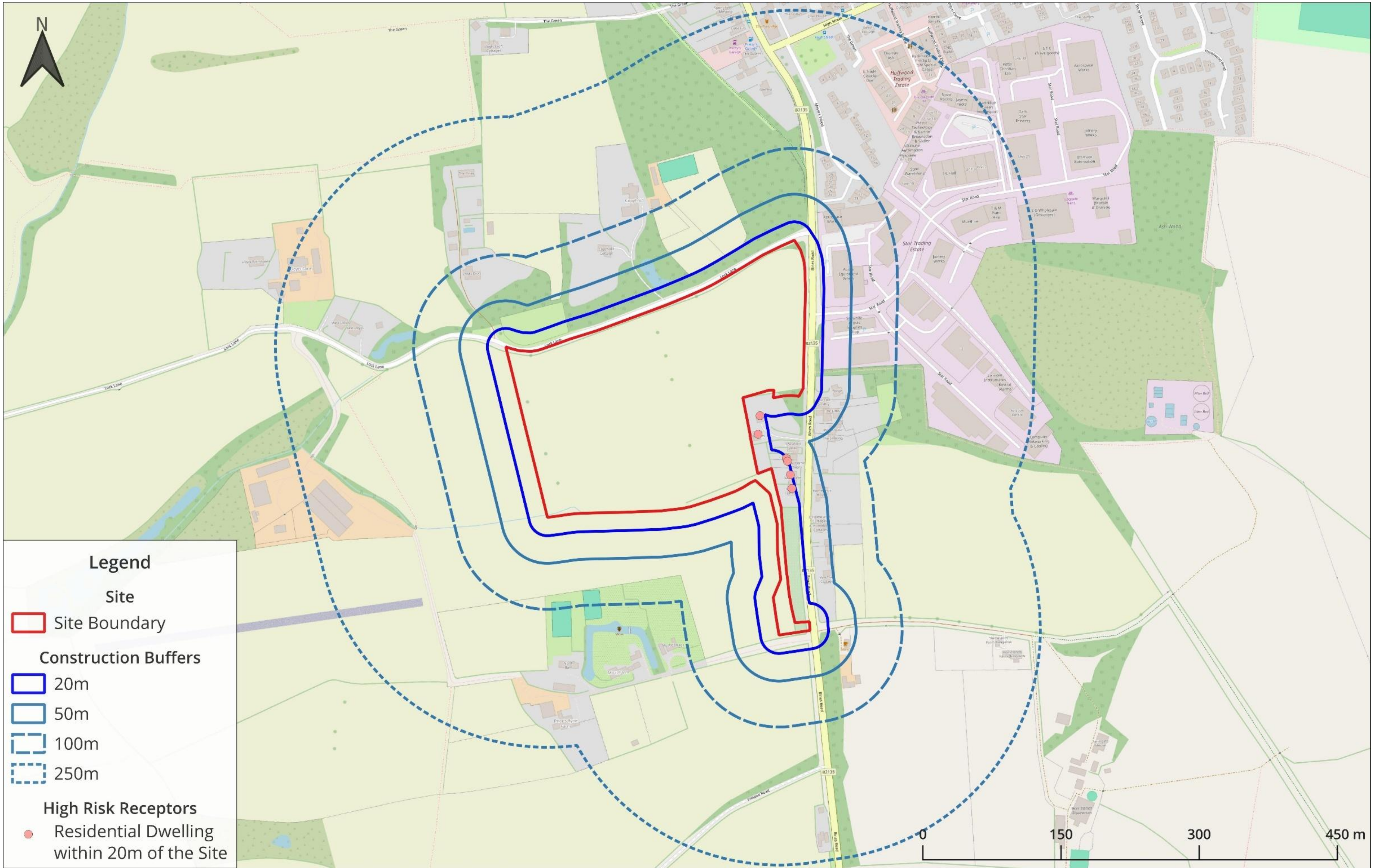

Figure 2: Construction Phase

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Date: 26/09/2024
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Figure 3: Modelled Roads and Receptors

