

ENVIRONMENT

Richborough Estates Limited
Land off Basingstoke Road
Spencers Wood
Air Quality Assessment

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Spencers Wood
Air Quality Assessment

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February 2026

DOCUMENT ISSUE RECORD

Document Number:	SWW-BWB-XX-ZZ-LA-RP-001_AQA
BWB Reference:	233424-01-AQA

Revision	Date of Issue	Status	Author:	Checked:	Approved:
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EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough Estates Limited to undertake an air quality assessment for a mixed-use development at land off Basingstoke Road, Spencers Wood.

The Site is located within the administrative area of Wokingham Borough Council. The Site is not within an existing Air Quality Management Area, however the Wokingham Air Quality Management Area and Reading Air Quality Management Area, are both located approximately 2km north of the Site which were declared for potential exceedances of the current annual mean nitrogen dioxide air quality objective for England.

A qualitative construction phase dust assessment was undertaken in accordance with Institute of Air Quality Management guidance and measures were recommended to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions was considered to be 'not significant' in accordance with Institute of Air Quality Management guidance.

A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of nitrogen dioxide and particulate matter (PM₁₀ and PM_{2.5}) were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance and Institute of Air Quality Management & Environmental Policy Implementation Community (previously Environmental Protection UK) guidance. The development was not predicted to result in any exceedances of the current relevant air quality objectives and the impact of the development with regard to these objectives was predicted to be 'negligible' in accordance with guidance.

Concentrations of oxides of nitrogen, ammonia, and nitrogen and acid deposition were also predicted across the The Thames Valley Special Protection Area, and the Bramshill and Hazeley Heath Sites of Special Scientific Interest. The results were passed onto the project ecologist to further assess the significance of the impacts.

Pollutant concentrations were also predicted across the Site and the suitability of the Site for the proposed mixed use was considered with regard to the current relevant air quality objectives. Pollutant concentrations were predicted to be below the current relevant air quality objectives and the Site was therefore considered suitable for the proposed use with regard to these objectives.

Based on the assessment results, the impact of the proposed development with regards to the current relevant air quality objectives was considered to be not significant. No further mitigation is required but measures included in the development that may be considered beneficial to air quality include contributing to the My Journey travel planning initiative, Air Source Heat Pumps and Electric Vehicle charging points.

CONTENTS

EXECUTIVE SUMMARY	iii
1. INTRODUCTION.....	1-6
Site Setting	1-6
Proposed Development	1-6
2. LEGISLATION, PLANNING POLICY & GUIDANCE.....	2-9
National Legislation and Planning Policy	2-9
Local Planning Policy	2-9
Air Quality Assessment Guidance	2-10
3. METHODOLOGY	3-11
Consultation with Wokingham Borough Council.....	3-11
Construction Phase Dust Assessment	3-11
Operational Phase Road Traffic Emissions – Detailed Assessment	3-12
4. BASELINE CONDITIONS	4-25
Local Air Quality Management	4-25
Local Air Quality Monitoring	4-25
Background Pollutant Concentrations	4-26
5. CONSTRUCTION PHASE DUST ASSESSMENT.....	5-29
Step 1: Screen the Need for a Detailed Assessment.....	5-29
Step 2: Assess the Risk of Dust Impacts.....	5-29
6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT.....	6-38
Baseline Assessment	6-38
Impact Assessment.....	6-39
Site Suitability Assessment	6-60
Development Measures	6-61
Defra PM _{2.5} Targets: Interim Planning Guidance	6-65
7. CONCLUSION	7-66
National Legislation and Planning Policy	7-72
Local Planning Policy	7-75

FIGURES

Figure 1.1: Site Location

Figure 3.1: Existing Receptor Locations

Figure 5.1: Construction Phase Assessment Dust Distance Buffers

Figure 6.1: Predicted Annual Mean NO₂ Concentrations Across the Site

Figure 6.2: Predicted Annual Mean PM₁₀ Concentrations Across the Site

Figure 6.3: Predicted Annual Mean PM_{2.5} Concentrations Across the Site

TABLES

Table 3.1: Model Inputs Used in the Assessment
Table 3.2: Existing Human Sensitive Receptor Locations
Table 3.3: Air Quality Standards and Objectives (England)
Table 3.4: Impact Descriptors for Individual Receptors
Table 4.1: WBC NO₂ Monitoring Data in 2017 – 2023
Table 4.2: Background Pollutant Concentrations used in the Assessment
Table 5.1: Dust Emission Magnitude Criteria and Definition
Table 5.2: Summary of Project Defined Dust Emission Magnitudes
Table 5.3: Determination of the Sensitivity of the Area
Table 5.4: Summary Dust Risk Table to Define Site Specific Risk
Table 5.5: Mitigation Measures for a High Risk Site
Table 5.6: Mitigation Measures Specific to Demolition, Earthworks, Construction and Trackout
Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2024 Base Year and Scenario 3: 2026 Opening Year Without Development at Existing Receptor Locations
Table 6.2: Predicted Annual Mean NO₂ Concentrations and Development Impact at Existing Receptor Locations
Table 6.3: Predicted Annual Mean PM₁₀ Concentrations and Development Impact at Existing Receptor Locations
Table 6.4: Predicted Annual Mean PM_{2.5} Concentrations and Development Impact at Existing Receptor Locations

APPENDICES

APPENDIX A: GLOSSARY OF TERMS
APPENDIX B: PROPOSED DEVELOPMENT FRAMEWORK PLAN
APPENDIX C: PLANNING POLICY AND LEGISLATION
APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT
APPENDIX E: WIND ROSE FOR 2022 FOR FARNBOROUGH METEOROLOGICAL RECORDING STATION
APPENDIX F: MODEL VERIFICATION

1. INTRODUCTION

- 1.1 BWB Consulting Limited (BWB) was instructed by Richborough Estates Limited (the Client) to undertake an air quality assessment to support an outline planning application for a proposed mixed-use development at land off Basingstoke Road, Spencers Wood ('the Site').
- 1.2 The assessment considers construction phase dust impacts and operational phase road traffic emissions. A qualitative construction phase dust assessment was undertaken in accordance with relevant guidance. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified receptor locations, including human and ecological receptors. In addition, pollutant concentrations were predicted across the Site to determine the suitability of the Site for the proposed end use with regard to the current relevant air quality objectives.
- 1.3 This report is necessarily technical in nature so to assist the reader a glossary of air quality terminology can be found in **Appendix A**.

Site Setting

- 1.4 The Site is located to the south of Spencers Wood, off the B3349 Basingstoke Road within the administrative area of Wokingham Borough Council (WBC). The Site is not located within an existing Air Quality Management Area (AQMA) however WBC designated the Wokingham AQMA for the potential exceedances of the current annual mean air quality objective for nitrogen dioxide (NO₂). Additionally, Reading Borough Council (RBC) designated the Reading AQMA for the potential exceedance of the current annual mean air quality objective for NO₂. The Wokingham AQMA and Reading AQMA are both located approximately 2km north of the Site and include areas of the A33 and the M4 Motorway.
- 1.5 The Site currently comprises greenfield land, used as arable land. To the north of the Site are residential dwellings with the B3349 Hyde End Road beyond. To the east of the Site lies agricultural land with a solar farm approximately 250m beyond. To the south of the Site lies agricultural land, commercial units, and B3349 Basingstoke Road. The Site is bound to the west by the B3349 Basingstoke Road and residential dwellings, with further residential dwellings and Lambs Lane Primary School situated beyond. **Figure 1.1** details the location of the proposed development.
- 1.6 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions from the B3349 Basingstoke Road and the B3349 Hyde End Road.

Proposed Development

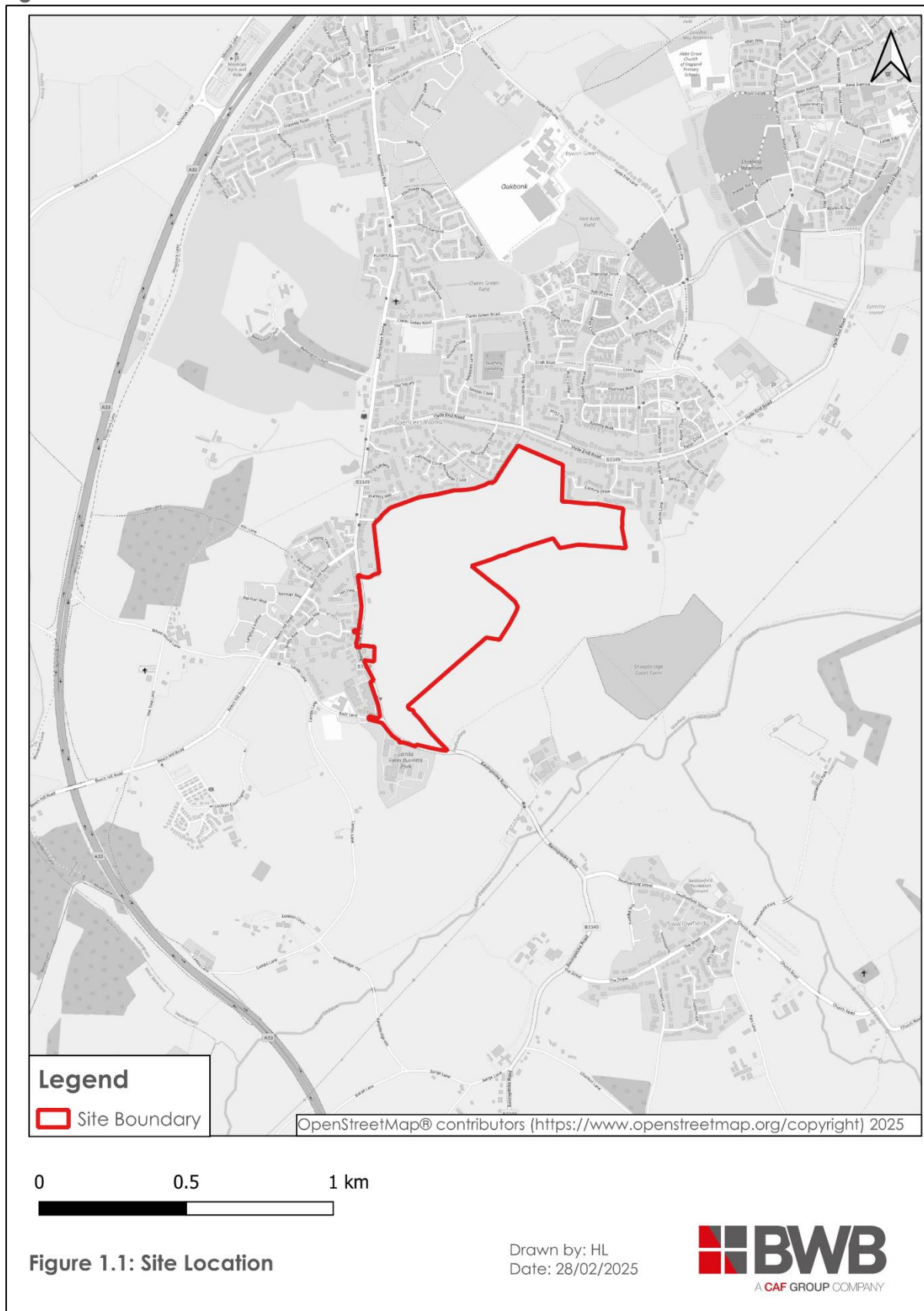
- 1.7 The development proposals include hybrid planning application (part outline/ part detailed) comprising:
 - Outline planning permission is sought with all matters reserved for future determination, save for the means of access via Basingstoke Road, for: up to 420 dwellings (Use Class C3), an 80 bed care home (Use Class C2), 0.8ha of employment land (Use Class E(g),

primary school (Use Class F1), local centre (Use Classes E(a), (b), (c), (f)), sports pitch and changing facility, public open space; and

- A full application for the proposed Suitable Alternative Natural Greenspace (SANG), associated landscaping/car park.

1.8 The proposed development framework plan is detailed in **Appendix B**.

Figure 1.1: Site Location



2. LEGISLATION, PLANNING POLICY & GUIDANCE

National Legislation and Planning Policy

2.1 The following national legislation and planning policy is relevant to air quality and was considered in the undertaking of the assessment. A summary of the relevant national legislation and planning policy is provided in **Appendix C**:

- European Parliament, EU 2008 ambient Air Quality Directive (2008)¹;
- HMSO, Air Quality (England) Regulations (2000)²;
- HMSO, Environment Act (1995)³;
- HMSO, Environment Act (2021)⁴;
- HMSO, Air Quality (England) Regulations (2002)⁵;
- HMSO, Air Quality Standards Regulations (2010)⁶;
- Department for Environment, Air Quality Strategy (1997)⁷;
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)⁸;
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2023)⁹;
- Department for the Environment, Food and Rural Affairs, The Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020)¹⁰;
- HMSO, The Environmental Targets (Fine Particulate Matter) (England) Regulations (2023)¹¹;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework (NPPF) (2023)¹²; and
- Ministry for Housing, Communities and Local Government, Planning Practice Guidance (PPG) for air quality (2019)¹³.

Local Planning Policy

2.2 The following local planning policy was considered in the undertaking of the assessment and a summary is provided in **Appendix C**:

- Wokingham Borough Council, Wokingham Borough Local Development Framework Adopted Core Strategy Development Plan Document (2010)¹⁴.

