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RIVERDALE DEVELOPMENTS LIMITED

PONDTAIL FARM, NORTH HORSHAM

AIR QUALITY ASSESSMENT

DECEMBER 2024

FINAL REPORT

2401475-SEC-00004-02

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FINAL REPORT
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REVIEW AND AUTHORISATION			
Authored By Dominic Handscomb Nalisha Parmar	**Position** Environmental Consultant Senior Air Quality Consultant	**Signature** [redacted]	**Date** 12/12/2024
Reviewed By Jorge Gomez Perales	**Position** Technical Director, Air Quality	**Signature** [redacted]	**Date** 12/12/2024
Checked By Jorge Gomez Perales	**Position** Technical Director, Air Quality	**Signature** [redacted]	**Date** 12/12/2024
Approved By Alex Mabey	**Position** Technical Director	**Signature** [redacted]	**Date** 12/12/2024

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HEAD OFFICE: 1 Tilers Road, Milton Keynes, MK11 3LH United Kingdom
BRIGHTON OFFICE: 37 Frederick Place, Brighton, BN1 4EA United Kingdom
LONDON OFFICE: 15 Adeline Place, London, WC1B 3AJ United Kingdom
https://rwdi.com
Southdowns Environmental Consultants Ltd. – part of the RWDI Group of Companies Reg. 3150111

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1. INTRODUCTION

1.1 Background

1.1.1 Southdowns Environmental Consultants Ltd –was commissioned by Riverdale Development Limited to produce an air quality assessment for the proposed residential development at Pondtail Farm in North Horsham, West Sussex. The site falls within the administrative boundary of Horsham District Council (HDC).

1.1.2 This assessment has been prepared to determine the likely air quality impacts from the development of the site on existing and introduced receptors, to accompany a planning application by Riverdale Developments Limited.

1.1.3 This document has been prepared in accordance with the principles and requirements of the Institute of Air Quality Management (IAQM) and EPUK's guidance for 'Land-use Planning & Development Control: Planning for Air Quality' [1].

1.2 Report Structure

1.2.1 Details of the site and the proposed scheme are presented in the following section of this report. Relevant air quality policy and guidance are outlined in Section 3 and the assessment methodology is detailed in Section 4. The existing baseline conditions are presented in Section 5. Impacts from construction and operation are assessed in Sections 6 and 7, respectively. The emissions mitigation assessment is summarised in Section 8 and mitigation options are presented in Section 9. The assessment is summarised in Section 10.

2. SITE DETAILS

2.1 Site Description

2.1.1 The proposed development site is located at land north of the A264, in a semi-rural setting on the northern outskirts of Horsham. The proposed development site currently comprises open fields and wooded areas and is bordered by the Sutton & Mole Valley railway line to the west of the site, running north to south, with Warnham Station located near to the northwest corner of the proposed development site. Langhurstwood Road runs along the eastern boundary of the site and Mercer Road divides the development site into northern and southern parcels of land.

2.1.2 Next to the railway station are various commercial premises which include: Greens of Horsham, a car repair/MOT test centre, Ryan James Benson Commercials Ltd (RJB), a car and commercial vehicle repairs operation, and Panel 2 Paint, a car body paint specialist.

2.1.3 An industrial estate is situated to the north of the site, which includes Wienerberger Ltd, a building materials supplier, and Britaniacrest Recycling.

2.1.4 The site location is shown in Figure A1 of Appendix A.

2.1.5 Two designated sites are located in close proximity to the proposed development site. Warnham Site of Special Scientific Interest (SSSI), approximately 850 m to the north of the proposed site, and Warnham Local Nature Reserve (LNR), approximately 160 m south of the site.

2.2 Proposed Development

2.2.1 The proposed development will involve the construction of 304 no. residential dwellings, comprising a mix of apartments, semi-detached and detached dwellings with two to five bedrooms and front and rear gardens and associated car parking spaces.

2.2.2 There will be various grass covered outdoor amenity spaces located within the development site.

2.3 Receptors

2.3.1 Locations where people or wildlife may be adversely affected by changes in air quality or dust soiling are considered as relevant receptors for air quality. Receptors introduced by the proposed development are also relevant.

2.3.2 For dust soiling, high-sensitivity receptors may include both residential and ecological receptors, whilst medium- to low-sensitivity receptors may include amenity areas and workplaces.

2.3.3 There are a number of receptors located in the vicinity of the proposed development site, which could potentially be affected by changes in air quality arising from the construction and operation of the development.

2.3.4 The nearest existing residential receptors are located directly adjacent to the development site along Langhurstwood Road to the east and southeast. Residential receptors are also present to the northeast of site, separated by Langhurstwood Road.

2.3.5 Approximately six residential properties in total are located within 20 metres of the site. A plan showing the location of the development site in relation to sensitive receptors is presented in Figure A2 of Appendix A.

2.3.6 The proposed development will introduce residential receptors to the area, which are considered as part of this assessment.

2.3.7 The Warnham SSSI was designated for its historic and geological importance. Warnham LNR was designated for its diverse range of habitats which includes reedbeds, ancient woodland, conifer plantations, mixed broad-leaved plantation, and wet grassland. The LNR supports a range of plants and animals, with 10 no. species of reptiles and amphibians, 162 no. birds, two dragonflies and damselflies, 28 no. mammals including seven bat species, 366 no. plant species and 523 no. species of moth [2].

2.3.8 No other ecological receptors have been identified in the vicinity of the development site.

3. AIR QUALITY LEGISLATION, POLICY, AND GUIDANCE

3.1 Air Quality, Dust and Emissions

3.1.1 Atmospheric pollutants of general concern associated with the impacts of developments on human receptors are nitrogen dioxide (NO_2) and particulate matter (PM).

3.1.2 NO_2 is produced through the combustion of fossil fuels, used for transport and energy supply. Emissions of oxides of nitrogen (NO_x) from exhausts comprise nitric oxide (NO) and NO_2. NO undergoes oxidisation in the atmosphere to form NO_2. High concentrations of NO_2 can cause lung inflammation, shortness of breath and coughing, and reduced immunity to lung infections like bronchitis.

3.1.3 PM can result directly as emissions from local sources (primary), or further afield, often having originated as other pollutants and reformed in the atmosphere (secondary). Primary sources of particulates are of most relevance to this assessment and can include emissions from combustion processes and dust from construction activities. Exposure to high concentrations of particulate matter can cause respiratory and cardiovascular illness and even death. PM_{10} is defined as a mass fraction of airborne particulates with an aerodynamic diameter of 10 microns (µm) or less, whilst $PM_{2.5}$ is defined as a mass fraction of airborne particulates with an aerodynamic diameter of 2.5 microns or less. PM_{10} and $PM_{2.5}$ are respirable and can be drawn deep into the lungs and cause health problems. The fraction of dust that is larger than 10 µm is filtered by the nose and throat.

3.2 EU and National Air Quality Legislation, Policy and Guidance

3.2.1 The EU Air Quality Directive (Directive 2008/50/EC) [3] came into force in June 2008, and was transposed into legislation in England, Wales, Scotland and Northern Ireland in the Air Quality Standards Regulations 2010 [4], since amended by the Air Quality Standards (Amendment) Regulations 2016 [5]. The Directive introduced legally-binding targets for national governments to reduce air pollution to levels at which no or minimal effects on human health are likely to occur. The obligation to meet the requirements of the Directive falls primarily upon the Secretary of State for the Environment in England, and appropriate Ministers in the Devolved Administrations, who are designated as the appropriate "competent authority".

3.2.2 Defra's *Air Quality Plan for Nitrogen Dioxide (NO_2) in UK (2017)* [6] details the government's plan for reducing roadside NO_2 levels and achieving EU limit values. A supplement to the plan was published in October 2018.

3.2.3 The Air Quality (England) Regulations 2000 [7], as amended [8] define air quality 'objectives' for a number of key pollutants. The air quality objectives are set at a range of different levels and averaging times for different pollutants.

3.2.4 The NO_2 and PM objectives are summarised in Table 3.1 overleaf.

3.2.5 The annual mean (long-term) objective applies at locations where individuals might be expected to spend a large majority of their time, for example residential properties. In the case of the hourly mean (short-term), this applies at locations where people might reasonably be expected to spend at least an hour (such as outdoor spaces and leisure areas).

Pollutant	Concentration (µg/m^3)	Measured as	Number of Exceedance in a calendar year
NO_2	40	Annual mean	None
	200	1-hour mean	no more than 18
NO_X	30	Annual Mean	None
PM_{10}	50	24-hour mean	No more than 35
	40	Annual mean	None
$PM_{2.5}$	20	Annual mean	None

TABLE 3.1: SUMMARY OF RELEVENT UK AIR QUALITY OBJECTIVES

3.2.6 The Environment Act 1995 [9] introduced the requirement for local authority management of air quality. Part IV of the Act details the duties of local authorities in carrying out their local air quality management (LAQM) responsibilities.

3.2.7 The UK government published the Environment Act 2021 [10]. The act makes provision of about targets, plans and policies for improving the natural environmental, and the environmental protection about air quality. The act highlights that the Secretary of State must by regulations set a target value for $PM_{2.5}$ annual mean concentrations in ambient air [11].

3.2.8 A new Air Quality Strategy (AQS) for England has been published in April 2023 [12]. The AQS sets out the actions the government expects local authorities to take in support of achieving government long-term air quality goals, including new $PM_{2.5}$ targets values. As summarised in Table 3.2.

Pollutant & Metric	Target	Target Year
$PM_{2.5}$ annual mean concentration	Interim target: 12 µg/m^3	2028
	Legally binding target: 10 µg/m^3	2040
$PM_{2.5}$ population exposure	Interim target: 22% reduction in exposure compared to 2018	2028
	Legally binding target: 35% reduction in exposure compared to 2018	2040

TABLE 3.2: $PM_{2.5}$ UK TARGET VALUES

3.2.9 The Environmental Protection Act 1990 (EPA) [13] deals with statutory nuisance. Nuisance caused by dust is regulated by the statutory nuisance provisions under Part III and is defined in s.79(1)(d) as: "*Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*".

3.2.10 Statutory nuisance is not intended to secure a high level of amenity but rather to act as a basic safeguard on emissions. The perpetrator of any alleged nuisance has a defence of best practicable means (BPM) which provides a basis for balancing the interests of the site and residents.

3.2.11 There are no UK standards or statutory guidance relating to deposited dust and nuisance, although a deposition rate of 200 mg/m^2/day is often used as a threshold for potentially significant nuisance effects.

3.2.12 The Clean Air Act 1993 (CAA) [14] details the legislative requirements for the heights of chimneys and flues where the burn rates exceed certain criteria. For appliances fuelled by gaseous matter the relevant criterion value is 366.4Kw.

3.2.13 The National Planning Policy Framework (NPPF) was first published in 2012 and most recently updated in December 2023 [15]. In relation to air quality Paragraph 192 states:

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

3.2.14 The roles of the planning authority and pollution control authorities are defined in paragraph 194:

"*The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities*."

3.2.15 The National Planning Practice Guidance (NPPG) [16] provides guiding principles on how planning can take into account of the impact of new development on air quality. It includes guidance on:

- air quality considerations for planning;
- plan-making and air quality;
- air quality and neighbourhood planning;
- available information;
- when air quality considerations could be relevant to development planning;

- specific issues when assessing air quality impacts;
- required detail for air quality assessments; and
- mitigating air quality impacts.

3.2.16 The guidance provides a flow chart detailing the process that should be followed in determining an application. It indicates that an application should proceed to decision with appropriate planning conditions or obligations if the proposed development, with mitigation in place, would not lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or fail to comply with the requirements of the Habitats Regulations [17].

3.3 Local Air Quality Policy and Guidance

3.3.1 Under the Local Development Framework (LDF) strategy, local authorities are required to prepare an overarching Core Strategy document. Horsham District's Planning Framework (excluding South Downs National Park) was adopted in 2015 and covers the period up to 2031 [18].

3.3.2 The new Local Plan covering the period from 2019 to 2036 was submitted to the Planning Inspectorate on 26th July 2024 for formal review and aims to deliver the social, economic and environmental needs of Horsham District [19]. HDC's new local plan and since been delayed and in December 2023 HDC approved the Horsham District Local Plan for 2023 to 2040 and recommended that it proceeds to the next stage of preparation with the aim to adopt the local plan in 2025.

