

ENVIRONMENT

Richborough Estates Limited
Hinckley North – Phase 2
Hinckley
Air Quality Assessment

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Hinckley North – Phase 2
Hinckley
Air Quality Assessment

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EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough Estates Limited to undertake an air quality assessment for a proposed residential development at land off Normandy Way, Hinckley.

The Site is located within the administrative area of Hinckley and Bosworth Borough Council. The Site is not located within, or in the vicinity of, an existing Air Quality Management Area.

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 Protection UK guidance. The proposed development was not predicted to result in any new exceedances of the current relevant air quality objectives and the impact of the development on local air quality was predicted to be 'negligible' in accordance with guidance.

Concentrations of nitrogen dioxide and particulate matter (PM₁₀ and PM_{2.5}) were also predicted across the Site and the suitability of the Site for the proposed residential use was considered with regard to air quality. Pollutant concentrations were predicted to be below the current relevant air quality objectives for England and the Site was therefore considered suitable for the proposed use with regard to these objectives.

No mitigation measures are required; however, the proposed development includes measures such as the implementation of a Travel Plan. The inclusion of these measures may have beneficial impacts with regard to air quality.

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1. INTRODUCTION

- 1.1 BWB Consulting Limited (BWB) was instructed by Richborough Estates Limited (the Client) to undertake an air quality assessment for a proposed residential development at land off Normandy Way, Hinckley ('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. In addition, pollutant concentrations were predicted across the Site to consider the suitability of the Site for the proposed residential use.
- 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**.