¹ European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe

² HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO

³ HMSO (1995) The Environment Act 1995, London: TSO

⁴ HMSO (2021) The Environment Act 2021, London: TSO

⁵ HMSO (2002) Statutory Instruments 2002 No. 3043, The Air Quality (England) (Amendment) Regulations 2002, London: HMSO

⁶ HMSO (2010) Statutory Instruments 2010 No. 1001 Air Quality Standards Regulations 2010. London: HMSO

⁷ Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO

⁸ Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO

⁹ Department for the Environment, Food and Rural Affairs (Defra) (2023) Air Quality Strategy: Framework for Local Authority

¹⁰ Department of the Environment, Food and Rural Affairs (Defra) (2020) The Environment (Miscellaneous Amendments) (EU Exit) Regulations, London: HMSO

¹¹ HMSO (2023) Statutory Instruments 2023 No. 96 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

¹² Ministry of Housing, Communities & Local Government (2023) National Planning Policy Framework, HMSO London

¹³ Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality

¹⁴ Wokingham Borough Council (2010) Wokingham Borough Local Development Framework Adopted Core Strategy Development Plan

Defra PM_{2.5} targets: Interim Planning Guidance

2.3 Defra is developing guidance in relation to the new targets for PM_{2.5} to be considered in planning. The new guidance will require planning applications to consider how the development will reduce population exposure to PM_{2.5} from design stage. At the time of writing, the planning guidance has not been published. An interim guidance¹⁵ has been published by Defra, which advises planning applications to consider the following:

- *How has exposure to PM_{2.5} been considered when selecting the development site?*
- *What actions and/or mitigations have been considered to reduce PM_{2.5} exposure for development users and nearby receptors (houses, hospitals, schools etc.) and to reduce emissions of PM_{2.5} and its precursors?*

2.4 Consideration to the interim guidance¹⁵ has therefore been included within the assessment.

Air Quality Assessment Guidance

2.5 The following guidance was utilised in the air quality assessment:

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(22)) (2022)¹⁶;
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (2024)¹⁷;
- Institute of Air Quality Management and Environmental Policy Implementation Community (previously Environmental Protection UK), Land-Use Planning and Development Control: Planning for Air Quality (2017)¹⁸;
- Standards for Highways, Design Manual for Roads and Bridges – LA 105 Air Quality (2024)¹⁹;
- Institute of Air Quality Management, A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (2020)²⁰; and
- Natural England, Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations (2018)²¹.

¹⁵ Defra (2024) PM_{2.5} Targets: Interim Planning Guidance

¹⁶ Defra (2022) Local Air Quality Management Technical Guidance LAQM.TG(22)

¹⁷ Institute of Air Quality Management (2024) Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London

¹⁸ Institute of Air Quality Management and Environmental Policy Implementation Community (previously Environmental Protection UK) (2017) Land-Use Planning and Development Control: Planning for Air Quality

¹⁹ Standards for Highways (2024) Design Manual for Roads and Bridges -LA 105 Air Quality

²⁰ Institute of Air Quality Management (2020) A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

²¹ Natural England (2018) Natural England's approach to advising competent authorities on the assessment of road traffic emissions under the Habitats Regulations

3. METHODOLOGY

Consultation with Wokingham Borough Council

- 3.1 Initial consultation was undertaken with WBC on 1st July 2024 via email, which outlined the proposed methodology for this assessment. The Environmental Protection department at WBC agreed with the proposed methodology on 5th July 2024 via email.
- 3.2 Further consultation with WBC was undertaken via email on 26th November 2024 to amend the verification locations used within the ADMS-Roads modelling assessment. WBC responded on 28th November 2024 agreeing to the proposed updates.
- 3.3 A summary of the methodology, as agreed with WBC, is provided below:
- Construction Phase - A construction phase dust assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)¹⁷.
 - Operational Phase – A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated traffic on local air quality and predict pollutant concentrations at the Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NO_x) and particulate matter (PM₁₀ and PM_{2.5}) at identified existing receptor locations for both without and with development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG22)¹⁶ and IAQM and Environmental Policy Implementation Community (previously Environmental Protection UK) (EPIC)¹⁸ guidance. Pollutant concentrations were predicted across the Site to consider the suitability of the Site for residential use.
- 3.4 Full details of the methodology used in the assessment, as agreed with WBC, are provided below.

Construction Phase Dust Assessment

- 3.5 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM guidance¹⁷. The full assessment methodology is not reproduced within this report but a summary of the assessment steps are provided below:
- Step 1 – screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works.
 - Step 2 – assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout).
 - Step 2A – determine the potential dust emission magnitude for each of the four activities;
 - Step 2B – determine the sensitivity of the area;
 - Step 2C – determine the risk of dust impacts by combining the findings of steps 2A and 2B.

- Step 3 – determine the site-specific mitigation for each of the four activities; and
- Step 4 – examine the residual effects and determine significance.

Operational Phase Road Traffic Emissions – Detailed Assessment

Air Dispersion Modelling

- 3.6 The air dispersion model ADMS-Roads, version 5.0.1.3 was utilised in the assessment to predict concentrations of NO_x, PM₁₀ and PM_{2.5} at existing receptors and across the Site.
- 3.7 The assessment was undertaken in accordance with Defra LAQM.TG(22)¹⁶ and IAQM and EPIC (previously EPUK) guidance¹⁸.

Assessment Scenarios and Traffic Data

- 3.8 The following scenarios were considered in the air dispersion modelling:
- Scenario 1: 2022 Verification Year;
 - Scenario 2: 2024 Base Year;
 - Scenario 3: 2026 Opening Year without development; and
 - Scenario 4: 2026 Opening Year with development.
- 3.9 The operational phase road traffic emissions study area is defined by the road network modelled as part of the assessment. Traffic data were obtained from the Hub Transport Planning Ltd, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for use in the assessment.
- 3.10 The traffic data has been sourced from the Wokingham Strategic Transport Model (WSTM 4). The WSTM extends to the junction at Basingstoke Road and Swallowfield Road ("Swallowfield Junction"). As such, traffic data in the vicinity of the ecological receptors were sourced from Department for Transport (DfT) traffic count data²². The WSTM predicts a decrease in AADT at the Swallowfield Junction in 2026; however for a robust assessment, the largest increase in development AADT has been used within Scenario 4: 2026 Opening Year with development, which was sourced from the 2032 traffic model scenario.
- 3.11 Further details on the traffic data used in the assessment are detailed in **Appendix C** and the modelled roads are shown in **Figure 3.1** and **Figure 3.2**.

ADMS-Roads Model Inputs

- 3.12 The model inputs were utilised in the assessment are shown in **Table 3.1**.

²² <https://roadtraffic.dft.gov.uk/#/6/55.254/-6.053/basemap-regions-countpoints>

Table 3.1: Model Inputs Used in the Assessment

Parameter	Input – Human Health	Input – Ecology
Emission factors	Emission factors were utilised from the Defra Emission Factor Toolkit ²³ (EFT), version 12.1, for the years of assessment (2022, 2024 and 2026).	Emission factors were utilised from the Defra Emission Factor Toolkit ²⁴ (EFT), version 13.1, for 2026.
Conversion of oxides of nitrogen	Concentrations of NO _x were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO ₂) using the Defra NO _x to NO ₂ calculator ²⁵ , version 9.1.	
Meteorological data	Hourly sequential meteorological data for the verification year of assessment (2022) were obtained for the Farnborough recording station. The Farnborough meteorological recording stations is considered representative of the study area given its proximity to the Site, located approximately 18.5km southeast of the Site. The wind rose for 2022 is provided in Appendix D	
Surface roughness and Monin-Obukhov length (MO) – Site	A surface roughness of 0.5m and an MO length of 10m were utilised in the air dispersion model to represent conditions at the Site and within the Study area. The Site is located in Spencers Wood and surrounded by open agricultural land to the east and south.	
Surface roughness and Monin-Obukhov length (MO) – Meteorological Station	A surface roughness of 0.5m and an MO length of 15m were utilised in the air dispersion model to represent conditions at the meteorological station. The meteorological recording station is located within Farnborough town, near Farnborough Airport.	
Background pollutant concentrations	Background concentrations of NO ₂ , PM ₁₀ and PM _{2.5} for the study area were obtained from the pollutant concentration maps ²⁶ provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2022, 2024 and 2026).	
Model verification	Model verification was undertaken using WBC monitoring data available for the study area. Diffusion tubes WOK841, WOK882 and WOK836 were used in the verification process. Full details of the verification procedure are provided in Appendix E .	
Calculation of short term PM ₁₀ concentrations	The following calculation, as detailed in Defra guidance¹⁶, was utilised to calculate the number of exceedances of the 24-hour mean PM₁₀ air quality objective: $\text{Number of 24-Hour Mean Exceedance} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$	N/A

²³ Defra (2024) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]

²⁴ Defra (2024) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]

²⁵ Defra (2024) NO_x to NO₂ Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]

²⁶ Defra (2024) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021]

Receptor Locations

Existing Sensitive Human Receptors

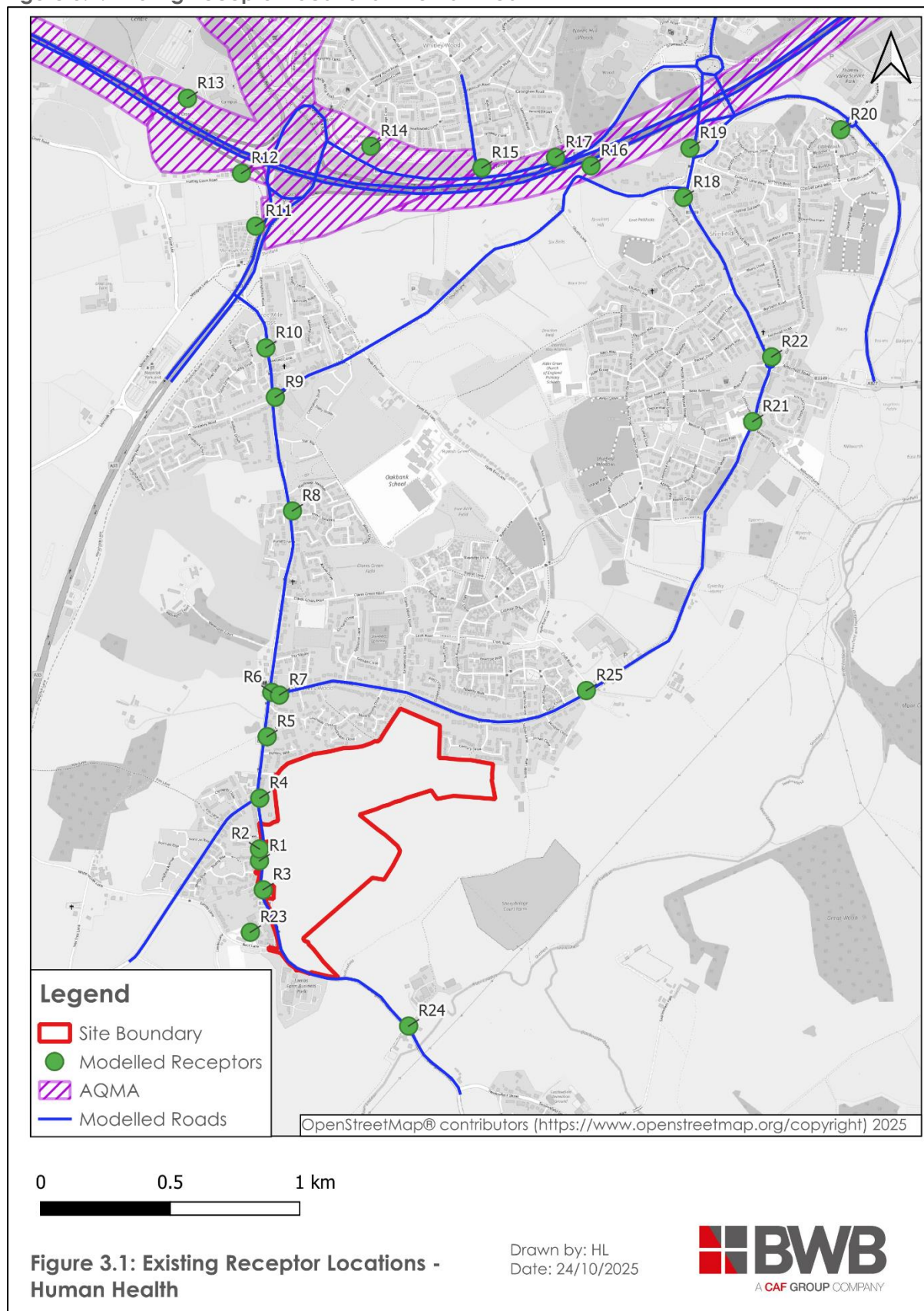
- 3.13 Existing human receptor locations were identified within close proximity of the road links detailed in paragraph 3.9 and considered in the operational phase road traffic emissions assessment. Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at the identified existing receptor locations for the assessment scenarios detailed in paragraph 3.8. Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the proposed development. Receptor heights were modelled at 1.5m for ground floor receptors to represent average breathing height at ground floor. Nurseries and primary schools were modelled at 0.8m to represent the lower average breathing height of children.
- 3.14 The existing human receptor locations are detailed in **Table 3.2** and **Figure 3.1**.