3.3.3 The new proposed Local Plan is due to supersede Horsham District's 2015 Local Plan upon final publication. Spatial Objectives 8 and 9 relating to air quality within the proposed Local Plan aim to:

"Identify and preserve the unique landscape character and the contribution that this makes to the setting of rural villages and towns and ensure that new development minimises the impact on the countryside"; and

"safeguard and enhance the environmental quality of the District, ensuring that development brings forward environmental net gains including biodiversity enhancements, and minimises the impact on environmental quality including air, soil, water quality and the risk of flooding".

3.3.4 Policy 26 – Air Quality, of the new proposed Local Plan, states:

"The Council recognises the importance of the management of air quality. Taking into account any relevant Planning Guidance Documents, proposals will be required to:

1. *Take account of The Air Quality and Emissions Mitigation Guidance for Sussex (2019), or any future updates. Major development proposals and proposals within an Air Quality Management Area (AQMA), or in relevant proximity to an AQMA, must be accompanied by an Air Quality Impact Assessment and an Emissions Mitigation Assessment;*

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. *Mitigate the impact on the amenities of users of the site and surrounding land to an appropriate level, where development creates or results in pollution including particulates, dust, smoke, pollutant gases or odour; and*

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

3.3.5 Under the local air quality management regime introduced by the Environment Act 1995 and subsequent regulations, HDC is required to review and assess its air quality at regular intervals. As detailed in the 2023 Air Quality Annual Status Report (ASR) [20], there are currently two Air Quality Management Areas (AQMA) declared in in the district in the village of Cowfold and the town centre of Storrington, in 2011 and 2010, respectively. Both declarations were made on the basis that the annual mean nitrogen dioxide (NO_2) concentrations would not meet the national air quality objective (AQO). Air Quality Action Plans (AQAP) were prepared for both.

3.3.6 The latest revision of the West Sussex County Council's (WSCC) AQAP: *'Breathing Better'* published in January 2020 [21] and updated in September 2023 [22] provides measures for improving air quality in the borough. This document contains proposed actions such as: increasing the uptake of low emission and electric vehicles and the introduction of electric vehicle charging points, identifying and implementing sustainable transport infrastructure and traffic management schemes, exploring behaviour change initiatives and engaging residents and businesses in activities that will benefit local air quality.

3.3.7 WDC, along with several other Sussex local authorities (the 'Sussex Air Quality Partnership'), developed the 'Air quality and emissions mitigation guidance for Sussex' [23] for the assessment of developments. This provides checklists to determine whether a development requires consideration with regard to air quality, and whether a full air quality assessment is required, or just an emissions mitigation assessment. An emissions mitigation assessment involves establishing the likely emissions from a development and calculating an appropriate monetary value to be applied to air quality mitigation measures within the development.

3.4 Non-Statutory Guidance

3.4.1 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have produced a document entitled: *Land-Use Planning & Development Control: Planning for Air Quality* [1] that provides guidance on how to ensure that air quality is properly accounted for in the development control process. This guidance provides advice on describing air quality impacts and assessing their significance.

3.4.2 The Institute of Air Quality Management (IAQM) has published specific *'Guidance on the assessment of dust from demolition and construction'* [24] to provide guidance and good-practice approaches on the assessment and mitigation of dust impacts from demolition and construction site activities. The impacts naturally depend on any incorporated mitigation and the emphasis in these guidelines is on classifying the risk of dust impacts from a site as a basis for the identification of mitigation that is commensurate with such risk.

4. ASSESSMENT METHODOLOGY

4.1 Assessment Approach

4.1.1 This air quality assessment has been produced using the information available and procedures as follows:

i. consultation with HDC to agree and confirm the scope and methodology of the assessment and report;
ii. review HDC's 2024 ASR [20] and Defra's background maps [25] to establish baseline air quality and identify the main pollution sources in the area and compare with the UK air quality objectives;
iii. consider the local environment to identify potentially sensitive receptors, both existing and proposed, that could be affected by changes in air quality as a result of the construction and operation of the proposed development;
iv. assess qualitatively the potential dust and air quality impacts of the construction activities and control measures considered necessary during these activities, in line with IAQM guidance [24];
v. review and use of available traffic data from the transport consultants, Connect Consultants [26];
vi. dispersion modelling using ADMS-Roads to predict the likely concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the development site and nearby sensitive receptors and the effects of the proposed development on air quality from the operation of development in terms of the traffic emissions, including model verification and adjustment in line with Defra LAQM-TG22 guidance [27] and the use of Defra's NO_X:NO_2 calculator (version 8.1) [28];
vii. comparison of the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations with the UK air quality objectives and the EPUK/IAQM significance criteria [1];
viii. calculate the estimated monetary value of damage caused by NO_X and $PM_{2.5}$ from the proposed development in accordance with the 'Air quality and emissions mitigation guidance for Sussex [23]; and
ix. identify and present relevant mitigation options recommended to reduce the potential impacts from the proposed development and, if necessary, to meet relevant planning and environmental requirements.

4.2 Baseline Conditions

4.2.1 Baseline conditions at and around the development site have been established using HDC's 2023 Annual Status Report for 2022 and Defra's background maps.

4.3 Screening Criteria

4.3.1 The assessment follows the procedure as defined in the IAQM/EPUK guidance document for 'Land-use Planning & Development Control: Planning for Air Quality' [1].

4.3.2 The IAQM/EPUK guidance provides criteria for establishing whether a development will require an air quality assessment. Stage 1 criteria are designed to screen out smaller developments and developments where air quality impacts can be considered to have insignificant effects. The criteria are set out in a two-stage approach:

4.3.3 In order to meet the criteria in Stage 1, the development must have:

- 10 or more residential units or a site area of more than 0.5 ha; or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

4.3.4 This must be combined with any of the following:

- more than 10 parking spaces within the development; or
- the development has a centralised energy facility or combustion process.

4.4 Construction Dust Screening

4.4.1 The IAQM document 'Guidance on the assessment of dust from demolition and construction' [24], provides criteria for establishing whether a development will require a construction dust assessment. The guidance indicates that an assessment is required if there is a human receptor within 350 m of the boundary of the site or 50 m of the trackout route (up to 500m from site entrance) or if there is an ecological receptor within 50 m of the boundary of the site or track out routes (up to 500m from site entrance).

4.5 Construction Traffic Screening

4.5.1 The EPUK/IAQM guidance [1] provides criteria for establishing whether a development will require a construction traffic assessment. The guidance indicates that an assessment of traffic emissions is only likely to be required for construction sites that will generate an additional annual average daily traffic (AADT) of greater than 100 HDVs or 500 LDVs outside of an AQMA.

4.6 Operational Traffic Screening

4.6.1 The EPUK/IAQM guidance provides criteria for establishing whether a development will require an operational traffic assessment. The guidance indicates that an assessment of traffic emissions is only likely to be required for development sites that will generate an AADT of greater than 100 HDVs or 500 LDVs outside of an AQMA.

4.7 Operational Energy Plant Screening

4.7.1 The EPUK/IAQM guidance provides criteria for establishing whether a development will require an operational energy plant assessment. The guidance indicates that, typically a detailed modelling assessment of the onsite energy plant is unlikely to be required where the single or combined NO_X emission rate less than 5 mg/s [1]. This is also dependent on the location and height of associated flues.

4.8 Traffic Dispersion Modelling

4.8.1 The ADMS-Roads gaussian dispersion model (version 5.0.1.3) was used to predict NO_2, PM_{10} and $PM_{2.5}$ concentrations at nearby sensitive receptors for the following five scenarios:

- 2022, baseline and verification year;
- 2026, baseline without development;
- 2026, anticipated first year of operation with development;
- 2030, baseline + strategic "North Horsham Development" without development; and
- 2030, baseline + strategic "North Horsham Development" + with development.

4.8.2 The model set-up and key model input parameters are presented in Appendix B.

[1] As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30 kW CHP unit operating at <95mg/Nm^3.

4.8.3 Road link emissions were calculated using the latest EFT (version 12.0.1) [29] emissions dataset.

4.8.4 A representative selection of locations sensitive to potential changes in pollutant concentrations were identified within 200m of the affected road network, in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB) [30] on the likely limits of pollutant dispersion from road sources.

4.8.5 Meteorological data from Charlwood for 2022 were used in the model (Appendix C).

4.8.6 Receptor locations modelled include those that are representative of likely worst-case exposure to pollution from road traffic sources and of the greatest changes in pollution levels as a result of the proposed development.

4.8.7 NO_X contributions from major roads were predicted using the model. NO_2 concentrations were calculated using the derived verification adjustment factor, Defra background maps (base year 2018) and Defra's latest NO_X:NO_2 calculator (version 8.1).

4.8.8 PM_{10} and $PM_{2.5}$ contributions from major roads were predicted using the model and were calculated using the derived verification adjustment factor for NO_2 concentrations mentioned above. The number of exceedances of 24-hour mean PM_{10} were calculated in line with LAQM-TG22 using the following relationship:

No. 24-hour mean exceedances = -18.5 + 0.00145 × annual mean^3 + (206/annual mean).

4.8.9 Model verification for a base year of 2022 was undertaken in line with LAQM-TG22. The calculation of the model verification is presented in Appendix D.

4.8.10 The significance of predicted air quality impacts was determined in accordance with EPUK/IAQM guidance and a summary of the significance criteria is presented in Appendix E.

4.9 Assessment of Residential Suitability

4.9.1 The assessment has considered whether proposals will introduce residential receptors into an existing area of poor air quality. Baseline concentrations have been considered for sensitive receptors introduced by the proposed development and compared against national air quality objectives for NO_2, PM_{10} and $PM_{2.5}$.

4.10 Emissions Mitigation Assessment

4.10.1 Sussex Air Quality Partnership's guidance [23] provides a checklist for establishing whether a development will require an emissions mitigation assessment. The guidance indicates that an assessment is required if the proposed development is categorised as a 'major' development.

5. BASELINE CONDITIONS

5.1 Local Air Quality

5.1.1 HDC conducts air quality monitoring at various locations within the borough as part of its LAQM duties.

5.1.2 Two AQMAs were declared in the district in the village of Cowfold and town centre of Storrington, in 2011 and 2010 respectively, on the basis that the annual mean nitrogen dioxide (NO_2) concentrations would not meet the national air quality objective (AQO). The proposed development is not located within or adjacent to an AQMA.

5.1.3 It can be seen from the 2024 Annual Status Report [20] that from 2018 to 2022, across the continuous and non-automatic monitoring stations within the district, there has been an overall decreasing trend in NO_2 concentrations. Across continuous monitoring stations, PM_{10} and $PM_{2.5}$ concentrations have remained low and relatively stable.

5.2 Automatic Monitoring

5.2.1 The only NO_2 roadside continuous monitoring site is located 3.0 km south of the development at Horsham Park Way. This monitoring location is situated 1.5 m from the kerb of a multilane crossroads which experiences high levels of traffic.

5.2.2 Table 5.1 shows the High Street monitor remained well within the annual mean NO_2 air quality objective (AQO) (annual mean of 40 µg/m^3) in all reported years. There were no exceedances of the NO_2 one-hour mean objective (no more than 18 exceedances of the one-hour mean of 200 µgm^{-3} per calendar year) in all reported years.

Description	X, Y	Distance from site (km)	Type	NO_2 Annual Mean Concentration (µg/m^3)					
				2018	2019	2020	2021	2022	AQO
HO2 - Horsham Park Way	517485, 130590	3.0	Roadside	25.4 (0)	24.4 (0)	18.8 (0)	21.1 (0)	17.7 (0)	**40**

TABLE 5.1: CONTINUOUS MONITORING SITE MEASURED NO_2 CONCENTRATIONS
Note: Exceedances of the annual mean NO_2 AQO are highlighted in **bold**.
Number of exceedances of the hourly mean NO_2 standard are presented in brackets.