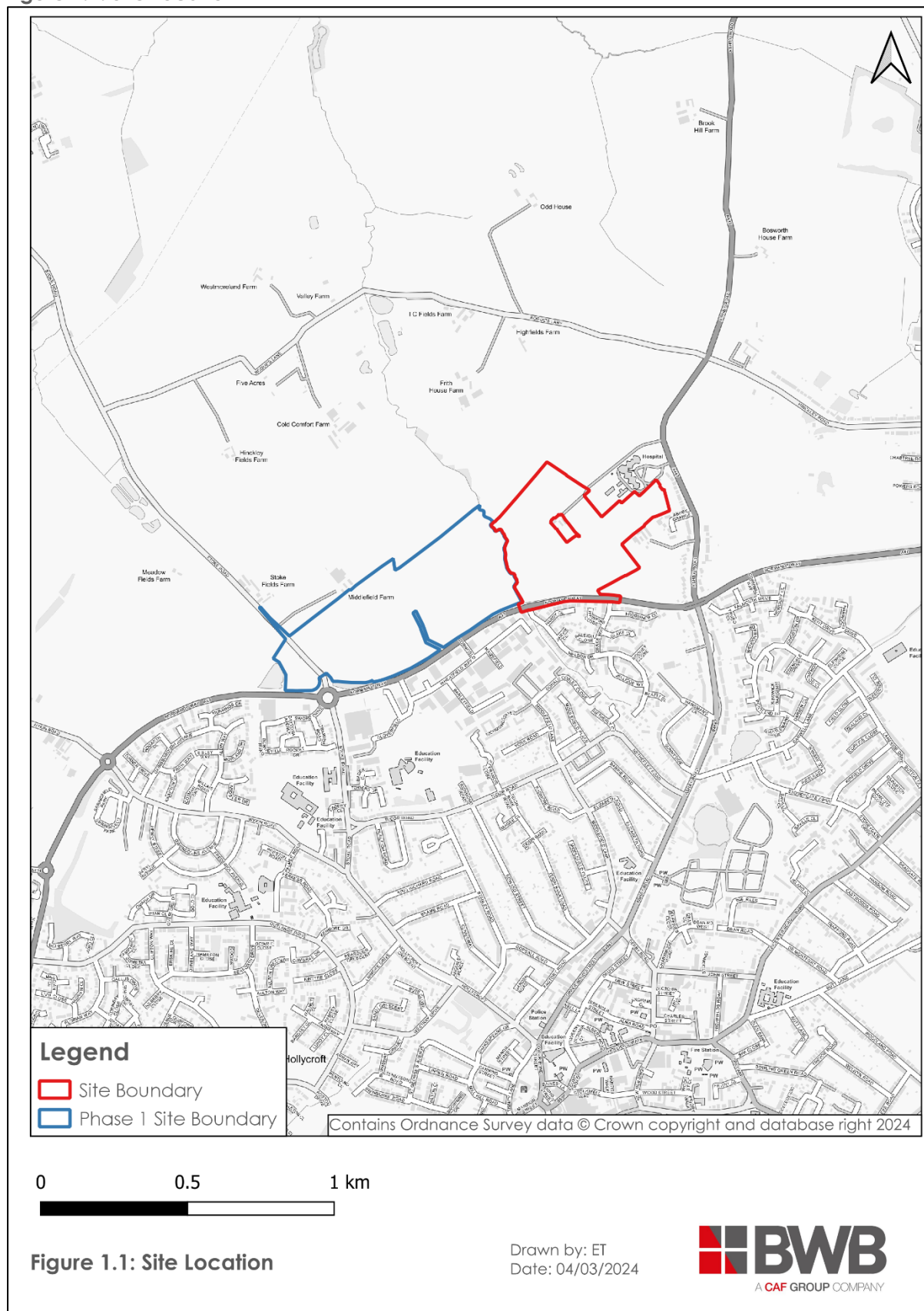
Site Setting

- 1.4 The Site is located at the northern edge of Hinckley, to the north off the A47 Normandy Way. It lies within the administrative area of Hinckley and Bosworth Borough Council (HBBC). **Figure 1.1** details the location of the proposed development. The Site currently comprises agricultural land and farm buildings.
- 1.5 The Site forms Phase 2 of the wider Hinckley North site. Phase 1 of the wider development is located immediately west of the Site, as illustrated in **Figure 1.1**.
- 1.6 To the north and west of the Site lies agricultural land, with the Hinckley and Bosworth Community Hospital situated immediately north-east of the Site. To the east are residential dwellings, with the A447 Ashby Road and agricultural land beyond. The A47 Normandy Way bounds the Site to the south, with residential dwellings and commercial properties beyond.
- 1.7 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions from the A47 Normandy Way and the A447 Ashby Road. The Site is not located within an existing Air Quality Management Area (AQMA); however, the Leicester Road Gyratory AQMA is located approximately 6.6km south-west of the Site. It was declared by the neighbouring local authority of Nuneaton and Bedworth Borough Council (NBBC) for potential exceedances of the annual mean nitrogen dioxide (NO₂) air quality objective.

Proposed Development

- 1.8 The proposed development comprises an outline planning application with all matters reserved except for access, for the erection of up to 415 dwellings, associated open space, drainage, landscaping and infrastructure. The proposed development masterplan 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**:

- Hinckley & Bosworth Borough Council, Local Development Framework Core Strategy (2009)¹⁴; and
- Hinckley & Bosworth Borough Council, Hinckley and Bosworth Local Plan 2020-2039 (Pre-Submission Local Plan Regulation 19) (2022)¹⁵.

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 of the Environment, Food and Rural Affairs (Defra) (2023) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO

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 Hinckley & Bosworth Borough Council (2009) Local Development Framework Core Strategy

¹⁵ Hinckley & Bosworth Borough Council (2022) Hinckley and Bosworth Local Plan 2020-2039 (Pre-Submission Local Plan Regulation 19)

Air Quality Assessment Guidance

2.3 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; and
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)¹⁸.

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 Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality

3. METHODOLOGY

Consultation with Hinckley and Bosworth Borough Council

- 3.1 Consultation was undertaken with the Environmental Health department at HBBC in which the proposed assessment methodology was provided via email on 14th November 2023. A response was received on 14th November 2023 to confirm that the proposed methodology was acceptable.
- 3.2 The methodology utilised in the air quality assessment is summarised 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 Protection UK (EPUK)¹⁸ guidance. Pollutant concentrations were predicted across the Site to consider the suitability of the Site for residential use.
- 3.3 Full details of the methodology used in the assessment, as agreed with HBBC, are provided below.