Table 3.2: Existing Human Sensitive Receptor Locations

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R1	471453	166002	Residential dwelling on B3349 Basingstoke Road	1.5
R2	471453	166047	Residential dwelling on B3349 Basingstoke Road	1.5
R3	471468	165890	Residential dwelling on B3349 Basingstoke Road	1.5
R4	471454	166243	Residential dwelling on B3349 Basingstoke Road	1.5
R5	471483	166480	Spencers Wood Day Nursery	0.8
R6	471501	166652	Residential dwelling on B3349 Basingstoke Road	1.5
R7	471530	166641	Residential dwelling on B3349 Hyde End Road	1.5
R8	471580	167352	Residential dwelling on B3349 Basingstoke Road	1.5
R9	471514	167790	Residential dwelling on B3349 Basingstoke Road	1.5
R10	471478	167980	Residential dwelling on B3349 Basingstoke Road	1.5
R11	471439	168450	Residential dwelling off Mere oak Lane	1.5
R12	471384	168654	Residential dwelling off Hartley Court Road	1.5

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R13	471175	168943	Busy Bees at Reading International	0.8
R15	471883	168758	Residential dwelling off Harness Close	1.5
R16	472312	168675	Residential dwelling off Whitley Wood Lane	1.5
R17	472733	168683	Residential dwelling off Brookers Hill	1.5
R18	472596	168716	Residential dwelling off Old Whitley Wood Lane	1.5
R19	473090	168561	Residential dwelling on Hollow Lane	1.5
R20	473115	168751	Residential dwelling on Hollow Lane	1.5
R21	473697	168822	Residential dwelling on Eastern Relief Road	1.5
R22	473358	167696	Shinfield Infant and Nursery School	0.8
R23	473431	167946	Residential dwelling on Hollow Lane	1.5
R24	471418	165726	Lambs Lane Primary School	0.8
R25	472715	166658	Residential dwelling on B3349 Hyde End Road	1.5

Figure 3.1: Existing Receptor Locations – Human Health



Existing Ecological Receptor Locations

- 3.15 Ecological designations which have the potential to be impacted by the development include the The Thames Valley Special Protection Area (SPA), which contains the Bramshill Site of Special Scientific Interest (SSSI) and the Hazeley Heath SSSI. These sites have the potential to be adversely impacted by increased concentrations of NO_x and NH₃ and by increased nutrient nitrogen and acid deposition. Seven receptor transects extending up to 200m from the A327, B3011 and Bramshill Road, which are nearest modelled roads were identified. All receptors were modelled at a height of 0m. The identified receptor locations are shown in **Table 3.3** and **Figure 3.2**.
- 3.16 Process Contributions (PCs) of NO_x and NH₃ concentrations, and nutrient nitrogen and acid deposition were predicted at the identified receptors. Predicted PCs were then compared to relevant criteria.

Table 3.3: Existing Sensitive Receptor Locations – Ecology

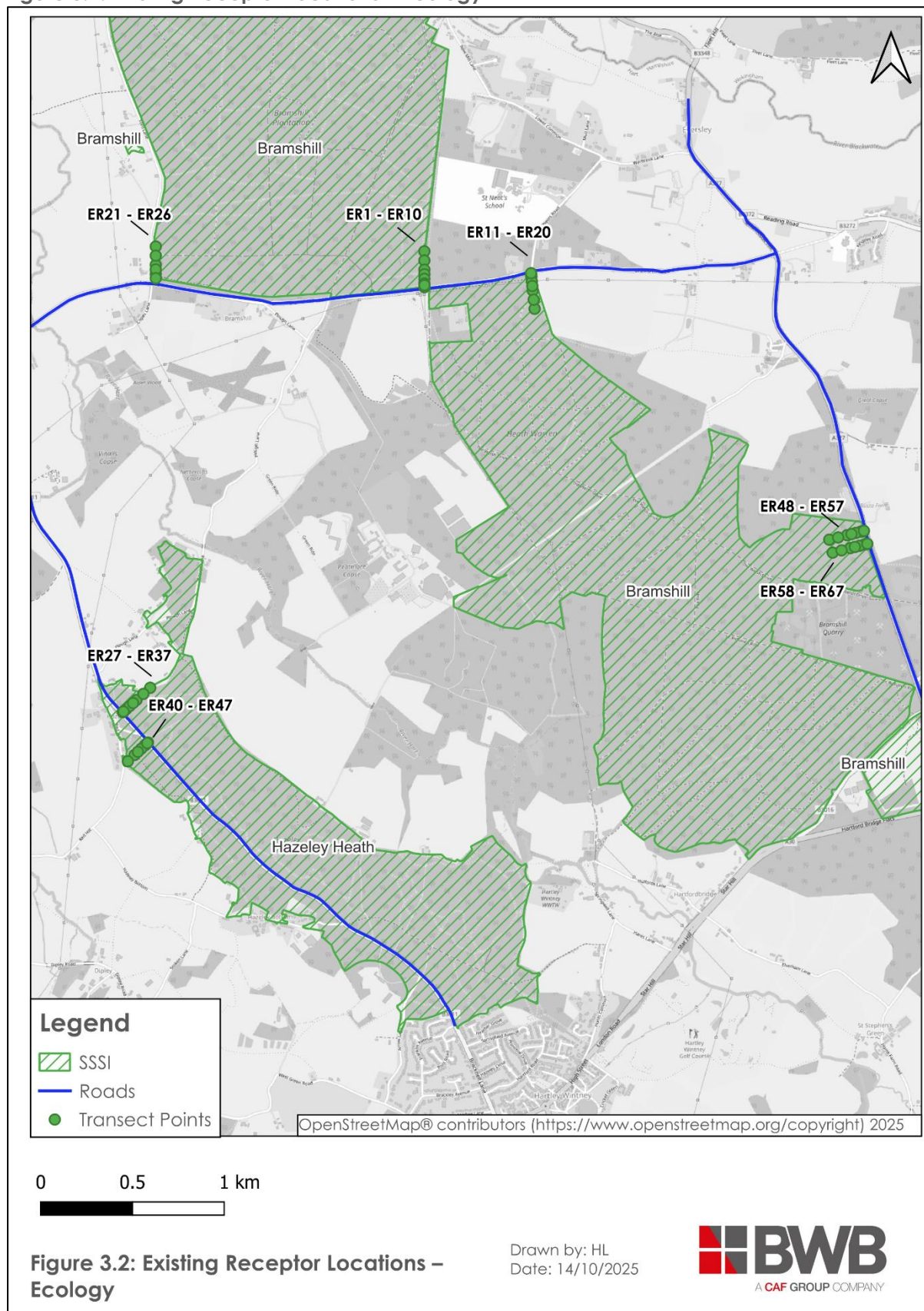
Receptor	Grid Reference		Details	Distance from Road
	X	Y		(m)
ER1	476039	161312	Thames Valley SPA and Bramshill SSSI	5
ER2	476039	161317		10
ER3	476039	161322		15
ER4	476039	161327		20
ER5	476039	161332		25
ER6	476039	161357		50
ER7	476039	161382		75
ER8	476039	161407		100
ER9	476039	161457		150
ER10	476039	161507		200
ER11	476621	161388		5
ER12	476621	161383		10
ER13	476622	161378		15
ER14	476622	161373		20

Receptor	Grid Reference		Details	Distance from Road
	X	Y		(m)
ER15	476623	161368		25
ER16	476625	161343		50
ER17	476628	161318		75
ER18	476630	161293		100
ER19	476635	161243		150
ER20	476640	161194		200
ER21	474575	161360		25
ER22	474575	161383		50
ER23	474575	161408		75
ER24	474575	161433		100
ER25	474575	161483		150
ER26	474575	161533		200
ER27	474396	158997	Thames Valley SPA and Hazeley Heath SSSI	0
ER28	474399	159000		5
ER29	474403	159003		10
ER30	474407	159007		15
ER31	474410	159010		20
ER32	474414	159013		25
ER33	474433	159030		50
ER34	474452	159046		75
ER35	474470	159063		100

Receptor	Grid Reference		Details	Distance from Road
	X	Y		(m)
ER36	474508	159096		150
ER37	474545	159129		200
ER38	474533	158832		0
ER39	474529	158828		5
ER40	474525	158825		10
ER41	474522	158821		15
ER42	474518	158818		20
ER43	474514	158815		25
ER44	474496	158798		50
ER45	474478	158781		75
ER46	474459	158763		100
ER47	474423	158729		150
ER48	478435	159984	Thames Valley SPA and Bramshill SSSI	5
ER49	478430	159983		10
ER50	478426	159982		15
ER51	478421	159980		20
ER52	478416	159979		25
ER53	478392	159973		50
ER54	478367	159967		75
ER55	478343	159961		100
ER56	478295	159948		150

Receptor	Grid Reference		Details	Distance from Road
	X	Y		(m)
ER57	478246	159936		200
ER58	478454	159914		5
ER59	478449	159913		10
ER60	478444	159911		15
ER61	478439	159910		20
ER62	478434	159909		25
ER63	478410	159903		50
ER64	478386	159896		75
ER65	478362	159890		100
ER66	478313	159878		150
ER67	478265	159865		200

Figure 3.2: Existing Receptor Locations – Ecology



Proposed Receptor Locations

- 3.17 Pollutant concentrations were predicted across the Site to consider exposure of future users of the proposed development to air quality. A Cartesian grid from minimum X 471190, Y 165078 to maximum X 471550, Y 165668, modelled at a height of 1.5m, was included to predict pollutant concentrations across the Site to represent the average ground floor breathing height and to consider its suitability for the proposed sensitive end use.

Limitations and Assumptions

- 3.18 There are uncertainties associated with both measured and predicted pollutant concentrations. The model (ADMS-Roads) used in this assessment relies on input data, which are also subject to uncertainty. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not take into account.
- 3.19 The assessment is based on traffic data provided by Hub Transport Planning Ltd, the Transport Consultants for the project. As such any assumptions made by the transport consultants will also influence the air quality assessment.
- 3.20 In future year scenarios, uncertainty relates to the projection of vehicle emissions and, in particular the rate at which emissions per vehicle will improve over time. This assessment utilised the most recent version of the Defra EFT²³ to provide the most up to date estimate of current and future emission projections.
- 3.21 To reduce the uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in Defra guidance¹⁶. As the models were verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.
- 3.22 Consideration of committed local developments that may represent sensitive receptors to dust during the construction phase was undertaken through a review of the WBC planning portal. Any applications submitted following the review, or not present on the portal at the time of review, were not considered.

Assessment Criteria

Human Health

- 3.23 Predicted pollutant concentrations were compared to the current relevant air quality objectives for England⁷. The current relevant air quality standards and objectives are detailed in **Table 3.4**.

Table 3.4: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective ($\mu\text{g.m}^{-3}$)	Date to Achieve by
NO ₂	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM ₁₀	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
PM _{2.5}	Annual Mean	20	1 January 2020
	<i>Annual mean interim target as detailed within the Environmental Improvement Plan²⁷</i>	12	31 January 2028
	Annual mean	10	31 December 2040

Italics notes future objective

3.24 Guidance is provided by the IAQM and EPIC (previously EPUK)¹⁸ to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at receptor locations are detailed in **Table 3.5**. These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the current relevant air quality objectives.

Table 3.5: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in 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

²⁷ Defra (2023) Environmental Improvement Plan 2023, First revision of the 25 Year Environment Plan

Note: Figures rounded up to the nearest whole number, therefore any value less than 1% after rounding (effectively less than 0.5%) will be described as negligible.

- 3.25 In accordance with IAQM and EPIC (previously EPUK) guidance¹⁸, negligible and slight impacts at are considered to be 'not significant' at individual receptor locations and moderate and substantial impacts are considered to be 'significant' at individual receptor locations. Overall significance is determined by professional judgement.

Ecology

- 3.26 Predicted concentrations were compared to the relevant critical levels and predicted deposition rates were compared to the relevant critical loads in order to assess any potential impacts on ecological designations. The relevant site-specific critical levels and critical loads for the Thames Valley SPA, Bramshill SSSI and Hazeley Heath SSSI were obtained from the Air Pollution Information System (APIS)²⁸ and were agreed with the Project Ecologist and are set out in **Table 3.6**. Where different critical loads were identified, the lowest critical load was used.

Table 3.6: Ecological Critical Level and Loads Used Within the Assessment

Pollutant	Critical Level ($\mu\text{g.m}^{-3}$)	Critical Load ($\text{kgN.ha}^{-1}.\text{year}^{-1}$)
NO _x	30	-
NH ₃	1	-
N-dep	-	5 – 15
Acid-dep	-	0.536*

The Acid-dep critical loads for the Bramshill SSSI and Hazeley Heath SSSI were higher than the Thames Valley SPA. Therefore the critical load for the Thames Valley SPA was used to provide a robust approach.

- 3.27 A screening criterion of <1% increase in the relevant long-term and short-term critical loads at nationally designated ecological sites (e.g. SSSIs; as applicable to this assessment) is recommended by the IAQM ecological guidance²⁰, and as per the Natural England (NE) guidance²¹, and was agreed with the Project Ecologist.
- 3.28 The results were passed onto the project ecologist to further assess the potential for impacts.

²⁸ APIS (2023) Air Pollution Information System [<http://www.apis.ac.uk/introduction.html>]

4. BASELINE CONDITIONS

Local Air Quality Management

- 4.1 The Site is not located within an existing AQMA however, the Reading AQMA and the Wokingham AQMA are both located approximately 2.9km north. The Wokingham AQMA encompasses the M4 motorway and properties along the M4 motorway. The Reading AQMA covers the Reading Town Centre and areas along the major radial road routes into Reading (including J11 of the M4). Both are designated for the potential exceedance to the annual mean NO₂ air quality objective, for England. The locations of the AQMAs are illustrated in **Figure 3.1**.

Local Air Quality Monitoring

Nitrogen Dioxide

- 4.2 WBC undertakes air quality monitoring within its administrative area using a network of both automatic monitors and passive diffusion tubes. The closest monitoring locations are the roadside monitoring locations WOK836 and WOK882, both of which are located approximately 2.1km north. No automatic monitoring locations are located in the vicinity of the Site.
- 4.3 Bias adjusted NO₂ monitoring results, for the locations in the vicinity of the Site, are detailed in **Table 4.1**. The IAQM released a position statement²⁹ in August 2021 with regard to 2020 and 2021 monitoring datasets. Due to the influence of the COVID-19 pandemic lockdown restrictions, 2020 and 2021 monitoring data are not considered representative of normal conditions. At the time of assessment, 2023 monitoring data had not yet been published, therefore 2022 was utilised for model verification as agreed with WBC.