5.2.3 PM_{10} is also monitored at the continuous roadside monitoring location detailed above. Table 5.2 below shows that measured PM_{10} concentrations remained well within the annual AQO at the monitoring location in all reported years. There were no exceedances of the PM_{10} 24-hour mean objective (no more than 32 exceedances of the 24-hour mean of 50 µgm^{-3} per calendar year) in all reported years.

Description	X, Y	Distance from site (km)	Type	PM_{10} Annual Mean Concentration (µg/m^3)					
				2018	2019	2020	2021	2022	AQO
HO2 - Horsham Park Way	517485, 130590	3.0	Roadside	19.6 (0)	19.3 (5)	15.7 (0)	17.5 (0)	19.3 (0)	**40**

TABLE 5.2: CONTINUOUS MONITORING SITE MEASURED PM_{10} CONCENTRATIONS
Note: Exceedances of the annual mean PM_{10} AQO are highlighted in **bold**.
Number of daily mean PM_{10} concentrations >50 µg/m^3 are presented in brackets.

5.3 Diffusion Tube Sites

5.3.1 HDC conducts NO_2 monitoring using passive diffusion tubes at a number of locations within the district. The nearest long-term kerbside diffusion tube sites, Home Farm, Langhurstwood Road (23) and Greylands Farm, Langhurstwood Road (24). are located within 100 metres of the proposed development site. The Home Farm diffusion tube site is located 1.9 m from the kerbside and the Greylands site is located 1.0 metre from the roadside.

5.3.2 The nearest long-term urban background site, 69 Hillside, Horsham (3), is located approx. 3.4 km to the southwest of the proposed development site and is 1.5 m from the kerbside of the nearest road.

5.3.3 All monitoring locations are situated close to the kerbside of nearby roads and, as such, are likely to experience higher NO_2 concentrations compared to the development site where properties are located further away from the roadside. Therefore, the development site is likely to have lower NO_2 concentrations.

5.3.4 Monitoring data between 2018 and 2022 are presented in Table 5.3, showing that all reported roadside remained within the NO_2 annual mean AQO.

5.3.5 The local authority guidance LAQM-TG22 [27] states that when the annual mean NO_2 concentration is below 60 µg/m^3, the short term (one-hour) objective for NO_2 is unlikely to be exceeded. Annual mean NO_2 concentrations presented in Table 5.1 and Table 5.3 have been below 60 µg/m^3 for all reported years.

Description	X, Y	Distance from site (km)	Type	NO_2 Annual Mean Concentration (µg/m^3)					
				2018	2019	2020	2021	2022	AQO
23 - Home Farm, Langhurstwood Road	517702, 133570	~0.1	Roadside	21.8	19.3	16.8	17.6	13.9	**40**
24 - Greylands Farm, Langhurstwood Road	517476, 134013	~0.01	Roadside	18.3	17.3	15.8	14.6	14.1	**40**

TABLE 5.3: DIFFUSION TUBE MONITORING ANNUAL MEAN NO_2 CONCENTRATIONS
Notes: Exceedances of the annual mean NO_2 AQO are highlighted in **bold**.
Exceedances of the 60 µg/m^3 NO_2 concentration are highlighted in **bold** and underlined.

5.4 Background Maps

5.4.1 Predicted background pollutant concentrations are available from the Defra website [25] for 1 km^2 grid squares across the UK. Defra predictions of annual background concentrations are within the UK AQOs for NO_2, PM_{10} and $PM_{2.5}$ in 2022, 2026, and 2030.

Pollutant	Range - Annual Mean Concentrations (µg/m^3)		
	2022	2026	2030
NO_2	9.8-11.0	8.5-10.1	7.7-9.6
PM_{10}	14.1-17.1	13.6-16.6	13.6-16.7
$PM_{2.5}$	9.4-11.9	9.0-11.6	9.0-11.6

TABLE 5.4: DEFRA BACKGROUND POLLUTANT CONCENTRATIONS

5.5 Summary of Baseline Conditions

5.5.1 The proposed development site is located at land north of the A264, in a semi-rural setting on the northern outskirts of Horsham. The site, at its closest point, is situated approximately 30 metres to the north of the A264.

5.5.2 Automatic continuous monitoring data from the nearest roadside location to the proposed development remained well within the annual mean AQO between 2018 and 2022 for NO_2 and PM_{10}.

5.5.3 Annual mean NO_2 concentrations measured at the nearest long-term passive roadside diffusion tube monitoring locations remained within the AQO in all reported years, with annual mean NO_2 concentrations decreasing from 2018 to 2022 at all sites. Both roadside diffusion tube sites are located very close to the proposed development site, on the proposed access road, and can therefore be considered representative of the site.

5.5.4 The hourly mean NO_2 objective is not likely to be exceeded at the development site since monitoring in the area is well below 60 µg/m^3.

5.5.5 Defra background annual mean pollutant concentrations predict that NO_2, PM_{10} and $PM_{2.5}$ currently meet the AQO and are expected to decline further in future years.

5.5.6 Overall, baseline data, show that AQOs are currently being met at the proposed development site and are expected to continue to do so.

6. CONSTRUCTION IMPACTS

6.1 Construction Dust Assessment

6.1.1 In line with IAQM guidance [24], an assessment of construction dust is required as there are human receptors within 20 m of the site and 20 m of the construction vehicle route (up to 250m from site entrance). There are no relevant ecological receptors within 50 m of the site or 50 m of the construction vehicle route and on this basis ecological receptors are not considered further in this assessment.

6.1.2 The assessment follows the assessment procedure in the IAQM guidance and has been used to identify appropriate mitigation measures proportionate to the level of risk, to reduce the effects such that they are not significant.

6.1.3 Human health and dust soiling have been assessed and are reported below in Section 6.3.

6.2 Construction Traffic Assessment

6.2.1 There are predicted to be less than 50 no. construction HGV movements to and from the site per day during the construction period. Therefore, the corresponding additional AADT would be below the EPUK/IAQM [1] screening criterion of 100 HGVs outside of an AQMA. Impacts from construction traffic will therefore be negligible and are not considered further in this assessment.

6.3 Magnitude of Dust Emissions

6.3.1 The dust emissions magnitude, area sensitivity and dust risk category were established in accordance the IAQM guidance.

Demolition

6.3.2 The existing site currently comprised a vacant parcel of land, to make way for the development, hence no building demolition activities are required to be assessed.

Earthworks

6.3.3 The total site area to be excavated is expected to be between 18,000m^2 and 110,000 m^2 with a soil type formed of Arun Terrace Deposits (sand and gravel) and Weald Clay Formation (mudstone) [31] with a low to moderate potential for dust release. It is estimated there will be more than 10 heavy earth-moving vehicles on site at one time. The site is considered to have a ‘Large’ dust emission magnitude for earthworks.

Construction

6.3.4 The total building volume to be constructed is expected to be greater than 75,000 m^3. Building materials will primarily consist of brickwork, concrete and timber. It is expected that concrete will be batched on-site. The site is considered to have a ‘Large’ dust emission magnitude for construction.

Trackout

6.3.5 The peak number of heavy-duty vehicle (HDV) outward movements per day is expected to be between 20 and 50. An on-site haul road will be established early on in the programme;

however, the length of the haul road is not yet confirmed. The haul road will be tarmacked and will therefore have a low potential for dust release. The site is considered to have a 'Medium' dust emission magnitude for trackout.

6.3.6 The dust emission magnitudes are summarised below in Table 6.1.

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Medium

TABLE 6.1: DUST EMISSION MAGNITUDE SUMMARY

6.4 Sensitivity of the Area

6.4.1 There are less than 10 receptors with a high sensitivity to dust soiling effects and human health impacts within 20 m of the site boundary and trackout route, as can be seen in Figure A2 and A3 of Appendix A.

6.4.2 The sensitivity of the area to dust soiling is defined as 'Medium' for earthworks, construction and trackout activities, due to the number and proximity of sensitive receptors.

6.4.1 The sensitivity of the area to human health impacts is defined as 'Low' for the earthworks, construction and trackout activities, due to the number and proximity of sensitive receptors and a predicted background annual mean PM_{10} concentration (see Table 5.2) of less than 24 $\mu g/m^3$ in the vicinity of the site.

6.4.2 The sensitivity of the area is summarised in Table 6.2.

Sensitivity of the Area	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium
Human Health	Low	Low	Low

TABLE 6.2: SENSITIVITY OF THE AREA SUMMARY

6.5 Dust Risk

6.5.1 The likely risk of dust effects, based on the contents of Tables 6.1 and 6.2, at nearby sensitive receptors without mitigation in place is summarised in Table 6.3. There is a 'Medium' risk from earthworks, construction and trackout activities causing dust soiling effects at local receptors. There is a 'Low' risk of health effects from earthworks, construction and trackout activities.

Summary	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk

TABLE 6.3: DUST RISK CATEGORY SUMMARY

6.6 Mitigation

6.6.1 Under best-practice guidance, the proposed development constitutes a 'Medium' risk for dust during the construction phase. Based on the results of the dust risk assessment, appropriate best-practice construction dust mitigation measures commensurate to the level of risk have been identified in accordance with the IAQM guidance [24] and are presented in Section 9.

6.7 Dust Effects

6.7.1 With appropriate mitigation in place, any dust effects can be minimised and residual dust effects can be considered to be not significant.

7. OPERATIONAL IMPACTS

7.1 Operational Traffic Assessment

7.1.1 Traffic data provided by the transport consultant, Connect, indicate that the proposed development will result in approximately 1,502 annual average daily traffic (AADT) flows across a typical day during the operation period [26] in 2026. Therefore, a detailed assessment of operational traffic emissions is required as the additional AADT during the operational period would be above the EPUK/IAQM [1] screening criterion of 500 LDVs outside of an AQMA.

7.1.2 Connect confirmed that just 613 of the additional AADT generated by the proposed development in 2026 and 2030 is expected to travel west on the A264 toward Warnham LNR and within 200 metres from this designated site. This is well below the IAQM [32] screening criterion of 1,000 AADT for designated nature conservation sites. The ecology consultant, Ecology Partnership, confirmed that the increased traffic (noted above) is unlikely to reach air pollution limits to have negative impacts upon Warnham LNR. Ecological impacts from operational traffic will be negligible and are therefore not considered further in this assessment.

7.2 Operational Onsite Energy Generation Assessment

7.2.1 A detailed assessment of operational energy plant emissions is not required as solar photovoltaic technology (PV) and singular household boilers are proposed, which do not constitute a centralised energy facility and therefore do not require further assessment.

7.3 Cumulative Effects

7.3.1 Britaniacrest Energy (3 R's) Facility and Brockhurst Wood Mechanical Biological Treatment (MBT) are located to the north of the Pondtail Farm development site. Further large predominantly residential development at Land North of Horsham is also part of HDCs proposals.

7.3.2 An air quality assessment has been prepared as part of an Environmental Statement (ES) in 2018 to support the planning application for the Britaniacrest Facility [33]. The ES contained conservative (worst-case) Process Contributions (PC) and Predicted Environmental Concentrations (PEC)) for cumulative development around Pondtail Farm.

7.3.3 HDC identified NO_2, PM_{10} and $PM_{2.5}$ as the main pollutants of concern, in particular as a result of local vehicle emissions and potential process contributions from Britaniacrest Energy Facility and Brockhurst Wood Mechanical Biological Treatment. NO_2 , PM_{10} and $PM_{2.5}$ are the key pollutant associated with the proposed site at Pondtail Farm. Therefore, NO_2, PM_{10} and $PM_{2.5}$ were assessed as part of the cumulative effects on this report.

7.3.4 The results presented in the 2018 ES show that, during the operational phase of each cumulative development, the short- and long-term NO_2 PEC are predicted to be below all the Environmental Assessment Levels (EAL) and effects are not considered to be significant at all the assessment receptors. The assessment receptors in the 2018 ES included a 3km-by-3km grid with a 30 metres spacing which is considered to be representative of new residential areas at the Pondtail Farm development site.

7.3.5 As part of the air quality assessment of the proposed development at Pondtail Farm, the maximum NO_2, PM_{10} and $PM_{2.5}$ long-term process contributions from the cumulative developments identified above were added to total NO_2, PM_{10}, and $PM_{2.5}$ concentrations in 2026 and 2030 assessment scenarios. This approach is robust and represents the worst-case scenario. The results are presented in the following section.