Construction Phase Dust Assessment

- 3.4 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 is 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

- 3.5 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 and proposed receptor locations.
- 3.6 The assessment was undertaken in accordance with Defra LAQM.TG22 guidance¹⁶ and IAQM and EPUK guidance¹⁸.

Assessment Scenarios and Traffic Data

- 3.7 The following scenarios were considered in the air dispersion modelling:
- Scenario 1: 2022 Verification Year;
 - Scenario 2: 2023 Base Year;
 - Scenario 3: 2028 Opening Year without development; and
 - Scenario 4: 2028 Opening Year with development.
- 3.8 Traffic data were obtained from Hub Transport Planning, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:
- A5 Watling Street;
 - A47 Normandy Way/ Clickers Way/ Dodwells Road/ The Long Shoot;
 - A447 Ashby Road;
 - B4666 Coventry Road;
 - B4667 Ashby Road; and
 - Stoke Road.
- 3.9 A growth factor was provided by Hub Transport Planning, the Transport Consultants for the project, for the A47 Normandy Way (east of Leicester Road) for use in model verification.
- 3.10 Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free flowing traffic conditions were modelled at their respective speed limits. Queuing sections were modelled in accordance with Defra guidance¹⁶.
- 3.11 Traffic data used in the air dispersion modelling are provided in **Appendix D**. Committed developments in the vicinity of the Site, including Phase 1 of the wider Hinckley North development, were considered in the traffic data.

ADMS-Roads Model Inputs

3.12 The following model inputs were utilised in the assessment:

- Emission factors – emission factors were utilised from the Defra Emission Factor Toolkit¹⁹ (EFT), version 11.0, for the years of assessment (2022, 2023 and 2028).
- Conversion of oxides of nitrogen – concentrations of NO_x were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO₂) using the Defra NO_x to NO₂ calculator²⁰, version 8.1.
- Meteorological data – hourly sequential meteorological data for the verification year of assessment (2022) were obtained for the East Midlands Airport recording station. This was the closest, most representative recording station to the Site. The wind rose for 2022 is provided in **Appendix E**.
- Surface roughness and Monin-Obukhov length (MO) – Site – a surface roughness of 0.5m and a MO length of 30m were utilised in the air dispersion model to represent conditions at the Site and within the Study area. These parameters were considered to represent the location of the Site on the edge of an urban area, adjacent to open land.
- Surface roughness and Monin-Obukhov length (MO) – Meteorological Station – a surface roughness of 0.5m and a MO length of 30m were utilised in the air dispersion model to represent conditions at the meteorological station. This is considered representative of the open, semi-urban location of the meteorological station.
- Background pollutant concentrations – background concentrations of NO₂, PM₁₀ and PM_{2.5} for the study area were obtained from the pollutant concentration maps²¹ provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2022, 2023 and 2028).
- Model verification – as agreed during consultation with HBBC, model verification was undertaken using 2022 monitoring data available for the study area, from monitoring locations operated by HBBC and NBBC. The verification locations used were considered to be representative of the Site and study area. Full details of the verification procedure are provided in **Appendix F**.
- Calculation of short term PM₁₀ 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:

$$\text{Number of 24-Hour Mean Exceedance} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$$

Receptor Locations

Existing Sensitive Receptors

3.13 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.8 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 3.7. 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

¹⁹ Defra (2021) Emission Factor Toolkit [<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>]

²⁰ Defra (2020) NO_x to NO₂ Calculator [<https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>]

²¹ Defra (2020) background pollutant concentration maps [<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>]

result of the proposed development. Receptor heights were modelled at 1.5m to represent average ground floor breathing height, with the exception of a nursery and a primary school which were modelled at a height of 0.8m to represent the lower average breathing height of children.