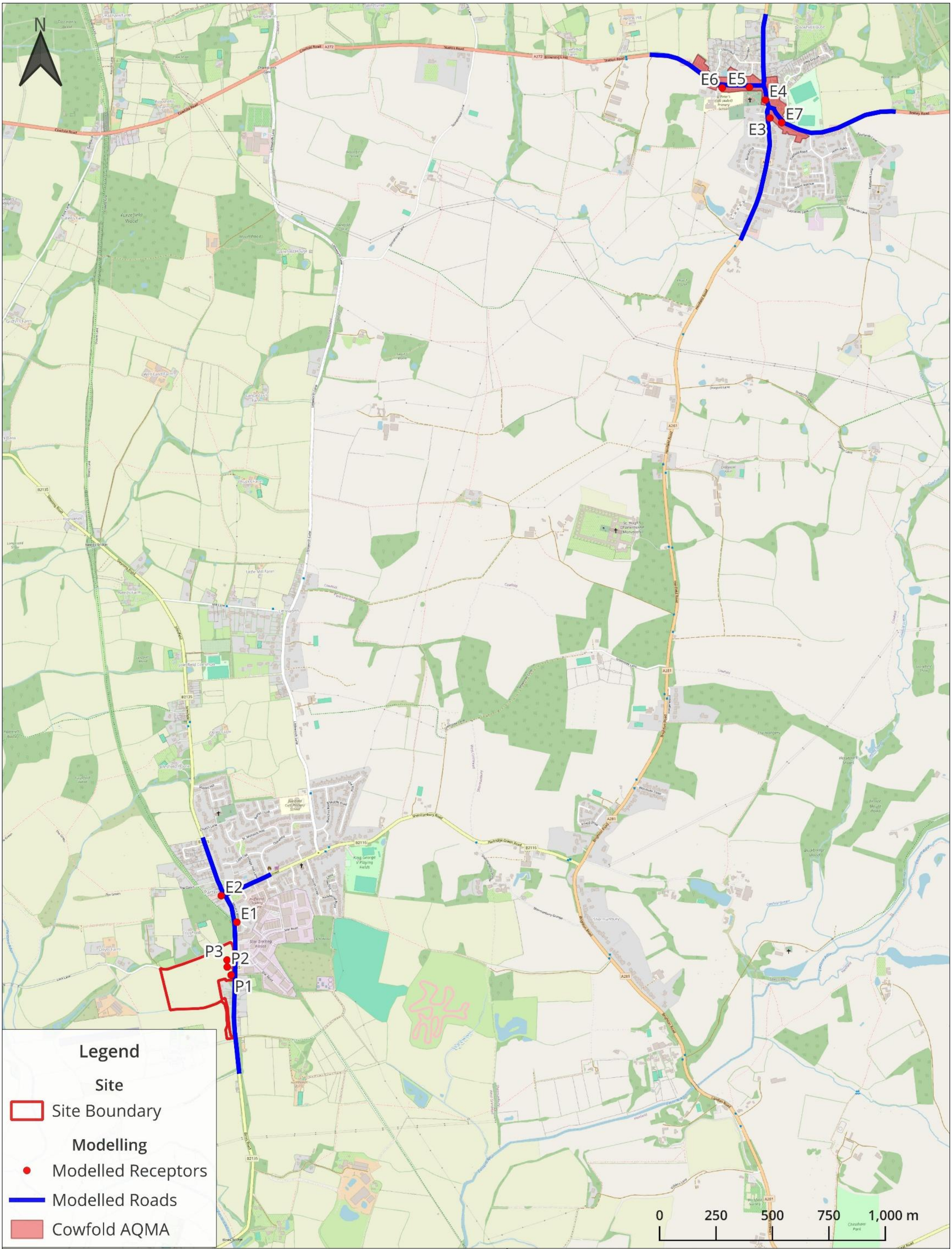

Figure 3: Modelled Roads and Receptors

Job No: 12785
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Date: 02/02/2026
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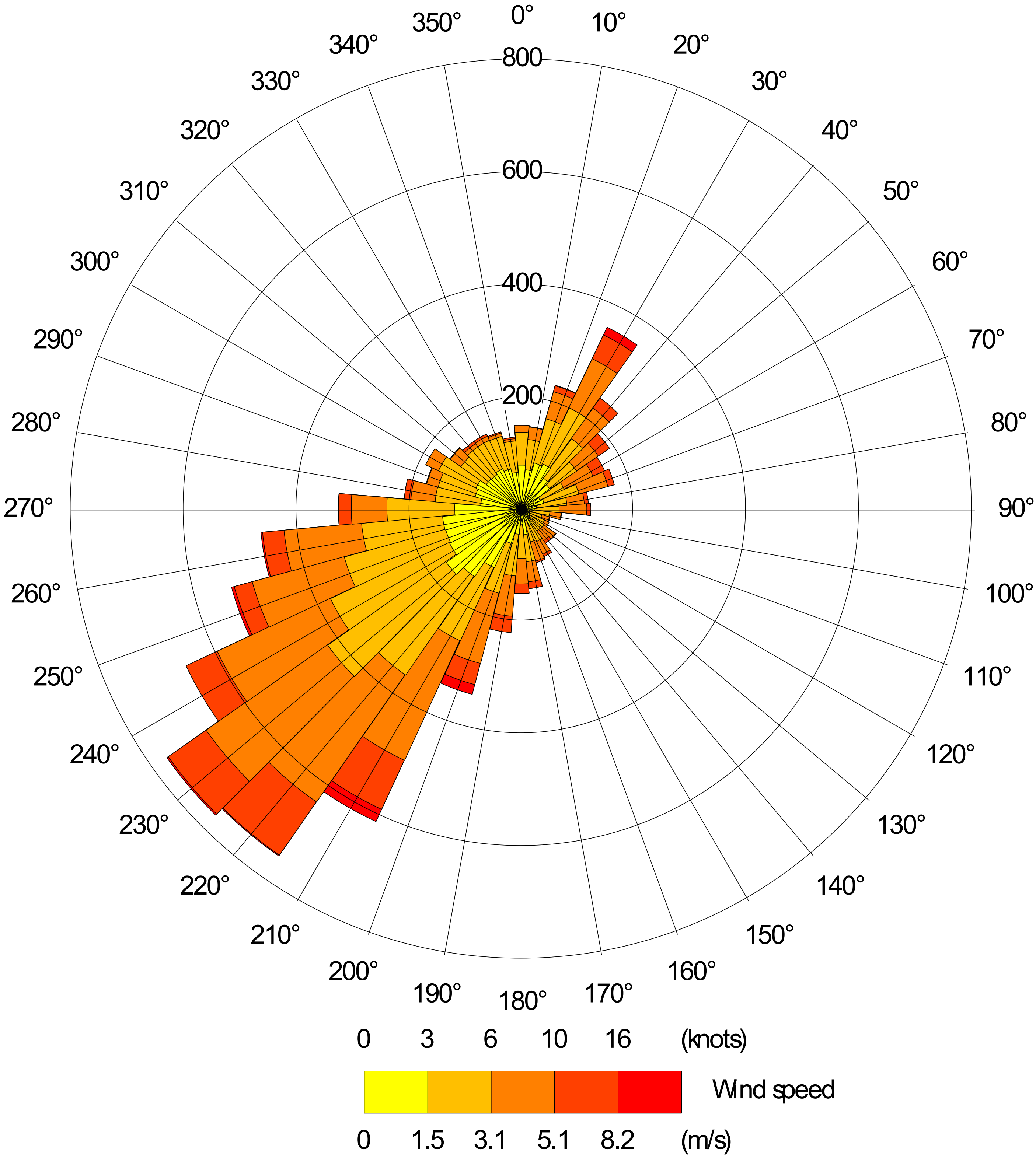
Figure 4: Wind Rose for Charlwood (2024)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270°
280°
290°
300°
310°
320°
330°
340°
350°
200
400
600
800
0 3 6 10 16 (knots)
Wind speed
0 1.5 3.1 5.1 8.2 (m/s)

Appendix A: Model Input Data

Model Inputs

Model inputs are provided below in Table A.1. These data relate to ADMS Roads inputs for model verification and the assessment modelling. A 2024 Emission Year was used for the model verification (2024) and the opening year of the development (2028) for conservative purposes.

Table A.1: Model Verification & Modelled Operational Inputs

Inputs	
Dataset	UK EFT v13.1
Emission Year	2024
Road Type	Urban (Not London)

Traffic Data

Traffic data used within the assessment were provided by Paul Basham Associates (PBA), the transport consultants assigned to the project. The data analysed included a baseline 2024 (verification year) scenario and two modelled scenarios for 2028 (development opening year), one with and one without the development generated traffic.

The speeds of traffic on roads varied based on the speed limit of the modelled road and the assumption that traffic generally slows when approaching a junction / in congested areas.

The AADT data used in the ADMS-Roads assessment are included in Table A.2, below.