7.4 Operational Phase- Detailed Assessment

7.4.1 Modelled receptors are listed in Table 7.1 illustrated in Figure A1 of Appendix A.

7.4.2 Modelled receptors include those at the development site and in the vicinity of the development site and local affected road network. The receptors chosen include locations that are representative of likely worst-case exposure.

Receptor ID	Description	Coordinates		Height (m)
		X	Y	
R1	Rookwood Park	515864	131542	1.5
R2	Rookwood Farmhouse	516243	131855	1.5
R3	North Parade	516997	132144	1.5
R4	Warnham Place	516903	133184	1.5
R5	Great Daux	516696	133426	1.5
R6	Bullfinch Close	517412	133386	1.5
R7	Pondtail Drive	517715	133468	1.5
R8	Langhurst Wood -Home Farm	517658	133651	1.5
R9	Langhurst Wood -South Pondtail Farm	517553	133730	1.5
R10	Graylands Farm	517482	134011	1.5
R11	Graylands Lodge	517426	134573	1.5
R12	Old Holbrook	518361	133565	1.5
R13	Haybarn Drive	518261	133454	1.5
R14	Rusper Road-Bailey Close	518724	133270	1.5
R15	Rusper Road-Copse Close	518640	132813	1.5
R16	Rusper Road-Kidmasn Close	518669	132461	1.5
R17	Winterbourne	518937	133319	1.5
R18	Proposed Development -North	517456	133946	1.5
R19	Proposed Development -Northeast	517274	133943	1.5
R20	Proposed Development - East	517460	133883	1.5
R21	Proposed Development -East	517602	133688	1.5
R22	Proposed Development -Southeast	517588	133583	1.5
R23	Proposed Development -Southwest	517302	133605	1.5
R24	Strategic North Horsham 1	517870	133630	1.5
R25	Strategic North Horsham 2	518772	133516	1.5

TABLE 7.1: ASSESSMENT RECEPTORS

7.5 Operational Phase-Results

7.5.1 The long-term modelled annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations for all scenarios are presented in Table 7.2 to Table 7.7. Percentage changes relative to the AQO, between

the 2026 with and without development scenarios, and the 2030 with and without development scenarios (which incorporates the planned North Horsham Infrastructure), were assessed against the EPUK/IAQM impact descriptor matrix as presented in Appendix D.

NO_2

7.5.2 Table 7.2 and Table 7.3 indicate that, at all assessed receptors, modelled annual mean NO_2 concentrations are calculated to be within the annual objective of 40 μgm^{-3} for all scenarios.

7.5.3 The maximum percentage change in NO_2 concentrations from the proposed development is 0.7% and 0.2% at the assessed receptors in 2026 and 2030 respectively. Predicted impacts using IAQM/EPUK criteria are 'Negligible' at all receptors and effects are not significant in both 2026 and 2030 scenarios.

7.5.4 LAQM-TG22 states that, when the annual mean NO_2 concentrations are less than 60 μgm^{-3}, the short-term (one-hour) objective for NO_2, is unlikely to be exceeded. Therefore, all assessment receptors are expected to meet the short-term objective.

PM_{10}

7.5.5 Table 7.4 and Table 7.5 indicate that, at all assessed receptors, modelled annual mean PM_{10} concentrations are expected to be well within the annual objective of 40 μgm^{-3} for scenarios 2026 and 2030.

7.5.6 The maximum percentage change in PM_{10} concentrations from the proposed development is 0.2% at the assessed receptors in 2026 and 0.2% in 2030. Predicted impacts using IAQM/EPUK criteria are 'Negligible' at all receptors and effects are not significant in both 2026 and 2030 scenarios.

7.5.7 Table 7.6 and Table 7.7 indicate that, at all modelled receptors, the number of exceedances of the 24-hour-mean PM_{10} standard are predicted to occur no more than once a year for both 2026 scenarios and 2030 scenarios.

7.5.8 No changes in the number of days that the 24-hour standard is exceeded are predicted between the 2026 with and without development scenarios or the 2030 with and without development scenarios. Therefore, impacts on 24-hour mean PM_{10} will be negligible and the effect will be not significant for all scenarios.

$PM_{2.5}$

7.5.9 Table 7.8 and Table 7.9 indicates that, at all assessed receptors, modelled annual mean $PM_{2.5}$ concentrations are calculated to be well within the annual objective of 20 μgm^{-3} for all scenarios.

7.5.10 The maximum percentage change in $PM_{2.5}$ concentrations from the proposed development is 0.1% at the assessed receptors in 2026 and <0.2% in 2030. Predicted impacts using IAQM/EPUK criteria are 'Negligible' at all receptors and effects are not significant in both 2026 and 2030 scenarios.

Receptor ID	Annual Mean NO_2 Concentration (μgm^{-3})			% Change Relative to AQAL (40 μgm^{-3})	Impact Descriptor
	2022 Baseline	2026 Without Development	2026 With Development		
Existing Receptors					
R1	12.6	11.1	11.2	<0.1	Negligible
R2	11.1	9.9	9.9	<0.1	Negligible
R3	12.5	11.0	11.0	<0.1	Negligible
R4	13.3	12.0	12.1	<0.2	Negligible
R5	12.6	11.3	11.3	0.1	Negligible
R6	12.7	11.3	11.4	0.1	Negligible
R7	12.9	11.5	11.5	0.2	Negligible
R8	12.9	19.6	19.9	0.7	Negligible
R9	11.7	18.4	18.6	<0.4	Negligible
R10	13.3	20.5	20.6	<0.5	Negligible
R11	12.7	19.9	20.0	<0.3	Negligible
R12	13.5	12.0	12.1	<0.3	Negligible
R13	13.8	12.3	12.4	<0.3	Negligible
R14	14.0	12.5	12.6	<0.2	Negligible
R15	13.7	12.5	12.6	<0.2	Negligible
R16	13.9	12.8	12.8	<0.2	Negligible
R17	12.9	11.4	11.5	0.1	Negligible
New Receptors Proposed Development					
R18	-	-	18.0	-	-
R29	-	-	17.7	-	-
R20	-	-	18.1	-	-
R21	-	-	18.9	-	-
R22	-	-	20.4	-	-
R23	-	-	18.5	-	-
New Receptors Strategic North Horsham					
R24	-	-	-	-	-
R25	-	-	-	-	-

TABLE 7.2: 2026 ANNUAL MEAN NO_2 CONCENTRATIONS AT ASSESSMENT RECEPTORS

Receptor ID	Annual Mean NO_2 Concentration (μgm^{-3})			% Change Relative to AQAL (40 μgm^{-3})	Impact Descriptor
	2022 Baseline	2030 Without Development	2030 With Development		
Existing Receptors					
R1	12.6	9.2	9.2	<0.1	Negligible
R2	11.1	8.6	8.6	<0.1	Negligible
R3	12.5	9.1	9.1	<0.1	Negligible
R4	13.3	9.6	9.6	0.1	Negligible
R5	12.6	9.2	9.2	<0.1	Negligible
R6	12.7	9.2	9.2	0.1	Negligible
R7	12.9	9.2	9.2	0.1	Negligible
R8	12.9	17.1	17.1	0.1	Negligible
R9	11.7	16.7	16.7	0.1	Negligible
R10	13.3	18.8	18.9	0.2	Negligible
R11	12.7	18.6	18.6	0.1	Negligible
R12	13.5	9.8	9.8	0.1	Negligible
R13	13.8	9.8	9.8	0.1	Negligible
R14	14.0	10.2	10.2	<0.1	Negligible
R15	13.7	10.4	10.4	0.1	Negligible
R16	13.9	10.5	10.5	0.1	Negligible
R17	12.9	9.6	9.6	<0.1	Negligible
New Receptors Proposed Development					
R18	-	-	16.7	-	-
R29	-	-	16.5	-	-
R20	-	-	16.7	-	-
R21	-	-	16.9	-	-
R22	-	-	17.8	-	-
R23	-	-	16.9	-	-
New Receptors Strategic North Horsham					
R24	-	9.8	9.9	<0.2	Negligible
R25	-	9.8	9.8	<0.1	Negligible

TABLE 7.3: 2030 ANNUAL MEAN NO_2 CONCENTRATIONS AT ASSESSMENT RECEPTORS

Receptor ID	Annual Mean PM_{10} Concentration (μgm^{-3})			% Change Relative to AQAL (40 μgm^{-3})	Impact Descriptor
	2022 Baseline	2026 Without Development	2026 With Development		
Existing Receptors					
R1	14.8	14.3	14.3	<0.1	Negligible
R2	14.3	13.7	13.7	<0.1	Negligible
R3	14.8	14.3	14.3	<0.1	Negligible
R4	15.6	15.0	15.1	<0.1	Negligible
R5	15.7	15.2	15.2	<0.1	Negligible
R6	14.8	14.3	14.3	<0.1	Negligible
R7	14.8	14.3	14.3	<0.1	Negligible
R8	15.0	15.2	15.3	0.2	Negligible
R9	14.7	14.9	14.9	0.1	Negligible
R10	17.9	18.1	18.2	0.2	Negligible
R11	17.7	17.9	18.0	0.1	Negligible
R12	14.8	14.2	14.3	<0.1	Negligible
R13	14.8	14.3	14.3	<0.1	Negligible
R14	15.5	14.9	15.0	<0.1	Negligible
R15	15.8	15.3	15.3	<0.1	Negligible
R16	15.9	15.4	15.4	<0.1	Negligible
R17	14.9	14.3	14.3	<0.1	Negligible
New Receptors Proposed Development					
R18	-	-	14.9	-	-
R29	-	-	14.8	-	-
R20	-	-	14.9	-	-
R21	-	-	15.0	-	-
R22	-	-	15.1	-	-
R23	-	-	14.9	-	-
New Receptors Strategic North Horsham					
R24	-	-	-	-	-
R25	-	-	-	-	-

TABLE 7.4: 2026 ANNUAL MEAN PM_{10} CONCENTRATIONS AT ASSESSMENT RECEPTORS

Receptor ID	Annual Mean PM_{10} concentration (μgm^{-3})			% Change Relative to AQAL (40 μgm^{-3})	Impact Descriptor
	2022 Baseline	2030 Without Development	2030 With Development		
Existing Receptors					
R1	14.8	14.4	14.4	<0.1	Negligible
R2	14.3	13.8	13.8	<0.1	Negligible
R3	14.8	14.3	14.3	<0.1	Negligible
R4	15.6	15.1	15.1	<0.1	Negligible
R5	15.7	15.2	15.2	<0.1	Negligible
R6	14.8	14.3	14.3	<0.1	Negligible
R7	14.8	14.4	14.4	<0.1	Negligible
R8	15.0	15.0	15.0	<0.1	Negligible
R9	14.7	14.8	14.9	<0.1	Negligible
R10	17.9	18.1	18.2	<0.2	Negligible
R11	17.7	18.0	18.0	<0.1	Negligible
R12	14.8	14.3	14.3	<0.1	Negligible
R13	14.8	14.3	14.3	<0.1	Negligible
R14	15.5	15.1	15.2	<0.1	Negligible
R15	15.8	15.5	15.5	<0.1	Negligible
R16	15.9	15.6	15.7	<0.1	Negligible
R17	14.9	14.5	14.5	<0.1	Negligible
New Receptors Proposed Development					
R18	-	-	14.9	-	-
R29	-	-	14.8	-	-
R20	-	-	14.9	-	-
R21	-	-	14.9	-	-
R22	-	-	15.2	-	-
R23	-	-	14.9	-	-
New Receptors Strategic North Horsham					
R24	-	15.0	15.0	0.1	Negligible
R25	-	14.4	14.4	<0.1	Negligible