Table 4.1: WBC NO₂ Monitoring Data in 2017 – 2023

ID	Grid Reference (X,Y)	Site Type	Distance from and direction from centre of the Site	Monitored Annual Average Concentration (µg.m ⁻³)						
				2017	2018	2019	2020	2021	2022	2023
WOK836	472346, 168684	Roadside	2.1km north	33.6	24.0	27.0	19.3	18.7	21.5	18.9
WOK882	472299, 168677	Roadside	2.1km north	39.5	29.0	32.6	20.7	23.8	24.9	23.9
WOK841	473130, 168783	Roadside	2.5km north	39.1	30.1	33.3	20.7	23.0	24.4	20.6

Data presented to available precision.

- 4.4 Annual mean NO₂ concentrations at all monitoring locations were below the current annual mean NO₂ objective of 40µg.m⁻³ between 2017 and 2023. Monitoring results for

²⁹ Institute of Air Quality Management (2021) Position Statement: Use of 2020 and 2021 Monitoring Datasets

all three monitoring locations show a general decreasing trend in annual mean NO₂ concentration with some year on year fluctuation.

- 4.5 WOK841 is located along Shinfield Road, approximately 65m south of the M4 motorway, just outside of the Wokingham AQMA. WOK841 is classified as a roadside location within the study area and has a similar standoff distance to the M4 motorway as modelled existing receptors.
- 4.6 WOK836 is located approximately 50m north of the M4 motorway, along Whitley Wood Lane. WOK882 is located approximately 45m north of the M4, along Old Whitley Wood Lane. Both diffusion tubes are within the Wokingham AQMA and have a similar standoff distance to the M4 motorway as modelled receptors within the study area.
- 4.7 Therefore, all monitoring locations listed in **Table 4.1** were utilised in the model verification process.

Particulate Matter (PM₁₀ and PM_{2.5})

- 4.8 WBC does not undertake particulate matter (PM₁₀ or PM_{2.5}) monitoring in the vicinity of the Site.

Background Pollutant Concentrations

- 4.9 No background air quality monitoring is undertaken by WBC within the study area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps²⁶, which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2021 monitoring and meteorological data. Background concentrations of NO₂, PM₁₀ and PM_{2.5} were obtained for the grid squares covering the study area for the years of assessment (2022, 2024 and 2026). The background concentrations used in the assessment are detailed in **Table 4.2**.

Table 4.2: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m ⁻³)		
			2022	2024	2026
NO ₂	473500, 168500	WOK841, R18-R20	10.3	9.7	8.9
PM ₁₀			13.6	13.5	13.3
PM _{2.5}			7.8	7.7	7.5
NO ₂	472500, 168500	WOK836, WOK882, R15-R17	11.1	10.4	9.5
PM ₁₀			15.0	14.8	14.6
PM _{2.5}			7.9	7.8	7.6

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration ($\mu\text{g.m}^{-3}$)		
			2022	2024	2026
NO ₂	471500, 166500	R1, R2, R4, R7	8.5	8.0	7.5
PM ₁₀			11.9	11.7	11.5
PM _{2.5}			7.3	7.1	6.9
NO ₂	471500, 165500	R3, R23	8.0	7.5	7.1
PM ₁₀			12.0	11.8	11.6
PM _{2.5}			7.1	6.9	6.7
NO ₂	471500, 167500	R8-R10	9.2	8.7	8.1
PM ₁₀			12.2	12.0	11.8
PM _{2.5}			7.4	7.2	7.0
NO ₂	471500, 168500	R11-R14	12.5	11.6	10.6
PM ₁₀			14.7	14.6	14.4
PM _{2.5}			7.8	7.7	7.5
NO ₂	473500, 167500	R21, R22	8.9	8.4	7.9
PM ₁₀			12.3	12.1	11.9
PM _{2.5}			7.4	7.2	7.0
NO ₂	472500, 165500	R24	7.9	7.5	7.0
PM ₁₀			12.0	11.8	11.6
PM _{2.5}			7.0	6.9	6.7
NO ₂	472500, 166500	R25	8.6	8.1	7.7
PM ₁₀			12.0	11.8	11.6
PM _{2.5}			7.2	7.1	6.9

- 4.10 2022, 2024 and 2028 background concentrations are below the current relevant annual mean air quality objectives for England for NO₂, PM₁₀, and PM_{2.5}. Background PM_{2.5} concentrations are also below the 2028 interim target of 12µg.m⁻³ and the 2040 future objective of 10µg.m⁻³.
- 4.11 Background concentrations of NO₂ were lower than PM₁₀ concentrations for all receptors in all grid squares. This is due to large PM₁₀ contributions from secondary and residual sources.

5. CONSTRUCTION PHASE DUST ASSESSMENT

- 5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality.
- 5.2 The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

Step 1: Screen the Need for a Detailed Assessment

- 5.3 Step 1 of the IAQM guidance¹⁷ involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.
- 5.4 In accordance with the guidance, a detailed assessment is required if:
- Human receptors are located within 250m of the boundary of the Site or 50m of routes used by construction vehicles on the public highways, up to 250m from the Site entrances; or
 - Ecological receptors are located within 50m of the boundary of the Site or 50m of routes used by construction vehicles on the public highways, up to 250m from the Site entrances.
- 5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website³⁰, no ecological designations were identified within the above screening distance and therefore the impact on ecological designations was not considered further. However human receptors are located within the above screening distances, with the closest of these receptors located off B3349 Basingstoke Road radial roads along B3349 Hyde End Road. A construction phase assessment was therefore undertaken.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

- 5.6 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance¹⁷ as detailed in **Table 5.1**. Demolition is not proposed as part of the development and therefore was not considered further in the assessment.

³⁰ Defra, Multi Agency Geographic Information for the Countryside (MAGIC) [<http://magic.defra.gov.uk/>]

Table 5.1: Dust Emission Magnitude Criteria and Definition

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

5.7 The following dust emission magnitudes were defined for the proposed development:

- Earthworks – The total Site area is more than 110,000m². The dust emission magnitude for earthworks activities was therefore classified as **Large**.
- Construction – The proposed development comprises of up to 420 dwellings, 0.8 hectare of employment land, a primary school and local centre. The total building volume is more than 75,000m³. The dust emission magnitude for construction activities was therefore defined as **Large**.
- Trackout – Due to the size of the Site, it is anticipated that there will be between 20 and 50 outward HDV movements in any one day. The dust emission magnitude for the trackout route was therefore classified as **Medium**. The trackout distance utilised in the assessment was set to 250m from the Site access in accordance with the guidance¹⁷.

5.8 A summary of the defined dust emission magnitudes for the development are provided in **Table 5.2**.

Table 5.2: Summary of Project Defined Dust Emission Magnitudes

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Medium

Step 2B: Define the Sensitivity of the Area

5.9 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling and human health impacts. The sensitivity of the study area takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM₁₀ and site-specific factors. **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance¹⁷ for determining receptor sensitivity.

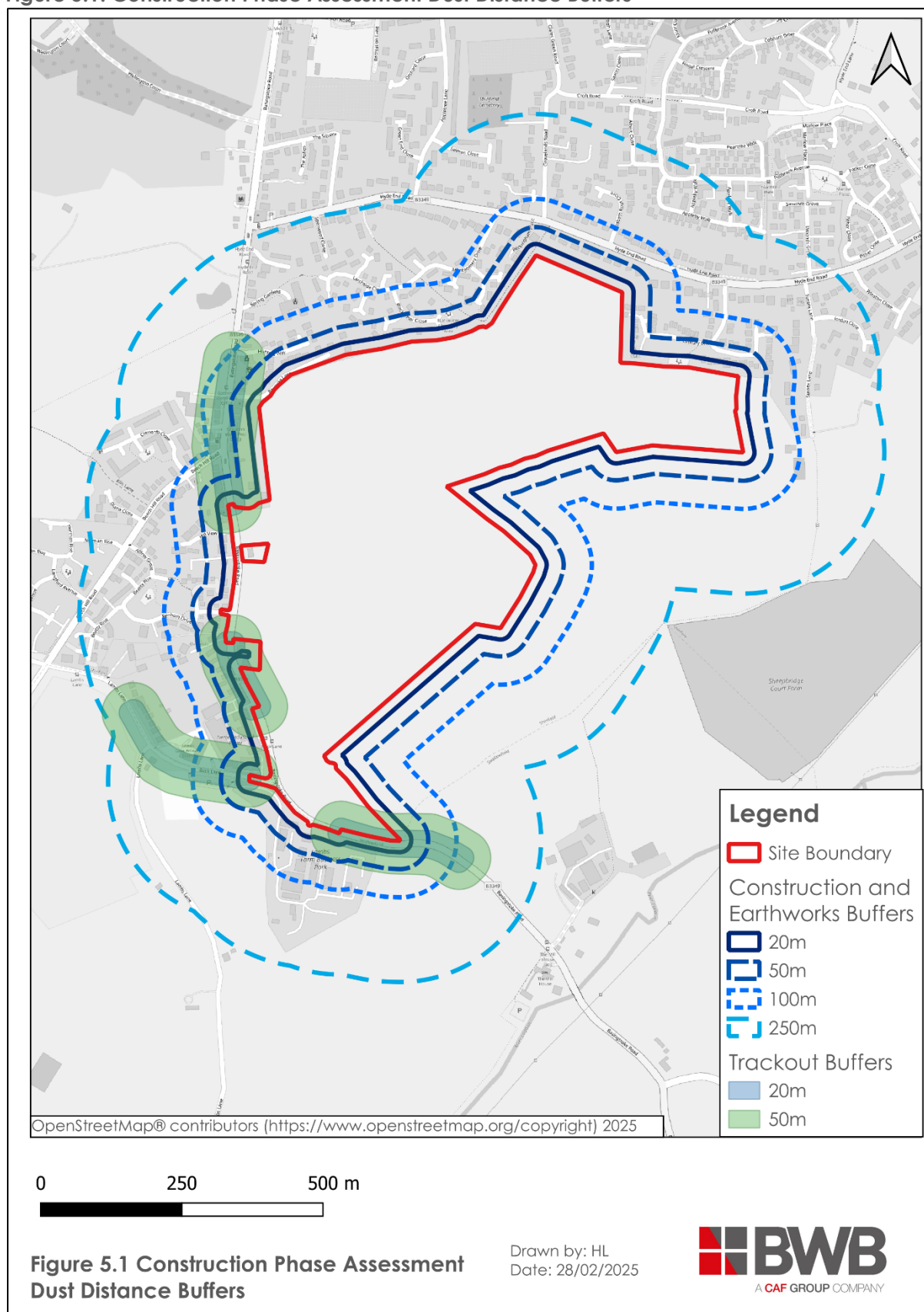
5.10 The sensitivity of the area is defined below, in accordance with IAQM criteria¹⁷ and summarised in **Table 5.3**.

- Dust Soiling – Residential dwellings, schools and car parks are considered to be highly sensitive to dust soiling activities. There are between 10 and 100 residential receptors and between one and 10 car parking spaces located within 20m of the proposed Site boundary. There are between 10 and 100 residential receptors, between one and 10 car parking spaces and one primary school, totalling more than 100 receptors within 20m of the trackout route. As such the sensitivity of the area to dust soiling, associated with earthworks, construction and trackout is defined as **High**.
- Human Health – Residential dwellings and schools are also considered to be highly sensitive to human health impacts of PM₁₀. There are between 10 and 100 highly sensitive residential dwellings within 20m of the Site boundary. Additionally there are between 10 and 100 highly sensitive residential dwellings and one primary school within 20m of the trackout route, totalling more than 100 highly sensitive receptors. Upon review of Defra background mapping²⁶ data, background PM₁₀ concentrations in the vicinity of the Site are below 24µg.m⁻³. The sensitivity of the area to dust soiling, associated with earthworks and construction is defined as **Low**. The sensitivity of the area to dust soiling, associated with trackout is defined as **Medium**.

Table 5.3: Determination of the Sensitivity of the Area

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

Figure 5.1: Construction Phase Assessment Dust Distance Buffers



Step 2C: Define the Risk of Impacts

- 5.11 The dust emission magnitude determined in Step 2A is then combined with the sensitivity of the area determined in Step 2B to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in **Table 5.4**.

Table 5.4: Summary Dust Risk Table to Define Site Specific Risk

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Medium	High	Medium Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	Medium	Medium Risk

Step 3: Site-Specific Mitigation

- 5.12 The risk of dust impacts, defined in Step 2C of the assessment, is used to determine the mitigation measures required to minimise the emission of dust during construction phase activities. The IAQM guidance¹⁷ provides details of highly recommended and desirable mitigation measures which are commensurate with the risk of dust impacts defined in Step 2C for construction, earthworks and trackout activities. Where the mitigation measures are general in nature, the highest risk category was applied in accordance with the guidance¹⁷. The highest risk category identified was '**High Risk**' and the recommended mitigation taken from the IAQM guidance¹⁷ is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a High Risk Site

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	None
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may	

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
	be the environmental 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.	
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 off-site, and the action taken to resolve the situation in the log book. Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	None
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 100m of the site boundary, with cleaning to be provided as necessary. Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	None

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	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 extended 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 vehicles switch off engines when stationary – no idling vehicles.	None
	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 un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker with the agreement of the local authority, where appropriate).	
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
Operations	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	None
	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 site for effective dust/particulate matter suppression/mitigation, using non-	

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
	potable water where possible and appropriate.	
	Used enclose 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 and 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.	None

Table 5.6: Mitigation Measures Specific to Demolition, Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (High Risk Site)	Avoid scabbling (roughening of concrete surfaces) if possible.	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
	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 (Medium Risk Site)	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.	None
	Avoid dry sweeping of large areas.	
	Ensure vehicles entering and leaving the 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.	

Category	Mitigation Measures	
	Highly Recommended	Desirable
	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 bowzers 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 10m from receptors where possible.	