Table A.2: Traffic Inputs for the ADMS-Roads Assessment

Road	Source	2024 Model Verification & Baseline		2028 Without Development		2028 With Development	
		AADT	% HDV	AADT	% HDV	AADT	% HDV
B2135 Bines Road (south of site access)	PBA	3,566	14%	5,429	13%	5,523	13%
B2135 Bines Road (north of site access)	PBA	3,566	14%	5,429	13%	6,004	12%
B2135 Church Road	PBA	2,443	7%	2,524	7%	2,785	7%
B2116 High Street (Partridge Green)	PBA	6,031	2%	6,230	2%	6,544	2%
A281 Henfield Road (Cowfold)	PBA	5,313	3%	5,511	3%	5,745	3%
A272 The Street	PBA	20,611	3%	21,382	3%	21,509	3%

Road	Source	2024 Model Verification & Baseline		2028 Without Development		2028 With Development	
		AADT	% HDV	AADT	% HDV	AADT	% HDV
A281 Brighton Road (Cowfold)	PBA	8,530	2%	8,849	2%	8,936	2%
A272 Station Road	PBA	19,321	4%	20,044	4%	20,091	4%
A272 Bolney Road	PBA	19,161	4%	19,878	4%	19,978	4%
A281 High Street (Henfield)	PBA	8,550	2%	-	-	-	-
A2037 Golden Square	PBA	9,073	2%	-	-	-	-
A281 Henfield Common South	PBA	8,452	2%	-	-	-	-

Traffic data for roads in Henfield were used exclusively for the model verification.

Appendix B: Model Verification Study

Model Verification

Model verification studies are undertaken in order to check the performance of dispersion models and, where modelled concentrations are significantly different to monitored concentrations, a factor can be established by which the modelled results can be adjusted in order to improve their reliability. The model verification process is detailed in LAQM.TG(22)[13].

Model verification can only be undertaken where there are sufficient roadside monitoring data in the vicinity of the subject scheme being assessed. LAQM.TG(22) recommends that a combination of automatic and diffusion tube monitoring data are used; although this may be limited by data availability. Five diffusion tube and one automatic monitoring locations, with appropriate traffic data were selected for this model verification study.

These monitors were selected based on their proximity to the site and roads within the Cowfold AQMA, as these were considered to best represent conditions similar to that of the site's location / nearby sensitive receptors and sensitivity receptors within the Cowfold AQMA. Table B.1 compares monitored and modelled NO_2 concentrations at the three monitoring locations.

Table B.1: Monitored and Modelled Concentrations of NO_2 at Local Monitoring Sites

Monitor	Type	Monitoring Type	Annual Mean NO_2 Concentration ($\mu g.m^{-3}$)		
			Monitored	Modelled	% Difference
Henfield 1n	R	Diffusion Tube	16.6	17.8	7.4%
Cowfold AU (A, B, C)	R	Diffusion Tube	15.8	17.7	12.0%
Cowfold 1 and Cowfold 2	R	Diffusion Tube	21.5	23.5	9.1%
Cowfold 3	R	Diffusion Tube	21.9	22.9	4.4%
Cowfold 7n	R	Diffusion Tube	24.9	23.3	-6.5%
HO5	R	Automatic	16.2	17.7	9.5%

Note: "R" = Roadside.

The data in Table B.1 show that the model slightly over-predicted annual mean NO_2 concentrations at a majority of the monitoring locations.

The modelled concentrations were within 25% of the monitored results therefore, an adjustment factor was not applied to the model.

Root Mean Square Error (RMSE) is used to define the average error or uncertainty of the model. According to LAQM.TG(22), the RMSE should ideally be within 10% of the relevant

AQS, but is acceptable where it is within 25% of the AQS. An RMSE of 1.6 $\mu g.m^{-3}$ was calculated through comparison of the monitored and modelled concentrations of NO_2, which equates to 4.0% with respect to the annual mean AQS and is therefore within the ideal 10% range.

As there were insufficient suitable PM_{10} or $PM_{2.5}$ monitoring data in the study area, it was not possible to perform model verification for these pollutants. As no adjustment factor was considered necessary for modelled NO_x, no adjustment has been applied for modelled road contributions of PM_{10} and $PM_{2.5}$, in accordance with LAQM.TG(22).

Appendix C: Recommended Construction Phase Mitigation

Recommended Construction Phase Mitigation Measures for sites with a *Medium* Risk of Dust Impacts and no Demolition Phase

Please refer to the IAQM's *Guidance on the Assessment of Dust from Demolition and Construction (2024)*[15] and *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018)*[25] for further, "desirable", mitigation measures.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this Appendix. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exception incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least

25 Institute of Air Quality Management. (2018). *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites*.

three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by the IAQM on monitoring during demolition, earthworks and construction.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Construction

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior 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.
- Access gates to be located at least 10m from receptors where possible.

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