TABLE 7.5: 2030 ANNUAL MEAN PM_{10} CONCENTRATIONS AT ASSESSMENT RECEPTORS

Receptor ID	Number of Days 24-Hour Mean PM_{10} > 50 µg/m^3			Change in No. of Days
	2022 Baseline	2026 Without Development	2026 With Development	
Existing Receptors				
R1	0	0	0	No change
R2	0	0	0	No change
R3	0	0	0	No change
R4	0	0	0	No change
R5	0	0	0	No change
R6	0	0	0	No change
R7	0	0	0	No change
R8	0	0	0	No change
R9	0	0	0	No change
R10	1	1	1	No change
R11	1	1	1	No change
R12	0	0	0	No change
R13	0	0	0	No change
R14	0	0	0	No change
R15	0	0	0	No change
R16	0	0	0	No change
R17	0	0	0	No change
New Receptors Proposed Development				
R18	-	-	0	-
R29	-	-	0	-
R20	-	-	0	-
R21	-	-	0	-
R22	-	-	0	-
R23	-	-	0	-
New Receptors Strategic North Horsham				
R24	-	-	-	-
R25	-	-	-	-

TABLE 7.6: 2026 NUMBER OF DAYS 24-HOUR MEAN PM_{10} > 50 µg/m^3 AT ASSESSMENT RECEPTORS

Receptor ID	Number of Days 24-Hour Mean PM_{10} > 50 µg/m^3			Change in No. of Days
	2022 Baseline	2030 Without Development	2030 With Development	
Existing Receptors				
R1	0	0	0	No change
R2	0	0	0	No change
R3	0	0	0	No change
R4	0	0	0	No change
R5	0	0	0	No change
R6	0	0	0	No change
R7	0	0	0	No change
R8	0	0	0	No change
R9	0	0	0	No change
R10	1	1	1	No change
R11	1	1	1	No change
R12	0	0	0	No change
R13	0	0	0	No change
R14	0	0	0	No change
R15	0	0	0	No change
R16	0	0	0	No change
R17	0	0	0	No change
New Receptors Proposed Development				
R18	-	-	0	-
R29	-	-	0	-
R20	-	-	0	-
R21	-	-	0	-
R22	-	-	0	-
R23	-	-	0	-
New Receptors Strategic North Horsham				
R24	-	0	0	No change
R25	-	0	0	No change

TABLE 7.7: 2030 NUMBER OF DAYS 24-HOUR MEAN PM_{10} > 50 µg/m^3 AT ASSESSMENT RECEPTORS

Receptor ID	Annual Mean $PM_{2.5}$ concentration (μgm^{-3})			% Change Relative to AQAL (25 μgm^{-3})	Impact Descriptor
	2022 Baseline	2026 Without Development	2026 With Development		
Existing Receptors					
R1	9.7	9.3	9.3	<0.1	Negligible
R2	9.9	9.4	9.4	<0.1	Negligible
R3	9.8	9.3	9.4	<0.1	Negligible
R4	9.8	9.4	9.4	<0.1	Negligible
R5	9.9	9.5	9.5	<0.1	Negligible
R6	9.8	9.4	9.4	<0.1	Negligible
R7	9.8	9.4	9.4	<0.1	Negligible
R8	9.9	9.7	9.8	0.1	Negligible
R9	9.8	9.6	9.6	<0.1	Negligible
R10	12.3	12.2	12.2	<0.1	Negligible
R11	12.3	12.1	12.1	<0.1	Negligible
R12	9.9	9.5	9.5	<0.1	Negligible
R13	10.0	9.5	9.6	<0.1	Negligible
R14	10.3	9.9	9.9	<0.1	Negligible
R15	10.9	10.5	10.5	<0.1	Negligible
R16	10.9	10.5	10.5	<0.1	Negligible
R17	10.0	9.6	9.6	<0.1	Negligible
New Receptors Proposed Development					
R18	-	-	9.6	-	-
R29	-	-	9.5	-	-
R20	-	-	9.6	-	-
R21	-	-	9.7	-	-
R22	-	-	9.7	-	-
R23	-	-	9.6	-	-
New Receptors Strategic North Horsham					
R24	-	-	-	-	-
R25	-	-	-	-	-

TABLE 7.8: 2026 ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS AT ASSESSMENT RECEPTORS

Receptor ID	Annual Mean $PM_{2.5}$ concentration (μgm^{-3})			% Change Relative to AQAL (25 μgm^{-3})	Impact Descriptor
	2022 Baseline	2030 Without Development	2030 With Development		
Existing Receptors					
R1	9.7	9.3	9.3	<0.1	Negligible
R2	9.9	9.5	9.5	<0.1	Negligible
R3	9.8	9.4	9.4	<0.1	Negligible
R4	9.8	9.5	9.5	<0.1	Negligible
R5	9.9	9.5	9.5	<0.1	Negligible
R6	9.8	9.4	9.4	<0.1	Negligible
R7	9.8	9.5	9.5	<0.1	Negligible
R8	9.9	9.7	9.7	<0.1	Negligible
R9	9.8	9.6	9.6	<0.1	Negligible
R10	12.3	12.2	12.3	<0.2	Negligible
R11	12.3	12.1	12.2	0.1	Negligible
R12	9.9	9.6	9.6	<0.1	Negligible
R13	10.0	9.6	9.6	<0.1	Negligible
R14	10.3	10.0	10.0	<0.1	Negligible
R15	10.9	10.6	10.6	<0.1	Negligible
R16	10.9	10.7	10.7	<0.1	Negligible
R17	10.0	9.6	9.6	<0.1	Negligible
New Receptors Proposed Development					
R18	-	-	9.6	-	-
R29	-	-	9.5	-	-
R20	-	-	9.6	-	-
R21	-	-	9.6	-	-
R22	-	-	9.8	-	-
R23	-	-	9.6	-	-
New Receptors Strategic North Horsham					
R24	-	9.8	9.8	0.1	Negligible
R25	-	9.6	9.6	<0.1	Negligible

TABLE 7.9: 2030 ANNUAL MEAN $PM_{2.5}$ CONCENTRATIONS AT ASSESSMENT RECEPTORS

7.6 Cumulative Effects

7.6.1 The assessment above accounts for other emissions sources in the area, through explicitly modelled major roads and background contributions. Predictions for the with and without development scenarios have taken into account cumulative effects from traffic emissions associated with committed developments in the area using relevant growth factors, for scenarios 2026 and 2030 as provided by Connect.

7.6.2 As described in Section 7, the assessment also considers the cumulative effects from number of other sources in the area. This includes the Britaniacrest Energy (3 R's) Facility and the Brockhurst Wood MBT to the north of the proposed site, the Land North of Horsham development, as reported in the 2018 ES prepared for Britaniacrest Energy [30] and has been added to total NO_2, PM_{10}, and $PM_{2.5}$ concentrations for all assessment scenarios to represent worst case scenarios.

7.6.3 Table 7.2 to Table 7.9 show modelled annual mean, NO_2, PM_{10} and $PM_{2.5}$ and daily mean PM_{10} concentrations at all receptors are predicted to have negligible impacts and within the UK air quality objectives for all development scenarios. Therefore, the cumulative effects are expected to be not significant.

8. EMISSIONS MITIGATION ASSESSMENT

8.1.1 In line with Sussex Air Quality Partnership's guidance [23], emissions were calculated using Defra's latest Emission Factor Toolkit (EFT) [29] for the trips to be generated by the proposed development, and the five-year 'damage cost value' was calculated using Defra's latest Damage Cost Appraisal Toolkit [34]. NO_X and $PM_{2.5}$ have been assessed in line with the Sussex guidance.

8.1.2 The trip rate (vehicle trips per day) for the development was provided by Connect [26], as described in Section 7.2 above. Heavy Duty Vehicles (HDVs) are considered to account for 0% of the trip rate based on the transport data provided. The selected area is 'England (not London)' and the selected road type is 'Rural (not London)'. Inputs of speed and link length are selected as per the Sussex guidance.

8.1.3 The length of the appraisal period is five years, starting in 2026 and ending in 2030. The selected pollutant sector is 'Road Transport Rural' for both NO_X and $PM_{2.5}$. The central present value outputs for both pollutants are presented for the appraisal period and are added together to calculate the total five-year damage cost value is presented.

8.1.4 The five-year air quality damage cost of the development was calculated to be £32,952. The calculation of the five-year damage cost is presented below in Table 8.1.

8.1.5 The five-year damage cost represents the minimum sum of money that must be spent on the implementation of practical mitigation measures to aid in off-setting air quality impacts from the development.

Trip Rate for Development (vehicle trips per day)		1,502	
Pollutant		**Annual Emissions (tonnes/year)**	
		NO_x	$PM_{2.5}$
Emissions (tonnes/annum)	2026	0.89463	0.09709
	2027	0.78407	0.09602
	2028	0.68014	0.09517
	2029	0.58406	0.09448
	2030	0.49824	0.09389
2017 IGCB Damage Cost Valuations (£/tonne of emissions)		4,921	31,972
Five-year (Central Present Value) Damage Cost (£)		17,376	15,576
Five-year Damage Cost NO_X + $PM_{2.5}$ (£)		**32,952**	

TABLE 8.1: FIVE-YEAR AIR QUALITY DAMAGE COST CALCULATION

9. MITIGATION AND CONTROL

9.1 Construction Dust

9.1.1 The construction activities associated with the proposed development are predicted to have, at worst, a 'Medium' risk for dust soiling and a 'Low' risk for health effects.

9.1.2 Impacts associated with the proposed development are likely to be in the form of dust generated primarily during construction phase activities. The use of appropriate mitigation measures throughout the construction phase will ensure that impacts are minimised or removed.

9.1.3 Based on the results of the dust risk assessment, it is recommended that the following general best-practice measures (taken from IAQM guidance [24]) be adopted.

Management Category	Mitigation Measure
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 boundaries. This may be the environment manager/engineer or the site manager.
	Display the head or regional office contact information.
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. 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 exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary. (Desirable)
	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.

Management Category	Mitigation Measure
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
	Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
Preparing and maintaining the site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is actives 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 vehicle / machinery and sustainable travel	Ensure all on-road vehicles comply with the relevant Emission requirements and NRMM standards, where applicable.
	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.
	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). (Desirable)
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing). (Desirable)
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable

Management Category	Mitigation Measure
	dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste Management	Avoid bonfires and burning of waste materials.
Measures specific to Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. (Desirable)
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. (Desirable)
	Only remove the cover in small areas during work and not all at once. (Desirable)
Measures specific to Construction	Avoid scabbling (roughening of concrete surfaces) if possible. (Desirable)
	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.
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery. (Desirable)
	For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust. (Desirable)
Measures specific to Construction	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
	Avoid dry sweeping of large areas.
	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
	Record all inspections of haul routes and any subsequent action in a site logbook.

Management Category	Mitigation Measure
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
	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 10 m from receptors where possible.

TABLE 9.1: RECOMMENDED MITIGATION

9.2 Operational

9.2.1 The assessment demonstrates that the operation of the proposed development will have negligible impacts on local air quality and the effects are considered to be not significant. No operational mitigation is therefore required to reduce impacts.

9.2.2 The proposed development will include the provision of electric vehicle charging infrastructure, the usage of solar panels, and bicycle parking facilities. This infrastructure is expected to cover the cost presented in Section 9 of this report.

9.2.3 The proposed development will not introduce new receptors into an area of poor air quality where objectives are breached. Therefore, no additional mitigation is required.

10. CONCLUSIONS

10.1.1 An assessment of the air quality impacts associated with the construction and operational phases of the proposed development is presented in this report.

10.1.2 The baseline assessment indicates that NO_2, PM_{10} and $PM_{2.5}$ AQOs are currently being met in the area around the development site and are expected to continue to be met. The proposed development will, therefore, not introduce new receptors into locations where air quality objectives are not met.

10.1.3 The results of the dust risk assessment indicate that construction activities, at worst, have a medium risk of dust soiling and a low risk of health effects from PM_{10} at nearby receptors without mitigation. These impacts can be minimised through the implementation of appropriate mitigation measures. These have been identified in Section 10 of this report. With mitigation in place, residual dust effects from construction will be minimal and are considered to be not significant.

10.1.4 Air quality impacts from construction and operational traffic are considered to be negligible, due to the expected low number of vehicle movements during the construction and operational phases of the proposed development.

10.1.5 There will be no impacts on local air quality from on-site energy plant as solar photovoltaic technology (PV) and singular household boilers are proposed during the operational phase.

10.1.6 The results of the emissions mitigation assessment show that the five-year air quality damage cost of the development is equal to £32,952. This represents the minimum sum of money to be spent on mitigating adverse air quality impacts from the proposed development.