Step 4: Determine Significant Effects

- 5.13 In accordance with IAQM guidance¹⁷, with the implementation of the mitigation measures detailed in Step 3, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Baseline Assessment

- 6.1 Pollutant concentrations were predicted at the identified existing sensitive receptor locations using the dispersion model ADMS-Roads. Predicted pollutant concentrations for Scenario 2: 2024 Base Year and Scenario 3: 2026 Opening Year without development are detailed in **Table 6.1**.

Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2024 Base Year and Scenario 3: 2026 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2024 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2026 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R1	9.5	12.1	7.3	8.7	11.9	7.2
R2	9.6	12.1	7.4	8.8	11.9	7.2
R3	9.5	12.5	7.3	8.8	12.3	7.1
R4	13.2	13.2	7.9	11.8	13.0	7.8
R5	11.3	12.8	7.7	10.2	12.6	7.6
R6	14.2	13.5	8.1	12.7	13.4	7.9
R7	11.6	12.9	7.7	10.6	12.8	7.6
R8	11.4	12.9	7.7	10.4	12.8	7.5
R9	13.9	13.6	8.0	12.4	13.4	7.9
R10	12.6	13.4	7.9	11.4	13.2	7.8
R11	16.6	16.1	8.5	14.6	16.0	8.3
R12	16.1	15.5	8.2	14.2	15.3	8.0
R13	18.2	15.6	8.3	16.0	15.5	8.1
R14	18.7	16.3	8.6	16.3	16.1	8.4
R15	23.2	17.8	9.5	20.1	17.6	9.3

Receptor	Scenario 2: 2024 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2026 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R16	22.0	17.2	9.2	19.2	17.0	9.0
R17	25.2	18.3	9.8	21.9	18.1	9.6
R18	12.9	14.3	8.1	11.7	14.2	8.0
R19	15.8	14.9	8.5	14.0	14.8	8.3
R20	12.8	14.3	8.1	11.6	14.1	7.9
R21	11.5	13.2	7.8	10.6	13.1	7.6
R22	13.7	13.7	8.0	12.6	13.6	7.9
R23	7.8	11.9	6.9	7.3	11.7	6.8
R24	10.1	12.3	7.2	9.2	12.2	7.0
R25	11.0	12.8	7.6	10.2	12.7	7.5

- 6.2 Annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were predicted to be below the current relevant annual mean objectives at all receptors in Scenario 2 and Scenario 3. Annual mean PM_{2.5} concentrations were also predicted to be below the 2028 interim target of 12 $\mu\text{g.m}^{-3}$ and the 2040 future objective of 10 $\mu\text{g.m}^{-3}$ at all receptors.
- 6.3 With regard to short term air quality objectives for NO₂ and PM₁₀ the predicted annual mean NO₂ concentrations are less than 60 $\mu\text{g.m}^{-3}$ and therefore in accordance with Defra guidance¹⁶ it may be assumed that exceedances of the 1-hour mean objective is unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Impact Assessment

Human Health

- 6.4 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at identified existing receptor locations for Scenario 4: 2026 Opening Year with development, to consider the impact of development-generated vehicles on existing sensitive receptors with regard to the current relevant air quality objectives.
- 6.5 Predicted pollutant concentrations are detailed in **Table 6.2**, **Table 6.3** and **Table 6.4** for NO₂, PM₁₀ and PM_{2.5} respectively together with Scenario 3: 2026 Opening Year without development concentrations for comparison purposes. The predicted change in

pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided.

Table 6.2: Predicted Annual Mean NO₂ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NO ₂ Concentration (µg.m ⁻³)				
	Scenario 3: 2026 Opening Year Without Development (µg.m ⁻³)	Scenario 4: 2026 Opening Year With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	11.9	12.0	+0.1	0	Negligible
R2	11.9	12.0	+0.1	0	Negligible
R3	12.3	12.4	+0.1	0	Negligible
R4	13.0	13.2	+0.4	0	Negligible
R5	12.6	12.8	+0.3	0	Negligible
R6	13.4	13.5	+0.4	0	Negligible
R7	12.8	12.8	+0.2	0	Negligible
R8	12.8	12.9	+0.3	0	Negligible
R9	13.4	13.5	+0.4	0	Negligible
R10	13.2	13.3	+0.2	0	Negligible
R11	16.0	16.0	<0.1	0	Negligible
R12	15.3	15.3	<0.1	0	Negligible
R13	15.5	15.5	<0.1	0	Negligible
R14	16.1	16.1	<0.1	0	Negligible
R15	17.6	17.6	<0.1	0	Negligible
R16	17.0	17.0	+0.1	0	Negligible
R17	18.1	18.1	<0.1	0	Negligible
R18	14.2	14.2	<0.1	0	Negligible

Receptor	Predicted NO ₂ Concentration (µg.m ⁻³)				
	Scenario 3: 2026 Opening Year Without Development (µg.m ⁻³)	Scenario 4: 2026 Opening Year With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R19	14.8	14.8	+0.1	0	Negligible
R20	14.1	14.1	<0.1	0	Negligible
R21	13.1	13.1	<0.1	0	Negligible
R22	13.6	13.7	<0.1	0	Negligible
R23	11.7	11.7	<0.1	0	Negligible
R24	12.2	12.2	<0.1	0	Negligible
R25	12.7	12.7	<0.1	0	Negligible

* Discrepancies in changes due to rounding effects

Table 6.3: Predicted Annual Mean PM₁₀ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM ₁₀ Concentration (µg.m ⁻³)				
	Scenario 3: 2026 Opening Year Without Development (µg.m ⁻³)	Scenario 4: 2026 Opening Year With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	11.9	12.0	<0.1	0	Negligible
R2	11.9	12.0	+0.1	0	Negligible
R3	12.3	12.4	+0.1	0	Negligible
R4	13.0	13.2	+0.2	0	Negligible
R5	12.6	12.8	+0.1	0	Negligible
R6	13.4	13.5	+0.2	0	Negligible
R7	12.8	12.8	+0.1	0	Negligible
R8	12.8	12.9	+0.1	0	Negligible

Receptor	Predicted PM ₁₀ Concentration (µg.m ⁻³)				
	Scenario 3: 2026 Opening Year Without Development (µg.m ⁻³)	Scenario 4: 2026 Opening Year With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R9	13.4	13.5	+0.1	0	Negligible
R10	13.2	13.3	+0.1	0	Negligible
R11	16.0	16.0	<0.1	0	Negligible
R12	15.3	15.3	<0.1	0	Negligible
R13	15.5	15.5	<0.1	0	Negligible
R14	16.1	16.1	<0.1	0	Negligible
R15	17.6	17.6	<0.1	0	Negligible
R16	17.0	17.0	<0.1	0	Negligible
R17	18.1	18.1	<0.1	0	Negligible
R18	14.2	14.2	<0.1	0	Negligible
R19	14.8	14.8	+0.1	0	Negligible
R20	14.1	14.1	<0.1	0	Negligible
R21	13.1	13.1	<0.1	0	Negligible
R22	13.6	13.7	<0.1	0	Negligible
R23	11.7	11.7	<0.1	0	Negligible
R24	12.2	12.2	<0.1	0	Negligible
R25	12.7	12.7	<0.1	0	Negligible

* Discrepancies in changes due to rounding effects

Table 6.4: Predicted Annual Mean PM_{2.5} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM _{2.5} Concentration (µg.m ⁻³)				
	Scenario 3: 2026 Opening Year Without Development (µg.m ⁻³)	Scenario 4: 2026 Opening Year With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	7.2	7.2	<0.1	0	Negligible
R2	7.2	7.2	<0.1	0	Negligible
R3	7.1	7.1	<0.1	0	Negligible
R4	7.8	7.8	+0.1	0	Negligible
R5	7.6	7.6	+0.1	0	Negligible
R6	7.9	8.0	+0.1	0	Negligible
R7	7.6	7.6	<0.1	0	Negligible
R8	7.5	7.6	+0.1	0	Negligible
R9	7.9	7.9	+0.1	0	Negligible
R10	7.8	7.8	<0.1	0	Negligible
R11	8.3	8.3	<0.1	0	Negligible
R12	8.0	8.0	<0.1	0	Negligible
R13	8.1	8.1	<0.1	0	Negligible
R14	8.4	8.4	<0.1	0	Negligible
R15	9.3	9.3	<0.1	0	Negligible
R16	9.0	9.0	<0.1	0	Negligible
R17	9.6	9.6	<0.1	0	Negligible
R18	8.0	8.0	<0.1	0	Negligible
R19	8.3	8.3	<0.1	0	Negligible

Receptor	Predicted PM _{2.5} Concentration (µg.m ⁻³)				
	Scenario 3: 2026 Opening Year Without Development (µg.m ⁻³)	Scenario 4: 2026 Opening Year With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R20	7.9	7.9	<0.1	0	Negligible
R21	7.6	7.6	<0.1	0	Negligible
R22	7.9	7.9	<0.1	0	Negligible
R23	6.8	6.8	<0.1	0	Negligible
R24	7.0	7.0	<0.1	0	Negligible
R25	7.5	7.5	<0.1	0	Negligible

* Discrepancies in changes due to rounding effects

6.6 Annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were predicted to be below the current annual mean objectives for England at all receptor locations, in both Scenario 3 and Scenario 4. Annual mean PM_{2.5} concentrations were also predicted to be below the 2028 interim target of 12µg.m⁻³ and the 2040 future objective of 10µg.m⁻³ at all receptor locations for Scenario 3 and Scenario 4. The proposed development does not lead to any new exceedances of the current or future air quality objectives, including receptors located within the nearby existing AQMAs. In accordance with the IAQM and EPIC (previously EPUK) guidance¹⁸, predicted impacts on local air quality were considered to be 'negligible', with regard to the current relevant objectives.

6.7 With regard to short term air quality objectives for NO₂ and PM₁₀, the predicted annual mean NO₂ concentrations are less than 60µg.m⁻³ and therefore in accordance with Defra guidance¹⁶ it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Ecology

6.8 Concentrations of NO_x and NH₃ and deposition rates of nitrogen and acid were predicted at ecological receptor locations within the Thames Valley SPA, Bramshill SSSI and Hazeley Heath SSSI for Scenario 4: 2026 Opening Year with development, to consider the impact of development-generated vehicles with regard to the critical levels and loads.

6.9 Predicted pollutant concentrations are detailed in **Table 6.5**, **Table 6.6**, **Table 6.7** and **Table 6.8** for NO_x, NH₃, nitrogen deposition and acid deposition for Scenario 3: 2026 without development and Scenario 4: 2026 with development for comparison purposes.

- 6.10 The predicted change in pollutant concentrations and deposition resulting from development-generated traffic, and the associated % change with regard to the relevant critical levels and loads is provided in the tables below. Exceedances are shown in **Bold**.

NO_x

- 6.11 **Table 6.5** presents the changes in predicted NO_x concentrations which have been assessed against the critical level of 30µg.m⁻³, as detailed in **Table 3.6**.

Table 6.5: Predicted Annual Mean NO_x Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NO _x Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER1	15.9	16.1	0.1	0
ER2	14.6	14.7	0.1	0
ER3	13.8	13.8	0.1	0
ER4	13.3	13.3	0.1	0
ER5	12.9	12.9	0.1	0
ER6	12.0	12.0	0.0	0
ER7	11.6	11.6	0.0	0
ER8	11.4	11.4	0.0	0
ER9	11.2	11.2	0.0	0
ER10	11.1	11.1	0.0	0
ER11	13.5	13.6	0.1	0
ER12	12.6	12.7	0.1	0
ER13	12.2	12.2	0.0	0
ER14	11.9	11.9	0.0	0
ER15	11.7	11.7	0.0	0

Receptor	Predicted NO _x Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER16	11.2	11.2	<0.1	0
ER17	11.0	11.0	<0.1	0
ER18	10.9	10.9	<0.1	0
ER19	10.8	10.8	<0.1	0
ER20	10.8	10.8	<0.1	0
ER21	12.6	12.7	+0.1	0
ER22	11.9	11.9	<0.1	0
ER23	11.5	11.5	<0.1	0
ER24	11.3	11.3	<0.1	0
ER25	11.0	11.0	<0.1	0
ER26	10.9	10.9	<0.1	0
ER27	22.5	22.7	+0.2	1
ER28	18.2	18.3	+0.1	0
ER29	16.2	16.3	+0.1	0
ER30	15.0	15.1	+0.1	0
ER31	14.2	14.3	+0.1	0
ER32	13.7	13.7	<0.1	0
ER33	12.3	12.4	<0.1	0
ER34	11.8	11.8	<0.1	0
ER35	11.5	11.5	<0.1	0

Receptor	Predicted NO _x Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER36	11.2	11.2	<0.1	0
ER37	11.0	11.0	<0.1	0
ER38	15.5	15.6	+0.1	0
ER39	13.3	13.3	+0.1	0
ER40	12.4	12.5	<0.1	0
ER41	12.0	12.0	<0.1	0
ER42	11.7	11.7	<0.1	0
ER43	11.5	11.5	<0.1	0
ER44	11.0	11.0	<0.1	0
ER45	10.8	10.8	<0.1	0
ER46	10.7	10.7	<0.1	0
ER47	10.6	10.6	<0.1	0
ER48	15.6	15.6	<0.1	0
ER49	14.3	14.3	<0.1	0
ER50	13.6	13.7	<0.1	0
ER51	13.2	13.2	<0.1	0
ER52	12.9	12.9	<0.1	0
ER53	12.2	12.2	<0.1	0
ER54	12.0	12.0	<0.1	0
ER55	11.8	11.8	<0.1	0

Receptor	Predicted NO _x Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER56	11.7	11.7	<0.1	0
ER57	11.6	11.6	<0.1	0
ER58	15.8	15.8	<0.1	0
ER59	14.4	14.5	<0.1	0
ER60	13.7	13.7	<0.1	0
ER61	13.3	13.3	<0.1	0
ER62	13.0	13.0	<0.1	0
ER63	12.3	12.3	<0.1	0
ER64	12.0	12.0	<0.1	0
ER65	11.8	11.8	<0.1	0
ER66	11.7	11.7	<0.1	0
ER67	11.6	11.6	<0.1	0

* Discrepancies in changes due to rounding effects, Exceedances are shown in **Bold**

- 6.12 The change in NO_x concentration relative to the critical level was mostly 0% at all receptor locations, with exception of one location which had a change of 1%. However, concentrations of NO_x at all the SSSI transects were predicted to be below the critical level of 30µg.m⁻³ in all scenarios considered.