3.14 The existing receptor locations are detailed in **Table 3.1** and **Figure 3.1**.

Table 3.1: Existing Sensitive Receptor Locations

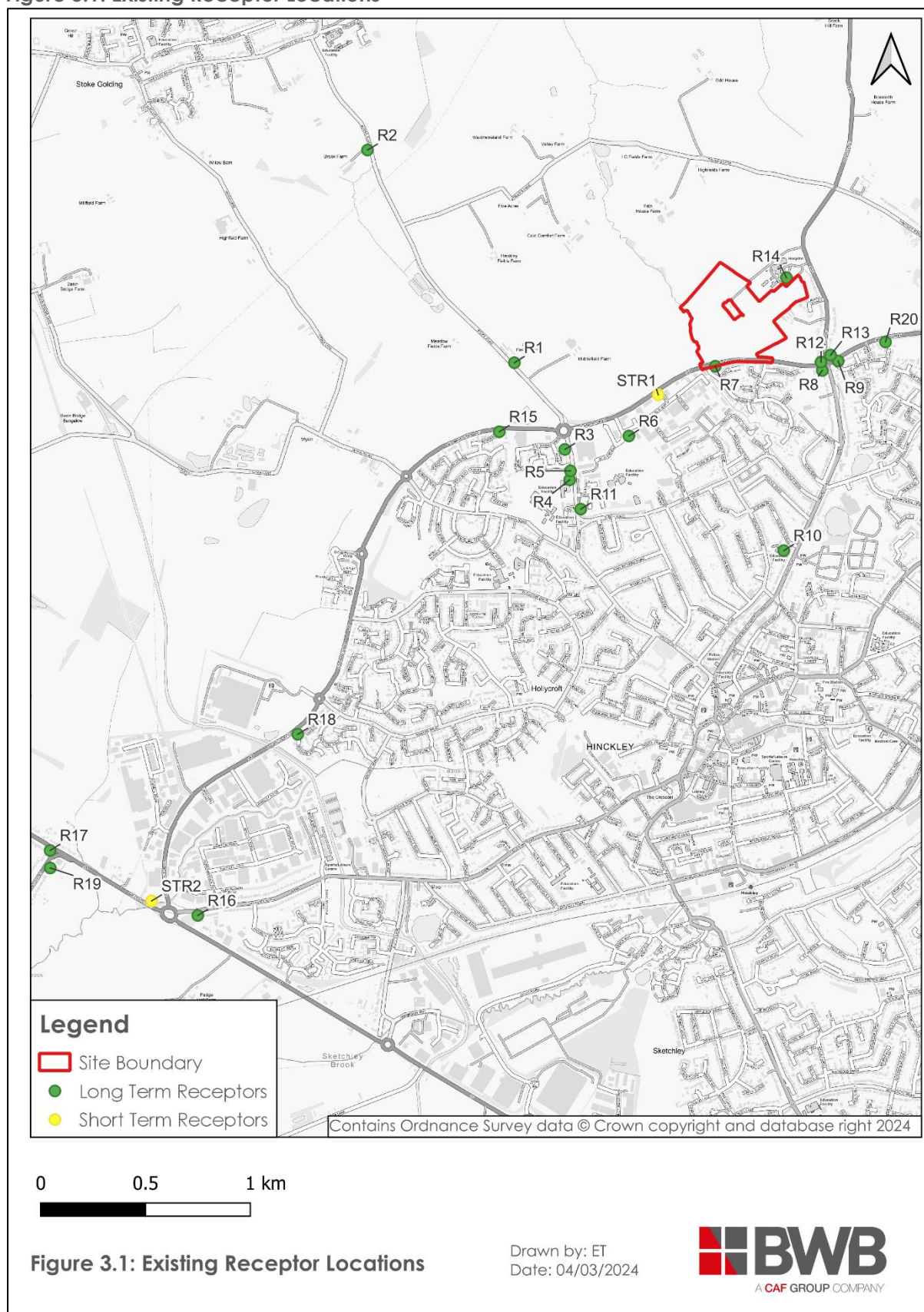
Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
Long Term Receptors				
R1	441607	295716	Residential dwelling on Stoke Road	1.5
R2	440909	296731	Residential dwelling on Stoke Road	1.5
R3	441850	295303	Residential apartment complex on Triumph Road	1.5
R4	441867	295158	Primary school on Stoke Road	0.8
R5	441875	295201	Residential dwelling on Stoke Road	1.5
R6	442150	295372	Nursery on Wheatfield Way	0.8
R7	442566	295695	Residential dwelling on Normandy Way	1.5
R8	443075	295681	Residential dwelling on Ashby Road	1.5
R9	443147	295723	Residential dwelling on Normandy Way	1.5
R10	442892	294820	Sixth Form on Middlefield Lane	1.5
R11	441925	295019	Residential dwelling on Stoke Road	1.5
R12	443071	295716	Residential dwelling on Normandy Way	1.5
R13	443113	295751	Residential dwelling on Ashby Road	1.5
R14	442904	296122	Hospital on Ashby Road	1.5
R15	441535	295388	Residential dwelling on Munnings Drive	1.5
R16	440091	293082	Residential dwelling on Coventry Road	1.5
R17	439395	293393	Residential dwelling on The Long Shoot	1.5