10.1.7 The proposed development is considered to comply with relevant national, regional and local planning policy and air quality does not present a constraint to the development proposals.

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APPENDIX A: FIGURES

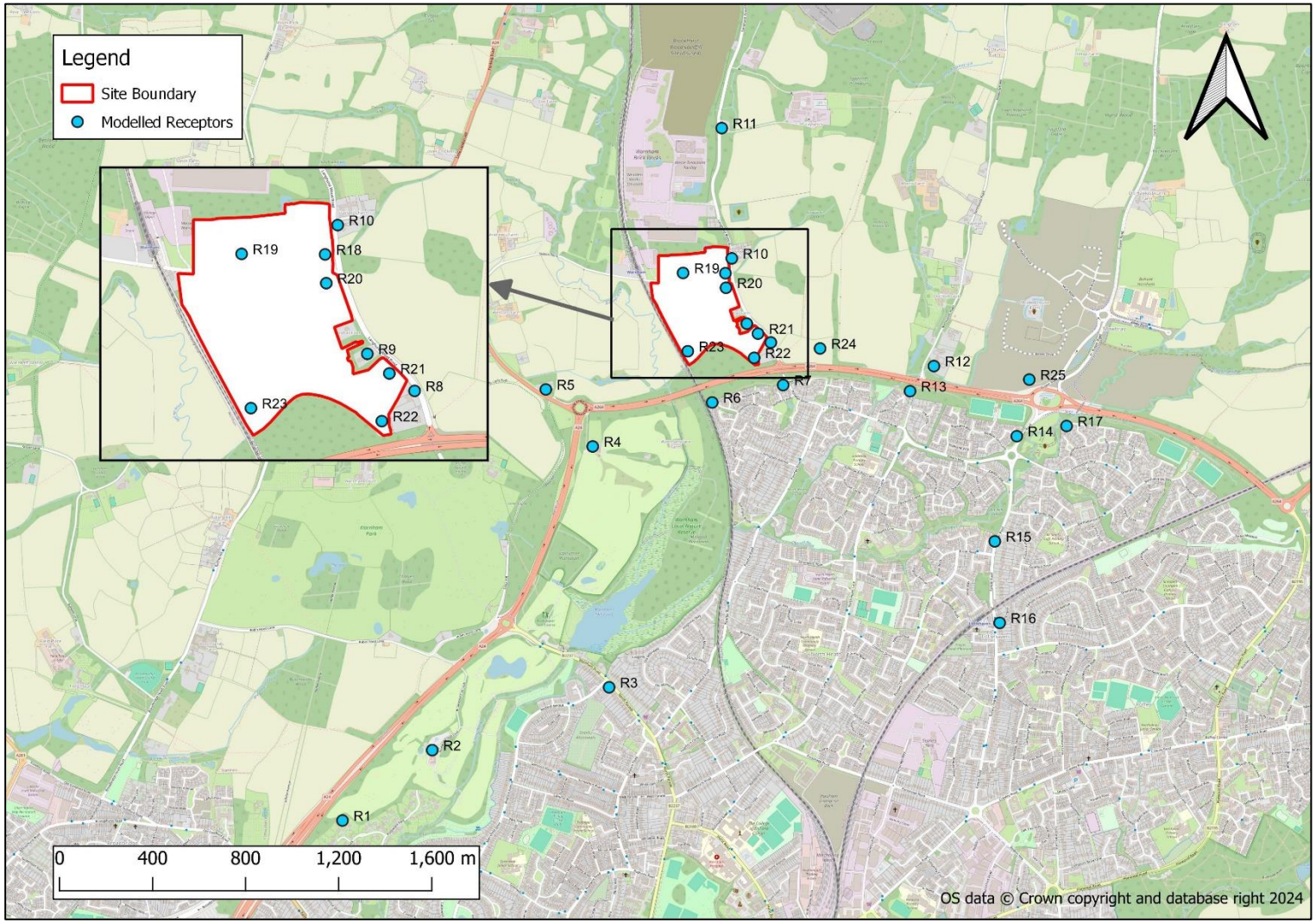


FIGURE A1: SITE LOCATION AND ASSESSMENT RECEPTORS

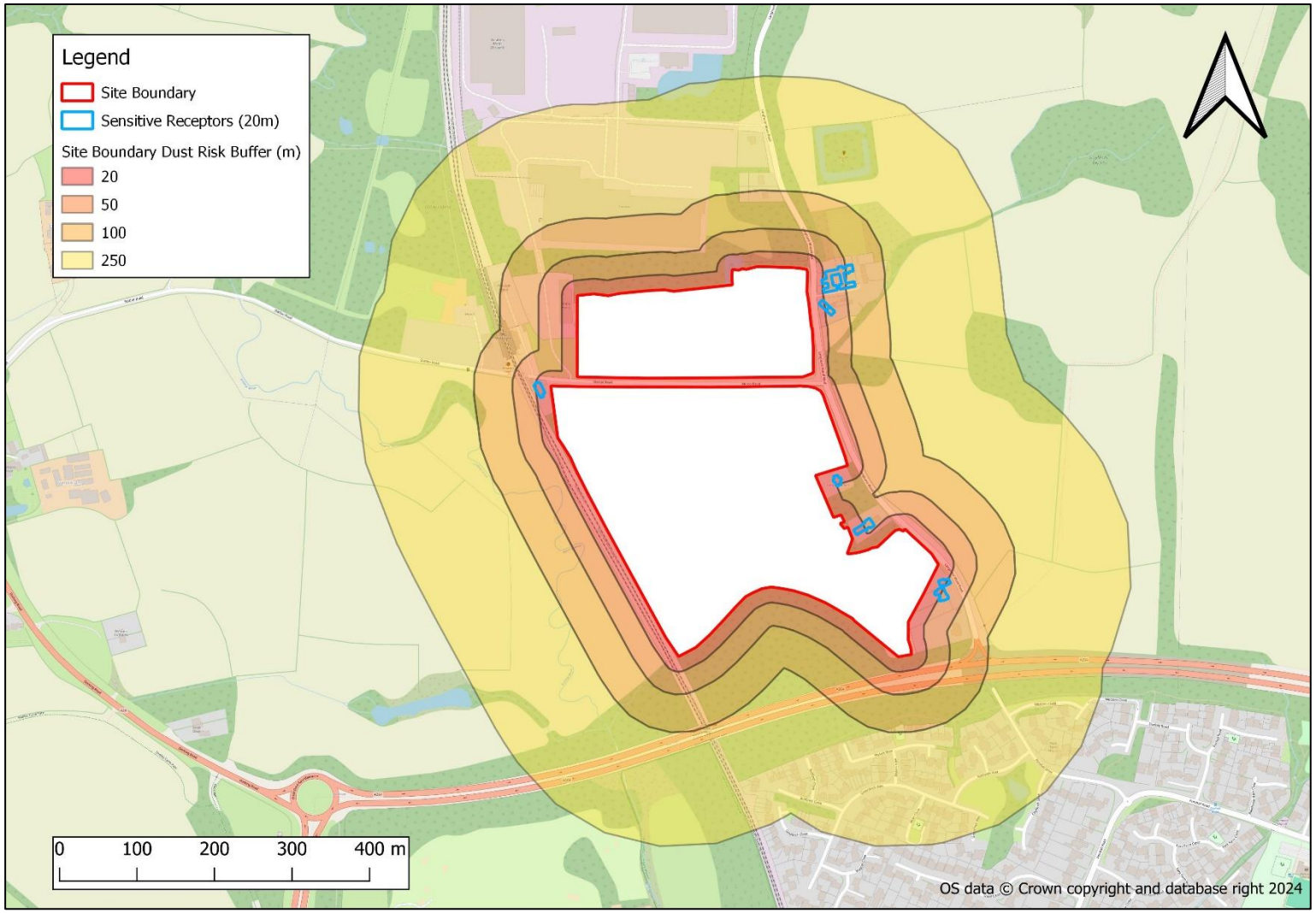


FIGURE A2: SITE BOUNDARY DUST RISK BUFFER AND SENSITIVE DUST RECEPTORS

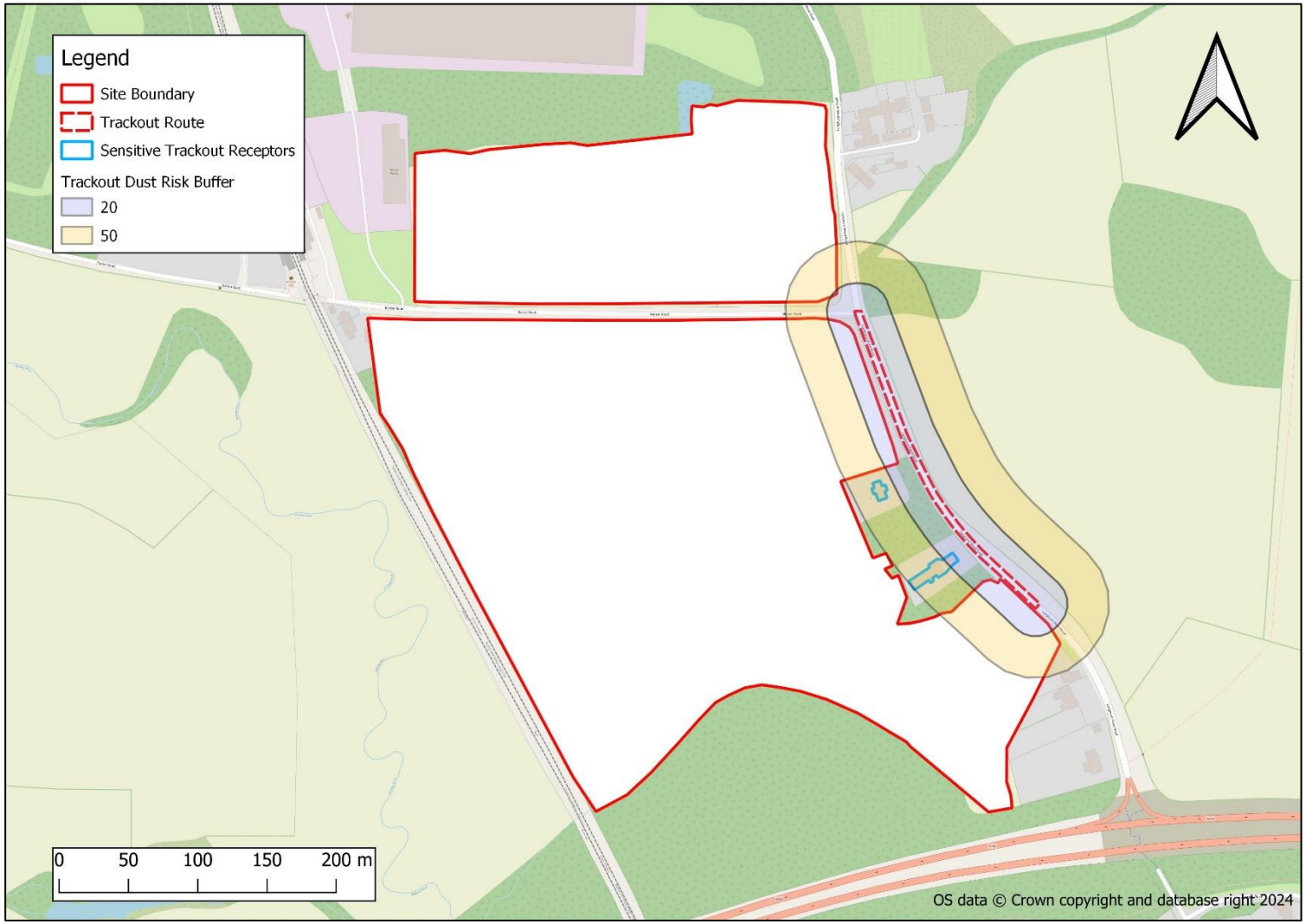


FIGURE A3: TRACKOUT ROUTE DUST RISK BUFFER AND SENSITIVE DUST RECEPTORS

APPENDIX B: MODEL INPUT

Set-up

ADMS-Roads model and ETF parameters used in the assessment are shown in Table B1 below.