NH₃

- 6.13 Table 6.6 presents the changes in predicted NH₃ concentrations which have been assessed against the critical level of 1µg.m⁻³, as detailed in **Table 3.6**.

Table 6.6: Predicted Annual Mean NH₃ Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NH ₃ Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER1	1.7	1.8	<0.1	13
ER2	1.6	1.6	<0.1	10
ER3	1.5	1.5	<0.1	8
ER4	1.4	1.4	<0.1	7
ER5	1.4	1.4	<0.1	6
ER6	1.2	1.2	<0.1	4
ER7	1.2	1.2	<0.1	3
ER8	1.2	1.2	<0.1	2
ER9	1.1	1.1	<0.1	2
ER10	1.1	1.1	<0.1	1
ER11	1.4	1.4	<0.1	8
ER12	1.3	1.3	<0.1	5
ER13	1.3	1.3	<0.1	4
ER14	1.2	1.2	<0.1	3
ER15	1.2	1.2	<0.1	3
ER16	1.1	1.1	<0.1	2
ER17	1.1	1.1	<0.1	1
ER18	1.1	1.1	<0.1	1
ER19	1.1	1.1	<0.1	1
ER20	1.1	1.1	<0.1	0

Receptor	Predicted NH ₃ Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER21	1.4	1.4	<0.1	6
ER22	1.3	1.3	<0.1	4
ER23	1.2	1.2	<0.1	3
ER24	1.2	1.2	<0.1	2
ER25	1.2	1.2	<0.1	2
ER26	1.2	1.2	<0.1	1
ER27	2.6	2.6	<0.1	20
ER28	2.1	2.1	<0.1	13
ER29	1.8	1.8	<0.1	10
ER30	1.7	1.7	<0.1	8
ER31	1.6	1.6	<0.1	7
ER32	1.5	1.5	<0.1	6
ER33	1.4	1.4	<0.1	3
ER34	1.3	1.3	<0.1	2
ER35	1.3	1.3	<0.1	2
ER36	1.2	1.2	<0.1	1
ER37	1.2	1.2	<0.1	1
ER38	1.8	1.8	<0.1	9
ER39	1.5	1.5	<0.1	5
ER40	1.4	1.4	<0.1	4

Receptor	Predicted NH ₃ Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER41	1.3	1.3	<0.1	3
ER42	1.3	1.3	<0.1	2
ER43	1.3	1.3	<0.1	2
ER44	1.2	1.2	<0.1	1
ER45	1.2	1.2	<0.1	1
ER46	1.2	1.2	<0.1	1
ER47	1.2	1.2	<0.1	0
ER48	1.6	1.6	<0.1	2
ER49	1.4	1.4	<0.1	2
ER50	1.3	1.3	<0.1	1
ER51	1.3	1.3	<0.1	1
ER52	1.2	1.2	<0.1	1
ER53	1.2	1.2	<0.1	1
ER54	1.1	1.1	<0.1	0
ER55	1.1	1.1	<0.1	0
ER56	1.1	1.1	<0.1	0
ER57	1.1	1.1	<0.1	0
ER58	1.6	1.6	<0.1	2
ER59	1.4	1.4	<0.1	2
ER60	1.3	1.3	<0.1	1

Receptor	Predicted NH ₃ Concentrations (µg.m ⁻³)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Level (%)
ER61	1.3	1.3	<0.1	1
ER62	1.2	1.2	<0.1	1
ER63	1.2	1.2	<0.1	1
ER64	1.1	1.1	<0.1	0
ER65	1.1	1.1	<0.1	0
ER66	1.1	1.1	<0.1	0
ER67	1.1	1.1	<0.1	0

* Discrepancies in changes due to rounding effects, Exceedances are shown in **Bold**

6.14 The change in NH₃ concentration relative to the critical level was above 1% at all receptor locations, with the exception of:

- ER20, ER47, ER54, ER55, ER56, ER64, ER65, ER66 and ER67.

6.15 Concentrations of NH₃ at the SSSI transects were predicted to be above the critical level of 1µg.m⁻³ in both Scenarios 3 and 4 at all receptor locations.

Nitrogen Deposition

6.16 **Table 6.7** presents the changes in predicted nitrogen deposition rates which have been assessed against the nitrogen deposition critical loads of 5 – 15 kgN.ha⁻¹.yr⁻¹, as detailed in **Table 3.6**.

Table 6.7: Predicted Annual Mean Nitrogen Deposition Rates

Receptor	Predicted Nitrogen Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER1	29.6	29.7	+0.1	3
ER2	28.0	28.1	+0.1	2
ER3	27.1	27.2	+0.1	2

Receptor	Predicted Nitrogen Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER4	26.6	26.6	+0.1	1
ER5	26.2	26.2	+0.1	1
ER6	25.2	25.2	<0.1	1
ER7	24.7	24.8	<0.1	1
ER8	24.5	24.5	<0.1	0
ER9	24.3	24.3	<0.1	0
ER10	24.1	24.1	<0.1	0
ER11	26.9	26.9	+0.1	2
ER12	25.9	25.9	+0.1	1
ER13	25.4	25.4	<0.1	1
ER14	25.0	25.1	<0.1	1
ER15	24.8	24.8	<0.1	1
ER16	24.3	24.3	<0.1	0
ER17	24.1	24.1	<0.1	0
ER18	24.0	24.0	<0.1	0
ER19	23.9	23.9	<0.1	0
ER20	23.8	23.8	<0.1	0
ER21	26.4	26.5	+0.1	1
ER22	25.6	25.6	<0.1	1
ER23	25.1	25.2	<0.1	1

Receptor	Predicted Nitrogen Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER24	24.9	24.9	<0.1	0
ER25	24.6	24.6	<0.1	0
ER26	24.5	24.5	<0.1	0
ER27	37.8	38.1	+0.2	4
ER28	33.1	33.3	+0.1	3
ER29	30.7	30.8	+0.1	2
ER30	29.5	29.5	+0.1	2
ER31	28.6	28.7	+0.1	1
ER32	28.0	28.1	+0.1	1
ER33	26.5	26.6	<0.1	1
ER34	25.9	26.0	<0.1	1
ER35	25.6	25.6	<0.1	0
ER36	25.2	25.3	<0.1	0
ER37	25.1	25.1	<0.1	0
ER38	30.2	30.3	+0.1	2
ER39	27.8	27.8	+0.1	1
ER40	26.9	26.9	<0.1	1
ER41	26.4	26.4	<0.1	1
ER42	26.0	26.1	<0.1	0
ER43	25.8	25.8	<0.1	0

Receptor	Predicted Nitrogen Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER44	25.3	25.3	<0.1	0
ER45	25.1	25.1	<0.1	0
ER46	25.0	25.0	<0.1	0
ER47	24.8	24.8	<0.1	0
ER48	28.7	28.7	<0.1	0
ER49	27.3	27.3	<0.1	0
ER50	26.6	26.6	<0.1	0
ER51	26.1	26.1	<0.1	0
ER52	25.8	25.8	<0.1	0
ER53	25.1	25.1	<0.1	0
ER54	24.8	24.8	<0.1	0
ER55	24.6	24.6	<0.1	0
ER56	24.5	24.5	<0.1	0
ER57	24.4	24.4	<0.1	0
ER58	28.7	28.7	<0.1	0
ER59	27.3	27.3	<0.1	0
ER60	26.6	26.6	<0.1	0
ER61	26.1	26.1	<0.1	0
ER62	25.8	25.8	<0.1	0
ER63	25.1	25.1	<0.1	0

Receptor	Predicted Nitrogen Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER64	24.8	24.8	<0.1	0
ER65	24.6	24.6	<0.1	0
ER66	24.4	24.5	<0.1	0
ER67	24.4	24.4	<0.1	0

* Discrepancies in changes due to rounding effects, Exceedances are shown in **Bold**

6.17 The change in nitrogen deposition rates relative to the critical load exceeded 1% at several receptor locations, with the exception of:

- ER13-ER20, ER22-ER26, ER33-ER37, and ER40-ER67.

6.18 Deposition rates of nitrogen were predicted to be above the nutrient nitrogen lower and higher critical loads of 5 - 15 kgN.ha⁻¹.yr⁻¹ in both Scenarios 3 and 4 at all receptor locations.

Acid Deposition

6.19 **Table 6.8** presents the changes in predicted acid deposition rates which have been assessed against the acid deposition critical load of 0.872kgN.ha⁻¹.yr⁻¹, as detailed in **Table 3.6**.

Table 6.8: Predicted Annual Mean Acid Deposition Rates

Receptor	Predicted Acid Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER1	2.2	2.2	<0.1	1
ER2	2.1	2.1	<0.1	1
ER3	2.0	2.0	<0.1	1
ER4	2.0	2.0	<0.1	1
ER5	1.9	1.9	<0.1	1

Receptor	Predicted Acid Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER6	1.9	1.9	<0.1	0
ER7	1.8	1.8	<0.1	0
ER8	1.8	1.8	<0.1	0
ER9	1.8	1.8	<0.1	0
ER10	1.8	1.8	<0.1	0
ER11	2.0	2.0	<0.1	1
ER12	1.9	1.9	<0.1	0
ER13	1.9	1.9	<0.1	0
ER14	1.8	1.8	<0.1	0
ER15	1.8	1.8	<0.1	0
ER16	1.8	1.8	<0.1	0
ER17	1.8	1.8	<0.1	0
ER18	1.8	1.8	<0.1	0
ER19	1.8	1.8	<0.1	0
ER20	1.8	1.8	<0.1	0
ER21	1.9	1.9	<0.1	1
ER22	1.9	1.9	<0.1	0
ER23	1.8	1.9	<0.1	0
ER24	1.8	1.8	<0.1	0
ER25	1.8	1.8	<0.1	0

Receptor	Predicted Acid Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER26	1.8	1.8	<0.1	0
ER27	2.8	2.8	<0.1	3
ER28	2.4	2.4	<0.1	2
ER29	2.3	2.3	<0.1	1
ER30	2.2	2.2	<0.1	1
ER31	2.1	2.1	<0.1	1
ER32	2.1	2.1	<0.1	1
ER33	2.0	2.0	<0.1	0
ER34	1.9	1.9	<0.1	0
ER35	1.9	1.9	<0.1	0
ER36	1.9	1.9	<0.1	0
ER37	1.9	1.9	<0.1	0
ER38	2.2	2.2	<0.1	1
ER39	2.1	2.1	<0.1	1
ER40	2.0	2.0	<0.1	1
ER41	2.0	2.0	<0.1	0
ER42	1.9	1.9	<0.1	0
ER43	1.9	1.9	<0.1	0
ER44	1.9	1.9	<0.1	0
ER45	1.9	1.9	<0.1	0

Receptor	Predicted Acid Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER46	1.9	1.9	<0.1	0
ER47	1.8	1.8	<0.1	0
ER48	2.1	2.1	<0.1	0
ER49	2.0	2.0	<0.1	0
ER50	2.0	2.0	<0.1	0
ER51	1.9	1.9	<0.1	0
ER52	1.9	1.9	<0.1	0
ER53	1.9	1.9	<0.1	0
ER54	1.8	1.8	<0.1	0
ER55	1.8	1.8	<0.1	0
ER56	1.8	1.8	<0.1	0
ER57	1.8	1.8	<0.1	0
ER58	2.1	2.1	<0.1	0
ER59	2.0	2.0	<0.1	0
ER60	2.0	2.0	<0.1	0
ER61	1.9	1.9	<0.1	0
ER62	1.9	1.9	<0.1	0
ER63	1.9	1.9	<0.1	0
ER64	1.8	1.8	<0.1	0
ER65	1.8	1.8	<0.1	0

Receptor	Predicted Acid Deposition Rates (kgN.ha ⁻¹ .yr ⁻¹)			
	Scenario 3: 2026 Opening Year Without Development	Scenario 4: 2026 Opening Year With Development	Change	Change in Concentration Relative to Critical Load (%)
ER66	1.8	1.8	<0.1	0
ER67	1.8	1.8	<0.1	0

* Discrepancies in changes due to rounding effects, Exceedances are shown in **Bold**

6.20 The change in acid deposition rates relative to the critical load were below 1% at several receptor locations, with the exception of:

- ER1, ER27-ER30, and ER38.

6.21 Deposition rates of acid were predicted to be above the acid critical load of 0.912 kgN.ha⁻¹.yr⁻¹ in both Scenarios 3 and 4 at all receptor locations.

6.22 As it can be seen in **Table 6.5**, **Table 6.6**, **Table 6.7** and **Table 6.8** predicted changes in NH₃ concentrations, nitrogen and acid deposition rates with the proposed development in place exceeded the 1% of the relevant critical loads and levels for the Thames Valley SPA, Bramshill SSSI and Hazeley Heath SSSI at several receptor points along the seven modelled transects. However NO_x concentrations were predicted to be achieve the critical level at all the modelled ecological sites. Theses results have therefore been referred to the project ecologist to determine the significance of the impact.

Site Suitability Assessment

6.23 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted across the Site for Scenario 4: 2026 Opening Year with development. Predicted pollutant concentrations are detailed in **Figure 6.1** to **Figure 6.3**.

6.24 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 4: 2026 Opening Year with development, indicate that pollutant concentrations across the Site will be below the current relevant air quality objectives in 2026 with the proposed development in place.