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R18	440572	293946	Residential dwelling on Lovetts Close	1.5
R19	439395	293315	Residential dwelling on The Long Shoot	1.5
R20	443377	295815	Residential dwelling on Newquay Close	1.5
<i>Short Term Receptors</i>				
ST1	442292	295564	Cafe on Normandy Way	1.5
ST2	439880	293149	Cafe on Dodwells Road	1.5

Proposed Receptor Locations

- 3.15 Pollutant concentrations were predicted across the Site to consider exposure of future residents of the proposed development to air quality. Pollutant concentrations were predicted for Scenario 4: 2028 Opening Year with development. A Cartesian grid was modelled at a height of 1.5m, to represent average ground floor breathing height, from minimum X 442000 Y 295500 to maximum X 443500 Y 296500.

Figure 3.1: Existing Receptor Locations



Limitations and Assumptions

- 3.16 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.
- 3.17 The assessment is based on traffic data provided by Hub Transport Planning, the transport consultants for the project. As such any assumptions made by the transport consultants will also influence the air quality assessment.
- 3.18 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 EFT¹⁹ to provide the most up to date estimate of current and future emission projections.
- 3.19 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.
- 3.20 Consideration of committed local developments that may represent sensitive receptors to dust during the construction phase was undertaken through a review of the HBBC planning portal. Any applications submitted following the review, or not present on the portal at the time of review, were not considered.
- 3.21 The traffic data on which the model is based assumes that the development comprises 400 dwellings, whereas following scheme updates it currently comprises 415 dwellings. However, taking into consideration the low baseline and background pollutant concentrations in the local area, as described in **Section 4**, and those predicted by the detailed modelling in **Section 6** in the future year scenarios, it is unlikely that this small increase in the number of dwellings would result in any changes in the assessment results.

Assessment Criteria

- 3.22 Predicted pollutant concentrations were compared to the relevant air quality objectives^{7,10,11}. The current relevant air quality standards and objectives are detailed in **Table 3.2**.

Table 3.2: 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

Pollutant	Averaging Period	Air Quality Objective ($\mu\text{g.m}^{-3}$)	Date to Achieve by
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 Plan²²</i>	12	<i>31 January 2028</i>
	Annual mean	10	31 December 2040

Italics denotes future air quality objectives published by the UK Government that will come into force in the future.

- 3.23 Guidance is provided by the IAQM and EPUK¹⁸ 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 3.3**. These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the relevant air quality objectives.

Table 3.3: 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

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.

²² Defra (2023) Environmental Improvement Plan 2023, First revision of the 25 Year Environment Plan

4. BASELINE CONDITIONS

Local Air Quality Management

- 4.1 The Site is not located within an existing AQMA. The closest AQMA to the Site is the Leicester Road Gyratory AQMA, located approximately 6.6km southwest of the Site. It was declared by the neighbouring local authority, NBBC, for potential exceedances of the annual mean NO₂ air quality objective.