Parameter	Verification & Dispersion Site Value	Met. Site Value (Charlwood Met Station 2022)
Latitude (degrees)	51.0	-
Surface roughness length (m)	0.5	0.0759
Minimum Monin-Obukhov length (m)	30	30
Surface Albedo (model default)	0.23	0.23
Priestley-Taylor parameter (model default)	1	1
Precipitation (met site data)	-	-
ETF Emission Year (baseline year)	2022	-
ETF Emission Year (development year)	2026 & 2030	-
EFT Road Type	Rural (not London) Urban (not London)	-
EFT Area	England (not London)	-

TABLE B1: MODEL INPUT PARAMETERS

Road Sources

For verification, major roads within 200 m of the verification sites were modelled explicitly. For all scenarios, major roads at the proposed development site were modelled explicitly. In addition, major road links within at least 200 m of assessed receptors were modelled explicitly.

All other emission sources (including minor roads) were accounted for indirectly through inclusion of background concentrations. Defra background concentrations for each respective scenario year were used in all future scenarios.

The following road links were modelled. Road widths were measured from aerial maps and development drawings. This information is presented in Table B2 below.

Link ID / Description	Modelled Road Elevation (m)	Modelled Road Width (m)	Canyon Height (m)
Link 2.	0	6.0	0
Link 1.	0	6.0	0
Link 4.	0	6.0	0
Link 4.1 north	0	7.0	0
Link 5/17. east	0	7.5	0
Link 6. east	0	7.5	0
6.1 GD RA east	0	7.5	0
6.2 GD RA west	0	7.5	0
Great Daux RA	0	12.0	0
Link 6. west	0	7.5	0
Link 5/17. west	0	7.5	0
Link 19 west	0	7.5	0

Link ID / Description	Modelled Road Elevation (m)	Modelled Road Width (m)	Canyon Height (m)
Link 4.1 south	0	7.0	0
Link 19. east	0	7.5	0
Link 19. Rusper RA east	0	8.5	0
Link 19. Rusper RA west	0	8.5	0
Rusper RA	0	10.0	0
Link 20.	0	6.5	0
Link 20. Rusper RA north	0	6.0	0
Link 20. Rusper RA south	0	6.0	0
Link 21. east	0	7.5	0
Link 21. west	0	7.5	0
Link 21. Rusper RA east	0	7.5	0
Link 21. Rusper RA west	0	9.5	0
Link 21. Moorhead RA east	0	8.5	0
Link 21. Moorhead RA west	0	7.5	0
Moorhead RA	0	11.5	0
Link 23. North	0	7.5	0
Link 23. South	0	7.5	0
Link 23. Moorhead RA north	0	7.5	0
Link 23. Moorhead RA south	0	9.5	0
Link 24.	0	8.5	0
Link 24. Moorhead RA south	0	6.0	0
Link 24. Moorhead RA north	0	8.0	0
Link 7.	0	7.5	0
Link 7. GD RA east	0	8.5	0
Link 7. GD RA west	0	7.0	0
Link 22. Rusper RA north	0	9.5	0
Link 22. Rusper RA south	0	6.5	0
Link 22. north	0	7.5	0
Rusper RA Small	0	9.0	0
Link 22. Rusper RA S up north	0	6.5	0
Link 22. Rusper RA S down nor	0	8.0	0
Link 22. south	0	7.5	0
Link 22. Rusper RA S up south	0	7.5	0
Link 22. Rusper RA S down sou	0	7.0	0
Link 8. GD RA north	0	9.0	0
Link 8. GD RA south	0	8.0	0
Link 8. north	0	8.5	0
Link 8. south	0	8.6	0
Robin Hood RA	0	12.0	0
Link 8. RH RA north	0	10.0	0
Link 8. RH RA south	0	10.5	0
Link 10. RH RA south	0	9.5	0

Link ID / Description	Modelled Road Elevation (m)	Modelled Road Width (m)	Canyon Height (m)
Link 10. RH RA north	0	7.5	0
Link 10. north	0	7.5	0
Link 10. south	0	7.5	0
Link 9. RH RA east	0	5.5	0
Link 9. RH RA west	0	8.0	0
Link 9. east	0	7.5	0
Link1.1	0	6.0	0
Link 9. west	0	7.5	0
New Small RA	0	6.0	0
Link 3. small RA east	0	6.0	0
Link 3. small RA west	0	6.0	0
Link 3.	0	6.0	0
Link 3. split north	0	6.0	0
Link 3. split south	0	6.0	0
New Large RA	0	10.0	0
Link 3 large RA north	0	6.0	0
Link 3 large RA south	0	6.0	0
Link 5. large RA east	0	7.5	0
Link 5. large RA west	0	7.5	0
Link 17. large RA east	0	7.5	0
Link 17. large RA west	0	7.5	0
Link 1. small RA east	0	6.0	0
Link 1. small RA west	0	6.0	0
Link 2. small RA north	0	6.0	0
Link 2. small RA south	0	6.0	0
Link 4. small RA north	0	6.0	0
Link 4. small round south	0	6.0	0

TABLE B2: MODELLED ROAD LINKS

Traffic Data

Road traffic data for 2022, 2026 and 2030, including AADT flows, average speeds and HGV % were provided by the transport consultant, Connect. Where required (e.g. road junctions), average speeds were adjusted within the model in line with LAQM-TG22. Traffic growth factors were applied to the 2022 baseline AADT traffic flows by Connect to calculate 2026 and 2030 scenarios. Road traffic from committed developments were accounted for within the provided traffic datasets for 2026 and 2030.

Road links modelled explicitly and their associated traffic data are presented in Table B3 overleaf.

Time Varying Emission Factors

Hourly time varying emission factors were entered into the model using a '.fac' file to ensure that diurnal variation of the local traffic was taken into account. Time varying emission factors used are

based on national 2022 traffic flow data. The dataset was acquired from the Department of Transport: Road Traffic Statistics database.

Link ID	2022 Baseline		2026 Without Development		2026 With Development		2030 With Development		2030 With Development		Vehicle Speed (km/h)
	AADT	HGV %	AADT	HGV %	AADT	HGV%	AADT	HGV%	AADT	HGV%	
Link 2.	3,668	7.5	3,767	7.5	4,074	7.0	3,706	7.5	4,012	7.0	64
Link 1.	125	4.2	129	4.2	1,630	0.3	127	4.2	1,628	0.3	64
Link 4. [i]	3,788	7.6	3,890	7.6	5,261	5.6	-	-	-	-	64
Link 4.1 north [i]	1,894	7.6	1,945	7.6	2,631	5.6	-	-	-	-	54
Link 5/17. east	17,050	3.7	17,509	3.7	18,200	3.6	16,926	3.6	17,233	3.6	113
Link 6. east	17,034	3.6	17,493	3.6	17,800	3.5	16,926	3.6	17,233	3.6	113
6.1 GD RA east	17,034	3.6	17,493	3.6	17,800	3.5	16,926	3.6	17,233	3.6	80
6.2 GD RA west	17,034	3.6	17,493	3.6	17,800	3.5	16,926	3.6	17,233	3.6	80
Great Daux RA	27,195	3.2	27,928	3.2	28,336	3.2	29,425	3.0	29,834	2.9	48
Link 6. west	17,034	3.6	17,493	3.6	17,800	3.5	16,926	3.6	17,233	3.6	113
Link 5/17. west	17,050	3.7	17,509	3.7	18,200	3.6	16,926	3.6	17,233	3.6	113
Link 19 west	16,747	3.9	17,199	3.9	17,733	3.8	20,149	3.1	20,528	3.1	113
Link 4.1 south [i]	1,894	7.6	1,945	7.6	2,631	5.6	-	-	-	-	54
Link 19. east	16,747	3.9	17,199	3.9	17,733	3.8	20,149	3.1	20,528	3.1	113
Link 19. Rusper RA east	16,747	3.9	17,199	3.9	17,733	3.8	20,149	3.1	20,528	3.1	80
Link 19. Rusper RA west	16,747	3.9	17,199	3.9	17,733	3.8	20,149	3.1	20,528	3.1	80
Rusper RA	22,666	3.0	23,277	3.0	23,734	2.9	29,563	2.3	29,942	2.3	48
Link 20.	8,730	1.3	8,965	1.3	8,998	1.3	18,103	0.6	18,136	0.6	64
Link 20. Rusper RA north	4,365	1.3	4,483	1.3	4,499	1.3	9,051	0.6	9,068	0.6	54
Link 20. Rusper RA south	4,365	1.3	4,483	1.3	4,499	1.3	9,051	0.6	9,068	0.6	54
Link 21. east	16,914	3.6	17,370	3.6	17,636	3.5	20,966	2.9	21,232	2.9	113

Link ID	2022 Baseline		2026 Without Development		2026 With Development		2030 With Development		2030 With Development		Vehicle Speed (km/h)
	AADT	HGV %	AADT	HGV %	AADT	HGV%	AADT	HGV%	AADT	HGV%	
Link 21. west	16,914	3.6	17,370	3.6	17,636	3.5	20,966	2.9	21,232	2.9	113
Link 21. Rusper RA east	16,914	3.6	17,370	3.6	17,636	3.5	20,966	2.9	21,232	2.9	80
Link 21. Rusper RA west	16,914	3.6	17,370	3.6	17,636	3.5	20,966	2.9	21,232	2.9	80
Link 21. Moorhead RA east	16,914	3.6	17,370	3.6	17,636	3.5	20,966	2.9	21,232	2.9	80
Link 21. Moorhead RA west	16,914	3.6	17,370	3.6	17,636	3.5	20,966	2.9	21,232	2.9	80
Moorhead RA	29,138	3.6	29,923	3.6	30,277	3.5	34,319	3.1	34,673	3.0	48
Link 23. North	19,448	3.8	19,972	3.8	20,154	3.7	22,307	3.3	22,489	3.3	113
Link 23. South	19,448	3.8	19,972	3.8	20,154	3.7	22,307	3.3	22,489	3.3	113
Link 23. Moorhead RA north	19,448	3.8	19,972	3.8	20,154	3.7	22,307	3.3	22,489	3.3	80
Link 23. Moorhead RA south	19,448	3.8	19,972	3.8	20,154	3.7	22,307	3.3	22,489	3.3	80
Link 24.	14,689	3.1	15,085	3.1	15,251	3.0	16,412	2.8	16,578	2.7	64
Link 24. Moorhead RA south	7,344	3.1	7,542	3.1	7,625	3.0	8,206	2.8	8,289	2.7	54
Link 24. Moorhead RA north	7,344	3.1	7,542	3.1	7,625	3.0	8,206	2.8	8,289	2.7	54
Link 7.	15,555	2.0	15,974	2.0	15,999	2.0	17,660	1.8	17,685	1.8	80
Link 7. GD RA east	7,778	2.0	7,987	2.0	7,999	2.0	8,830	1.8	8,842	1.8	70
Link 7. GD RA west	7,778	2.0	7,987	2.0	7,999	2.0	8,830	1.8	8,842	1.8	70
Link 22. Rusper RA north	7,305	0.7	7,502	0.7	7,599	0.7	8,960	0.6	9,056	0.6	48
Link 22. Rusper RA south	7,305	0.7	7,502	0.7	7,599	0.7	8,960	0.6	9,056	0.6	48
Link 22. north	14,611	0.7	15,004	0.7	15,197	0.7	17,920	0.6	18,113	0.6	48
Rusper RA Small	14,611	0.7	15,004	0.7	15,197	0.7	17,920	0.6	18,113	0.6	32
Link 22. Rusper RA S up north	7,305	0.7	7,502	0.7	7,599	0.7	8,960	0.6	9,056	0.6	38