6.25 Predicted annual mean PM_{2.5} concentrations across the Site will not exceed the 2028 interim target of 12µg.m⁻³ or the 2040 future annual mean air quality objective of 10µg.m⁻³ in the opening year of 2026.

6.26 With regard to short term air quality objectives for NO₂ and PM₁₀, the predicted annual mean NO₂ concentrations are less than 60µg.m⁻³ and therefore in accordance with Defra guidance¹⁶ it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Development Measures

- 6.27 The proposed development is not predicted to have a significant impact on air quality and therefore mitigation measures are not required to minimise air quality impacts. However, measures included within the development which may be beneficial to local air quality include contributing to the My Journey travel planning initiative, Air Source Heat Pumps (ASHPs) and Electric Vehicle charging points (EV charging).

Figure 6.1: Predicted Annual Mean NO₂ Concentrations Across the Site

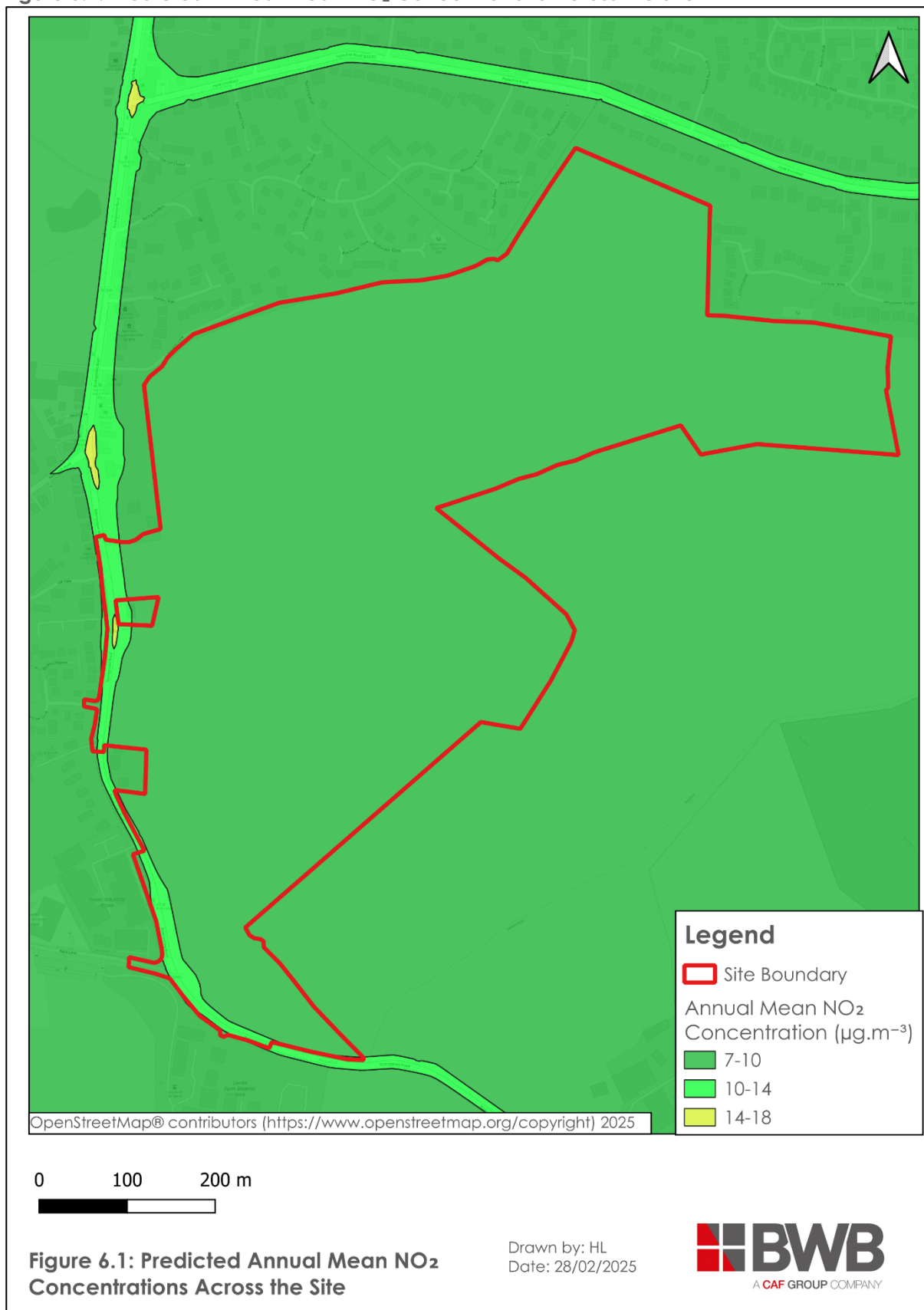


Figure 6.2: Predicted Annual Mean PM₁₀ Concentrations Across the Site

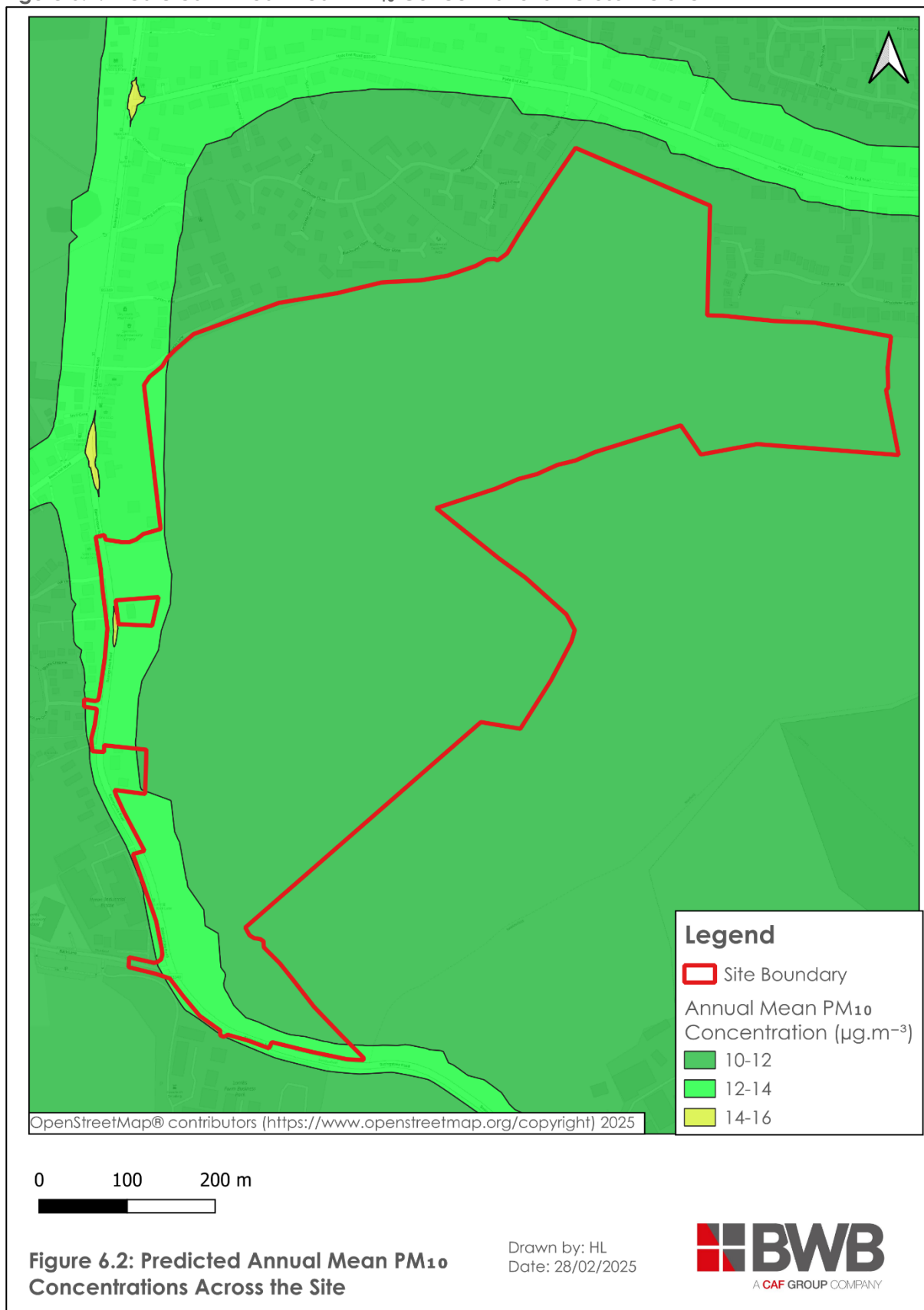
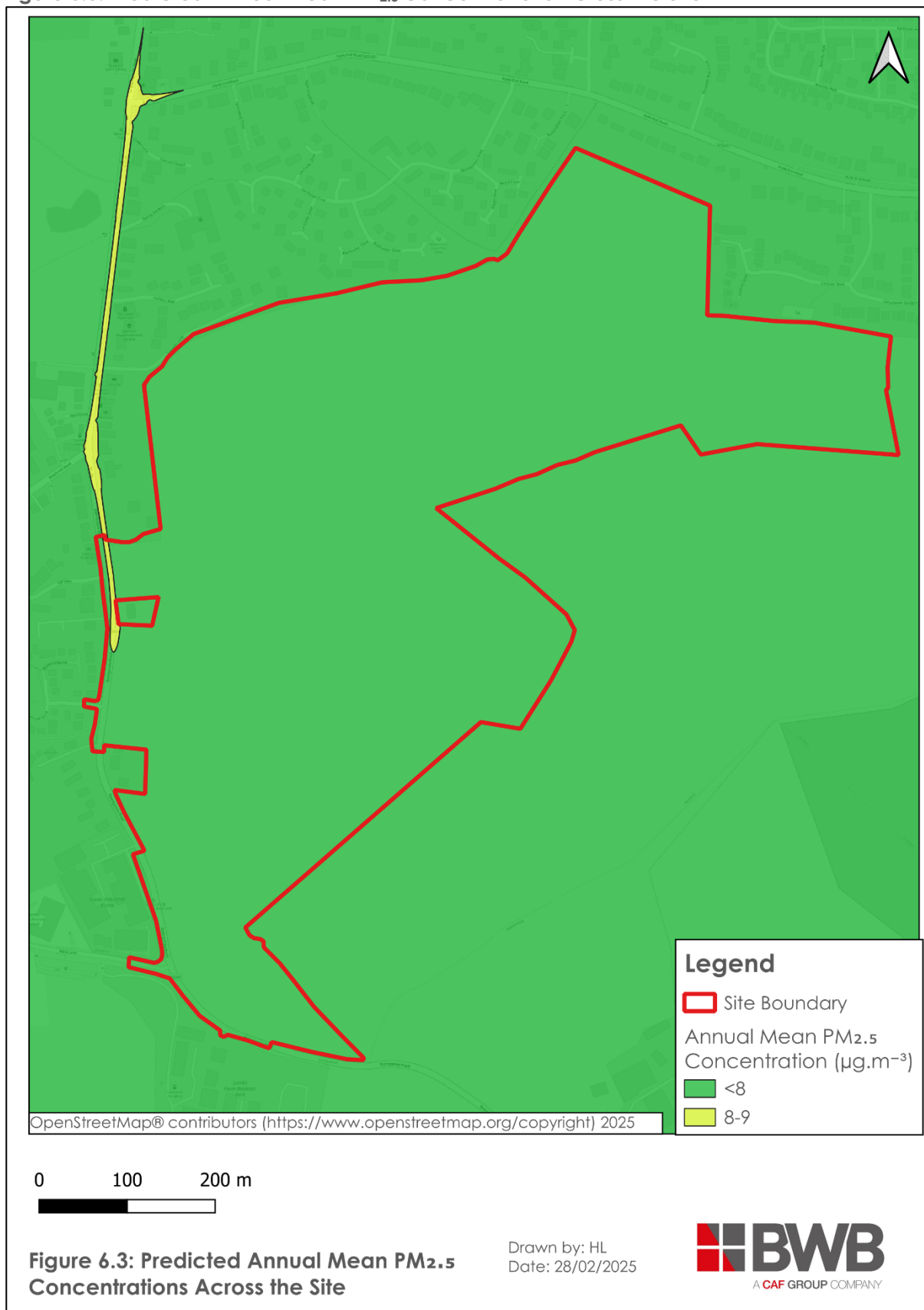


Figure 6.3: Predicted Annual Mean PM_{2.5} Concentrations Across the Site



Defra PM_{2.5} Targets: Interim Planning Guidance

- 6.28 Defra is developing new guidance which will require planning applications will reduce population exposure to PM_{2.5} from design stage. Consideration to the interim planning guidance¹⁵, as considered in the development design, is summarised below:
- A review of nearby pollution sources identified road emissions as the main pollutant source in the vicinity of the Site. Upon review of publicly available data, annual mean PM_{2.5} concentrations across and in the vicinity of the Site suggest no exceedances to the 2040 future objective of 10µg.m⁻³.
 - As part of the operational phase road emissions assessment, existing sensitive receptors were identified and pollutant concentrations at these receptors were predicted. These included nearby schools which are classified as vulnerable groups. The assessment considered the annual mean PM_{2.5} concentrations against the 2040 future objective of 10µg.m⁻³.
 - A construction phase dust assessment was conducted to consider the impact of dust. On review of background mapping²⁶, annual mean PM_{2.5} concentrations across and in the vicinity of the Site are below 10µg.m⁻³. Therefore, it is considered that with the implementation of the mitigation measures detailed in Section 5, the residual impacts from the construction phase are considered to be 'not significant'.
 - When considering the design of the Site, the proposed primary school and care home are set back from any major roads and is not expected to experience concentrations exceeding the 2040 future objective of 10µg.m⁻³.
- 6.29 Based on the above, the Site was considered suitable for the proposed end use, when considering the 2040 future objective of 10µg.m⁻³. Based on the above and as summarised in Section 6, no exceedances of the 2040 future objective were predicted at any existing receptors, including identified vulnerable groups. Therefore, no further mitigation is required.