Local Air Quality Monitoring

Nitrogen Dioxide

- 4.2 HBBC undertakes monitoring of NO₂ concentrations using a network of diffusion tubes, the closest of which is DT1, located approximately 1.9km south of the Site on Trinity Lane. The neighbouring local authority of NBBC also operates diffusion tube monitoring in the study area, the closest of which is monitoring location NB35, located approximately 3.9km south-west of the Site on Watling Street. Diffusion tube monitoring in the administrative area of Blaby District Council (BDC) was also considered within the review of baseline conditions.
- 4.3 Bias adjusted NO₂ monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 4.1**. 2020 and 2021 monitoring data were available and were therefore included in the review. However, due to the COVID-19 pandemic and associated lockdown restrictions influencing road traffic levels, monitoring results from 2020 and 2021 are not considered to be representative of normal conditions. As there is no position statement regarding the use of 2022 monitoring data, 2022 data was treated as the last year of 'normal' monitoring data.

Table 4.1: HBBC, NBBC and BDC NO₂ Monitoring Data in 2015 – 2022

Location and Reference	Grid Reference (X,Y)	Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration (µg.m ⁻³)							
				2015	2016	2017	2018	2019	2020	2021	2022
DT 1 – Trinity Lane	442417, 293808	Urban Centre	1.9km south	25.9	25.0	21.6	20.3	19.6	15.6	17.1	16.3
DT 7 – 66 London Road	443624, 293829	Suburban	2.1km south-east	-	24.4	23.6	21.3	21.1	16.9	17.6	18.1
DT 15 – 93 Rugby Road, Hinckley	442291, 293579	Urban Centre	2.2km south	-	35.9	35.1	31.1	29.0	24.9	25.5	23.6
DT 16 – 171 Rugby Road, Hinckley	442328, 293264	Suburban	2.5km south	-	26.3	27.6	25.0	24.0	18.9	18.6	18.9

Location and Reference	Grid Reference (X,Y)	Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration ($\mu\text{g.m}^{-3}$)							
				2015	2016	2017	2018	2019	2020	2021	2022
DT 6 – 207 Rugby Road, Burbage	442592, 292938	Suburban	2.8km south	-	22.6	21.6	20.4	19.8	15.6	17.0	16.4
DT 8 – Earl Shilton Bypass	446696, 296771	Suburban	3.7km east	17.4	17.9	17.7	16.2	19.1	15.6	17.2	17.7
NB35 – 60 Watling Street (NBBC)	439268, 293457	Roadside	3.9km south-west	24.8	24.8	23.2	22.9	23.0	16.7	16.8	17.6
DT 69 – Station Road, Elmhurst (BDC)	454079, 303535	Roadside	3.9km east	-	-	-	26.3	16.7	12.9	14.5	15.3

- indicates data not available. Monitoring locations are within HBBC administrative area unless stated otherwise.

- 4.4 As detailed in **Table 4.1**, monitored annual mean NO_2 concentrations recorded at monitoring locations in the vicinity of the Site were all below the current annual mean NO_2 air quality objective of $40\mu\text{g.m}^{-3}$ between 2015 and 2022. There was an overall downward trend in monitored NO_2 concentrations, with the exception of monitored concentrations at DT8 where concentrations fluctuated between 2015 and 2022.
- 4.5 Monitoring locations DT8 and NB35 are considered to be representative of the Site and of sensitive receptors in the study area due to their locations on the main road network. DT8 is located adjacent to the A47 Clickers Way whilst NB35 is located on the A5 Watling Street, with these roads considered to be the predominant emissions sources in the vicinity of the Site. Monitoring locations DT8 and NB35 were therefore utilised in the model verification process.
- 4.6 Monitoring locations DT1, DT6, DT7, DT15 and DT16 were excluded from the model verification process due to their locations within the urban centre of Hinckley, which is not considered to be representative of conditions in the study area. Monitoring location DT69, within the administrative area of BDC, was also excluded from the model verification process as its rural setting, adjacent to a railway line, was also not considered to be representative of conditions at the Site. Full details of the verification process can be found in **Appendix F**.