Link ID	2022 Baseline		2026 Without Development		2026 With Development		2030 With Development		2030 With Development		Vehicle Speed (km/h)
	AADT	HGV %	AADT	HGV %	AADT	HGV%	AADT	HGV%	AADT	HGV%	
Link 22. Rusper RA S down north	7,305	0.7	7,502	0.7	7,599	0.7	8,960	0.6	9,056	0.6	38
Link 22. south	14,611	0.7	15,004	0.7	15,197	0.7	17,920	0.6	18,113	0.6	48
Link 22. Rusper RA S up south	7,305	0.7	7,502	0.7	7,599	0.7	8,960	0.6	9,056	0.6	38
Link 22. Rusper RA S down south	7,305	0.7	7,502	0.7	7,599	0.7	8,960	0.6	9,056	0.6	38
Link 8. GD RA north	15,980	3.4	16,411	3.4	16,705	3.3	18,382	3.0	18,676	2.9	80
Link 8. GD RA south	15,980	3.4	16,411	3.4	16,705	3.3	18,382	3.0	18,676	2.9	80
Link 8. north	15,980	3.4	16,411	3.4	16,705	3.3	18,382	3.0	18,676	2.9	113
Link 8. south	15,980	3.4	16,411	3.4	16,705	3.3	18,382	3.0	18,676	2.9	113
Robin Hood RA	26,908	2.9	27,633	2.9	28,025	2.8	29,637	2.7	30,029	2.7	30
Link 8. RH RA north	15,980	3.4	16,411	3.4	16,705	3.3	18,382	3.0	18,676	2.9	80
Link 8. RH RA south	15,980	3.4	16,411	3.4	16,705	3.3	18,382	3.0	18,676	2.9	80
Link 10. RH RA south	18,135	3.1	18,624	3.1	18,803	3.1	19,763	3.1	19,942	3.1	80
Link 10. RH RA north	18,135	3.1	18,624	3.1	18,803	3.1	19,763	3.1	19,942	3.1	80
Link 10. north	18,135	3.1	18,624	3.1	18,803	3.1	19,763	3.1	19,942	3.1	113
Link 10. south	18,135	3.1	18,624	3.1	18,803	3.1	19,763	3.1	19,942	3.1	113
Link 9. RH RA east	6,246	0.9	6,414	0.9	6,530	0.9	6,310	0.9	6,425	0.9	72
Link 9. RH RA west	6,246	0.9	6,414	0.9	6,530	0.9	6,310	0.9	6,425	0.9	72
Link 9. east	12,492	0.9	12,829	0.9	13,060	0.9	12,620	0.9	12,851	0.9	48
Link1.1 [i]	125	4.2	129	4.2	1,630	0.3	-	-	-	-	44
Link 9. west	12,492	0.9	12,829	0.9	13,060	0.9	12,620	0.9	12,851	0.9	97

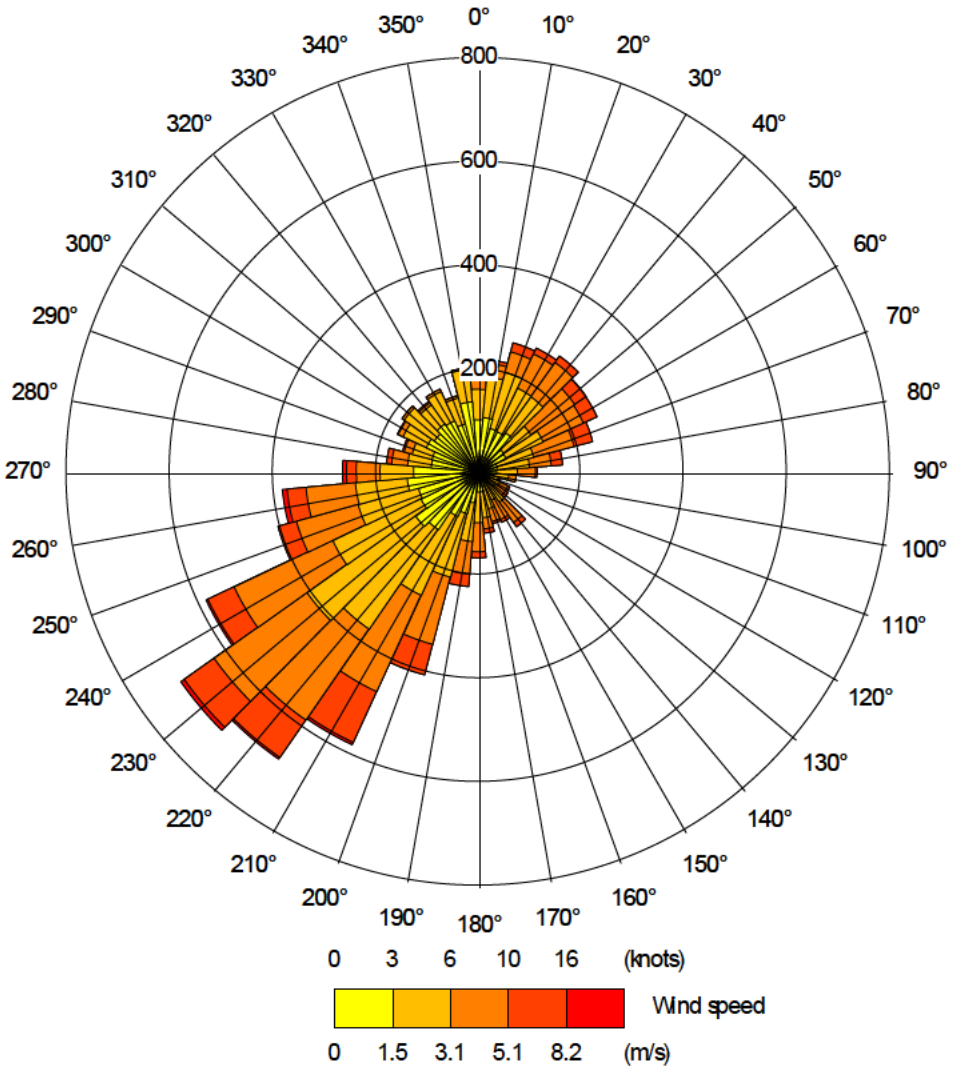
Link ID	2022 Baseline		2026 Without Development		2026 With Development		2030 With Development		2030 With Development		Vehicle Speed (km/h)
	AADT	HGV %	AADT	HGV %	AADT	HGV%	AADT	HGV%	AADT	HGV%	
New Small RA	-	-	-	-	-	-	2,544	7.5	3,604	5.3	32
Link 3. small RA east	-	-	-	-	-	-	1,900	7.5	2,586	5.5	54
Link 3. small RA west	-	-	-	-	-	-	1,900	7.5	2,586	5.5	54
Link 3.	-	-	-	-	-	-	3,801	7	5,172	5.5	64
Link 3. split north	-	-	-	-	-	-	1,900	7.5	2,586	5.5	64
Link 3. split south	-	-	-	-	-	-	1,900	7.5	2,586	5.5	64
New Large RA	-	-	-	-	-	-	23,835	3.8	24,701	3.7	48
Link 3 large RA north	-	-	-	-	-	-	1,900	7.5	2,586	5.5	54
Link 3 large RA south	-	-	-	-	-	-	1,900	7.5	2,586	5.5	54
Link 5. large RA east	-	-	-	-	-	-	16,926	3.6	17,233	3.6	80
Link 5. large RA west	-	-	-	-	-	-	16,926	3.6	17,233	3.6	80
Link 17. large RA east	-	-	-	-	-	-	16,926	3.6	17,233	3.6	80
Link 17. large RA west	-	-	-	-	-	-	16,926	3.6	17,233	3.6	80
Link 1. small RA east	-	-	-	-	-	-	63	4.2	814	0.3	54
Link 1. small RA west	-	-	-	-	-	-	63	4.2	814	0.3	54
Link 2. small RA north	-	-	-	-	-	-	1,853	7.5	2,006	7.0	54
Link 2. small RA south	-	-	-	-	-	-	1,853	7.5	2,006	7.0	54

TABLE B3: TRAFFIC DATA USED IN THE ASSESSMENT

Note: [i] Link IDs not modelled in 2030 scenarios following implementation of strategic development of North Horsham infrastructure.

APPENDIX C: WIND ROSE

WindRose Charlwood 2022



APPENDIX D: MODEL VERIFICATION

Model verification for NO_2 has been conducted using three diffusion tube sites run by Horsham District Council (HDC). The monitored road contribution NOx was calculated using Defra's latest NO_X to NO_2 calculator (version 8.1).

Diffusion tube location NO_2 data were taken from HDC's 2023 Air Quality ASR. Details are listed in Table D1 below.

Verification ID	X, Y Co-ordinates	Height Above Ground (m)	Distance to nearest Kerb (m)	Monitored NO_2 2022 (ugm^{-3})
23 - N. Horsham 1N	517702, 133570	2.4	1.9	13.9
24 - N. Horsham 2N	517476, 134013	2.8	1.0	14.1
9 - Horsham 6	518650, 132490	2.6	1.5	17.6
10 - Horsham 7	516952, 132215	2.2	2.0	18.9

TABLE D1: DIFFUSION TUBE DATA USED FOR MODEL VERIFICATION

Relevant Defra backgrounds for 2022 according to location were used in the model verification.

The same verification model set-up was used for the 2022, 2026 and 2030 scenarios.

Traffic Data

Roads modelled explicitly and their associated traffic data used in the model verification are presented in Table B3 of Appendix B.

Modelled road contributions to NO_X were compared to monitored road contributions to NO_X. Monitored road NO_X contributions were calculated with Defra's NO_X to NO_2 calculator. Initial verification results are shown in Table D2 below. This shows that the model under-estimated road NO_x contributions at the verification sites, though overall the model predicted concentrations accurately.

Site ID	Background NO_2 (μgm^{-3})	Background NO_x (μgm^{-3})	Monitored Total NO_2 (μgm^{-3})	Monitored NO_2 Road Contribution (μgm^{-3})	Monitored NO_X Road Contribution (μgm^{-3})	Modelled NO_X Road Contribution (μgm^{-3})	Ratio of Monitored Road Contribution NOx: Modelled Road Contribution NOx
~~23 - N. Horsham 1N~~	~~10.2~~	~~13.4~~	~~13.9~~	~~3.6~~	~~6.7~~	~~12.9~~	~~0.5~~
24 - N. Horsham 2N	10.2	13.4	14.1	3.9	7.1	3.6	2.0
9 - Horsham 6	10.1	13.3	17.6	7.5	13.9	9.6	1.5
10 - Horsham 7	10.4	13.7	18.9	8.5	15.8	8.7	1.8

TABLE D2: COMPARISON OF MONITORED AND MODELLED NO_X AND NO_2 DATA

As the results were not within 25% of the monitored concentrations, it was necessary to correct the model for under prediction. A NO_x adjustment factor of 1.6 was applied to all modelled road NO_x concentrations. Table D2 shows site ID 23 North Horsham 1N overpredicting NO_X modelling concentrations.

Defra's NO_X:NO_2 calculator was used to derive modelled NO_2 concentrations, using adjusted modelled road NO_X and background NO_2 concentrations. Following adjustment, modelled total NO_2 concentrations were compared against monitored total NO_2 and found to be within -/+ 6%. The results of further calculations undertaken are shown in Table D3 below.

Site ID	**Monitored Total NO_2 (μgm^{-3})**	**Monitored NO_X Road Contribution (μgm^{-3})**	**Adjusted Modelled NO_X Road Contribution (μgm^{-3})**	**Adjusted Modelled Total NO_2 (μgm^{-3})**	**% Difference (modelled – monitored)**
24 - N. Horsham 2N	14.1	3.9	5.9	13.5	-4.5
9 - Horsham 6	17.6	7.5	15.7	18.5	5.3
10 - Horsham 7	18.9	8.5	14.3	18.1	-4.1

TABLE D3: COMPARISON OF ADJUSTED MODELLED NO_X AND NO_2 DATA

The same NO_X adjustment factor was applied to all modelled road contributions. Representative PM_{10} and $PM_{2.5}$ monitoring data for model verification was unavailable in the area. Therefore, the same NOx adjustment factor was applied to PM_{10} and $PM_{2.5}$ road contributions following guidance available in Defra LAQM TG-22.

APPENDIX E: IAQM SIGNIFICANCE CRITERIA

Impact descriptors for individual existing receptors is presented in Table E1 below. This is based on the IAQM guidance for new development [1].

Annual mean concentrations at receptors in the assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Explanation

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

2. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

3. The Table is only designed to be used with annual mean concentrations.

4. Descriptors for individual receptors only; the overall significance is determined using professional judgement (see Chapter 7 [1] *). For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.*

5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.

6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

TABLE E1: IAQM SIGNIFICANCE CRITERIA