7. CONCLUSION

- 7.1 An air quality impact assessment was undertaken for the proposed mixed-use development at land off Basingstoke Road, Spencers Wood.
- 7.2 A qualitative construction phase assessment was undertaken and measures were recommended to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance¹⁷.
- 7.3 A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on with regard to the current relevant air quality objectives at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance¹⁶. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development with regard to the current relevant air quality objectives was predicted to be 'negligible' in accordance with IAQM and EPIC (previously EPUK) guidance¹⁸.
- 7.4 A detailed road traffic emissions assessment was also undertaken to consider the impact of development-generated road traffic on at identified ecological receptor locations within the Thames Valley SPA, Bramshill SSSI and Hazeley Heath SSSI with regards to the relevant critical levels and loads. The results were referred to the project ecologist to determine the significance of the impact. Please refer to the submitted 'Further Information: Air Quality Assessment' accompanying this report.
- 7.5 Pollutant concentrations were also predicted across the Site. Concentrations of NO₂, PM₁₀ and PM_{2.5} were all predicted to be below the current relevant air quality objectives and therefore the Site was considered to be suitable for the proposed end use with regard to the current relevant air quality objectives.
- 7.6 Based on the assessment results, the impact of the proposed development on local air quality with regards to the current relevant air quality objectives was considered to be not significant. No mitigation is required but measures included in the development that may be considered beneficial to air quality include contributing to the My Journey travel planning initiative, ASHPs and EV charging.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

	Definition
AADT	Annual Average Daily Traffic flow.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
EPIC	Environmental Policy Implementation Community (formerly EPUK)
EPUK	Environmental Protection UK.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles (HGVs + buses and coaches)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO ₂	Nitrogen dioxide.
NO _x	Nitrogen oxides.
Percentile	The percentage of results below a given value.
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre (µg.m ⁻³)	A measure of concentration in terms of mass per unit volume. A concentration of 1 µg.m ⁻³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX B: PROPOSED DEVELOPMENT FRAMEWORK PLAN

APPENDIX C: PLANNING POLICY AND LEGISLATION

National Legislation and Planning Policy

The UK Air Quality Strategy

- C.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive¹ sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000², as amended, for the purpose of the Local Air Quality Management Framework. The Air Quality (England) Regulations were amended in 2002⁵ and again in 2010⁶, with miscellaneous amendments added in 2020¹⁰ following the UK exit from the EU. Additionally, an updated PM_{2.5} objective was published in 2023⁹ with an interim target to be achieved by 2028²⁷.
- C.2 The UK Government are required under the Environment Act 1995³ to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997⁷ and was most recently reviewed and updated in 2007⁸ and most recently reviewed and updated in 2023⁹. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.
- C.3 The Environment Act 2021⁴ was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995³ with regard to the Local Air Quality Management regime. Under the Environment Act 2021⁴, the Secretary of State must lay a statement before Parliament setting out progress made in meeting air quality objectives and standard in England and steps taken towards achieving the standards. The Environment Act 2021⁴ also places responsibility on local authorities to co-operate with air quality partners in the preparation of Air Quality Action Plans and identification of measures which should be monitored within the Plan and dates by which they should be implemented.
- C.4 Part IV of the Environment Act³ requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate Air Quality Management Areas (AQMA). Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

- C.5 The National Planning Policy Framework (NPPF)¹² was amended in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.
- C.6 The NPPF¹² recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

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

[...]

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;

[...]

Ground conditions and pollution

[...]

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

[...]

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."

C.7 With regard to assessing cumulative effects the NPPF¹² states:

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

[...]"

Planning Practice Guidance

- C.8 The Planning Practice Guidance (PPG) for air quality¹³ was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.
- C.9 The PPG¹³ sets out the following with regard to air quality and planning:
- *“What air quality considerations does planning need to address;*
 - *What is the role of plan-making with regard to air quality;*
 - *Air quality concerns relevant to neighbourhood planning;*
 - *What information is available about air quality;*
 - *When could air quality considerations be relevant to the development management process;*
 - *What specific issues may need to be considered when assessing air quality impacts;*
 - *How detailed does an air quality assessment need to be; and*
 - *How can an impact on air quality be mitigated”.*
- C.10 The PPG¹³ sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.
- C.11 The PPG¹³ states that development plans may need to consider:
- *“what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*
 - *the impact of point sources of air pollution (pollution that originates from one place);*
 - *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
 - *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
 - *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement”.*
- C.12 The PPG¹³ also states what may be considered relevant to determining a planning application and these include whether a 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;*
- *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".*

C.13 The PPG¹³ provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Wokingham Borough Council, Wokingham Borough Local Development Framework Adopted Core Strategy Development Plan Document

C.14 WBC has adopted the Wokingham Borough Local Development Framework Adopted Core Strategy Development Plan Document¹⁴. The document sets out the vision for how the borough will develop up to 2026 and includes the following policy related to air quality:

"CP1 – Sustainable Development

Planning permission will be granted for development proposals that:

1) Maintain or enhance the high quality of the environment;

2) Minimise the emission of pollutants into the wider environment;

[...]

8) Avoid areas where pollution (including noise) may impact upon the amenity of future occupiers;

[...]"

C.15 The above policy was taken into consideration throughout the undertaking of the assessment.

APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

Table D1: Traffic Data Utilised in the Air Dispersion Modelling Assessment

Road Link	Speed	Scenario 1: 2022 Verification Year		Scenario 2: 2024 Base Year		Scenario 3: 2026 Opening Year Without Development		Scenario 4: 2026 Opening Year With Development	
	Km.hr ⁻¹	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
A33 Basingstoke Road (Northbound)	46	23,091	762	23,613	779	24,135	792	24,008	792
A33 Basingstoke Road (Southbound)	50	20,393	775	20,750	768	21,108	782	21,125	782
M4 Eastbound (east of Junction 11)	109	58,495	2,223	59,786	2,212	61,076	2,144	61,262	2,144
M4 Westbound (east of Junction 11)	107	60,560	2,120	62,099	2,111	63,639	2,112	64,006	2,112
M4 Eastbound (west of Junction 11)	109	57,736	1,617	59,205	1,599	60,675	1,581	60,826	1,581
M4 Westbound (west of Junction 11)	109	53,962	1,457	54,984	1,430	56,006	1,456	56,009	1,456
Church Lane	56	10,758	204	11,402	205	12,046	197	12,284	197
B3349 Hyde End Road	38	8,767	26	9,780	20	10,793	22	10,906	22
B3349 Basingstoke Road	91	9,428	283	10,121	283	10,815	291	10,792	291
Beech Hill Road	61	4,408	0	4,699	0	4,990	0	5,344	0
B3349 Basingstoke Road	54	12,743	344	13,447	350	14,151	340	16,213	340

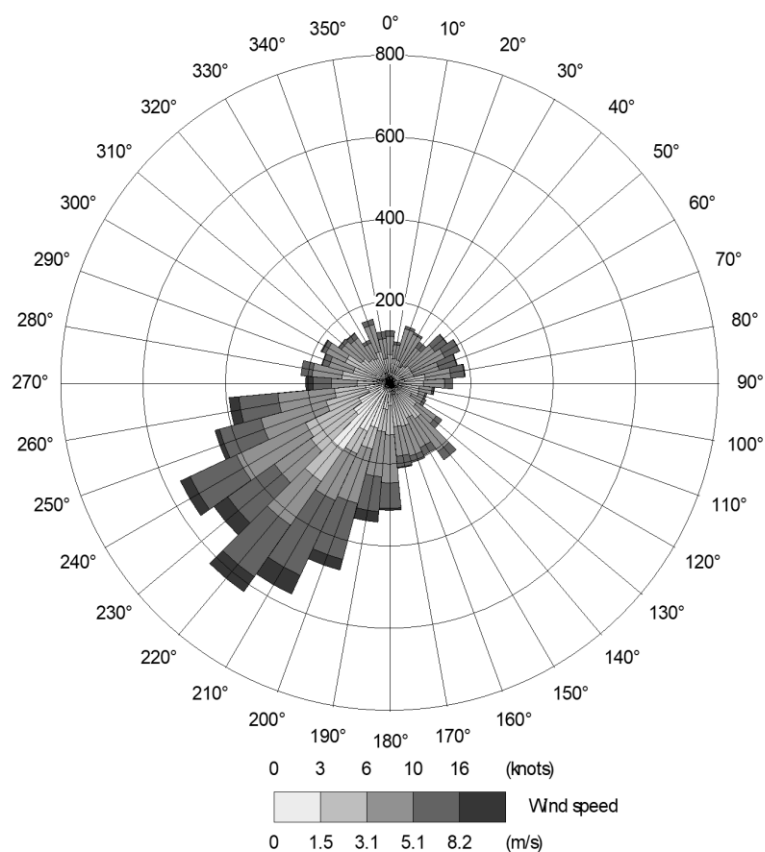
Road Link	Speed	Scenario 1: 2022 Verification Year		Scenario 2: 2024 Base Year		Scenario 3: 2026 Opening Year Without Development		Scenario 4: 2026 Opening Year With Development	
	Km.hr ⁻¹	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
B3349 Basingstoke Road	54	10,857	369	11,195	369	11,533	371	13,264	371
B3349 Basingstoke Road	50	18,215	237	19,030	228	19,845	235	21,335	235
A33 Basingstoke Road (Northbound)	51	22,493	1,080	23,045	1,037	23,597	1,013	23,568	1,013
A33 Basingstoke Road (Southbound)	51	23,235	1,231	23,692	1,232	24,149	1,228	24,069	1,228
Hollow Lane/Old Shinfield Road	38	9,920	40	11,289	56	12,659	64	12,743	64
Shinfield Eastern Relief Road	46	22,166	13,30	24,900	1,370	27,634	1,379	27,573	1,379
Shinfield Road	32	18,395	1,177	19,694	1,201	20,994	1,244	21,080	1,244
B3031 Basingstoke Road	35	15,011	615	15,468	619	15,925	624	15,993	624
A33 Basingstoke Road	48	27,476	1,236	27,940	1,201	28,404	1,148	28,696	1,148
A33 Basingstoke Road	50	26,528	1,273	27,273	1,282	28,018	1,294	28,758	1,294
B3260	43	24,485	710	25,008	750	25,532	765	25,487	765
Whitley Wood Lane	18	114,00	319	12,149	328	12,898	323	12,925	323

Road Link	Speed	Scenario 1: 2022 Verification Year		Scenario 2: 2024 Base Year		Scenario 3: 2026 Opening Year Without Development		Scenario 4: 2026 Opening Year With Development	
	Km.hr ⁻¹	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
B3349 Basingstoke Road	58	7,580	258	8,073	266	8,566	265	9,464	265
A327	50/60	<i>Data not required</i>				11,462	521	11,517	521
B3011	40/50					9,735	228	9,884	228
Bramshill Road	40					6,935	117	7,084	117

D.1 An illustration of the road links included in the ADMS-Roads model is provided in **Figure D1**.

APPENDIX E: WIND ROSE FOR 2022 FOR FARNBOROUGH METEOROLOGICAL RECORDING STATION

- E.1 Meteorological data for 2022 Verification Year scenario for the Farnborough recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2022 is detailed below and illustrates a predominant wind direction from the southwest.



APPENDIX F: MODEL VERIFICATION

- F.1 Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra¹⁶. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.
- F.2 The model was run for Scenario 1: 2022 Verification Year to predict the 2022 annual mean road contributions of NO_x at the monitoring locations in the study area. The model NO_x outputs at these locations were compared to the 2022 monitored concentrations to provide adjustment factors. **Table F1** presents the verification process for NO_x. **Figure F1** details the monitoring locations utilised in the model verification.
- F.3 Monitoring locations WOK841, WOK836 and WOK832 were utilised in the NO_x model verification process. These locations were considered to be representative of the Site and study area due to their proximity to assessed roads and representative standoff distances to the M4 motorway.
- F.4 No monitoring of PM₁₀ and PM_{2.5} is undertaken within the study area. Therefore the adjustment factor calculated during the NO_x verification process was utilised to adjust predicted concentrations of PM₁₀ and PM_{2.5}.

Table F1: NO_x Verification Process

Model Verification Steps	WOK841	WOK836	WOK882
2022 monitored total NO ₂ (µg.m ⁻³)	24.4	21.5	24.9
2022 background NO ₂ concentration (µg.m ⁻³)	10.3	11.1	11.1
Monitored road contribution NO _x (µg.m ⁻³)	32.5	23.3	31.9
Modelled road contribution NO _x (µg.m ⁻³)	17.6	24.4	30.5
Ratio of monitored road NO _x to modelled road NO _x	1.8	1.0	1.0
Adjustment factor for modelled road contribution NO _x	1.1528		
Adjusted modelled road contribution NO _x (µg.m ⁻³)	20.3	28.1	35.2
Modelled total NO ₂ concentration (µg.m ⁻³)	19.5	23.4	26.1
Monitored total NO ₂ concentration (µg.m ⁻³)	24.4	21.5	24.9
% difference between modelled and monitored total NO ₂ concentration	24.4	21.5	24.9
RMSE % (should be less than 25% and ideally less than 10%)	7.8%		

Road-NO_x component, determined from NO_x to NO₂ calculator

- F.5 A road-NO_x factor of **1.1528** was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. This factor was then applied to the modelled road-NO_x concentration

at each receptor, before conversion to NO₂ concentrations using the NO_x to NO₂ calculator provided by Defra¹⁶.

- F.6 The RMSE was calculated at 7.8% which is well within the recommended guideline variance as suggested by the Defra guidance¹⁶. Model performance is therefore considered to be good.

Figure F1: Monitoring Locations Utilised in the ADMS-Roads Model Verification Process