Particulate Matter (PM_{10} and $\text{PM}_{2.5}$)

- 4.7 No monitoring of particulate matter is undertaken by HBBC or NBBC within their administrative areas.

Background Pollutant Concentrations

- 4.8 No background air quality monitoring is undertaken by HBBC within the study area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps²¹, which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2018 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, 2023 and 2028). 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	2023	2028
Monitoring Locations Used in Verification					
NO ₂	446500, 296500	DT8	10.1	9.9	8.5
PM ₁₀			13.1	13.0	12.7
PM _{2.5}			8.4	8.3	8.0
NO ₂	439500, 293500	NB35	13.4	13.0	11.4
PM ₁₀			13.9	13.8	13.4
PM _{2.5}			8.8	8.7	8.5
Receptors					
NO ₂	441500, 295500	R1, R3 – R5, R11, R15	10.4	10.1	8.7
PM ₁₀			13.4	13.2	12.9
PM _{2.5}			8.4	8.3	8.0
NO ₂	440500, 296500	R2	8.7	8.5	7.5
PM ₁₀			12.6	12.5	12.2
PM _{2.5}			8.0	7.9	7.6
NO ₂	442500, 295500	R6, R7, STR1	10.9	10.6	9.2
PM ₁₀			13.1	13.0	12.7

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration ($\mu\text{g.m}^{-3}$)		
			2022	2023	2028
PM _{2.5}			8.5	8.4	8.1
NO ₂	443500, 295500	R8, R9, R12, R13, R20	10.7	10.4	9.0
PM ₁₀			13.0	12.9	12.6
PM _{2.5}			8.5	8.4	8.1
NO ₂	442500, 294500	R10	12.1	11.8	10.4
PM ₁₀			13.3	13.2	12.9
PM _{2.5}			8.9	8.8	8.5
NO ₂	442500, 296500	R14	8.7	8.5	7.5
PM ₁₀			13.2	13.1	12.8
PM _{2.5}			8.2	8.0	7.8
NO ₂	440500, 293500	R16, R18	13.8	13.4	12.0
PM ₁₀			13.4	13.3	13.0
PM _{2.5}			8.7	8.5	8.3
NO ₂	439500, 293500	R17, R19, STR2	13.4	13.0	11.4
PM ₁₀			13.9	13.8	13.4
PM _{2.5}			8.8	8.7	8.5

- 4.9 Background pollutant concentrations are below the current relevant annual mean air quality objectives for NO₂, PM₁₀ and PM_{2.5} for England. Background PM_{2.5} concentrations are also below both the 2028 interim target of 12 $\mu\text{g.m}^{-3}$ and the 2040 future annual mean air quality objective of 10 $\mu\text{g.m}^{-3}$.
- 4.10 With the exception of R16 and R18, background PM₁₀ concentrations are higher than NO₂ concentrations. This is considered to be as a result of high proportions of residual and secondary particulate matter contributing to total PM₁₀ concentrations.

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. These include emissions of dust generated through demolition, excavation, construction, earthworks and trackout activities, exhaust pollutant emissions from construction traffic on the local highways network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.
- 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) website²³, 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 the A447 Ashby Road and Ashby Grange. 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**.

²³ 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
Demolition	Large	Total building volume >75,000m ³ , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12m above ground level.
	Medium	Total building volume 12,000m ³ – 75,000m ³ , potentially dusty construction material, demolition activities 6 - 12m above ground level.
	Small	Total building volume <12,000m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months.
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 <4m 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 emissions magnitudes were defined for the proposed development:

- Demolition – The proposed development will require the demolition of existing buildings within the Site, with the exception of the Sunnyside Farm farmhouse. The total building volume to be demolished is estimated to be between 12,000m³ and 75,000m³. The dust emissions magnitude for demolition was therefore defined as **Medium**.
- Earthworks – The total Site area is greater than 110,000m². The dust emissions magnitude for earthworks was therefore defined as **Large**.
- Construction – The proposed development comprises the construction of circa 460 residential dwellings. The total building volume is therefore anticipated to be greater than 75,000m³. The dust emissions magnitude for construction was therefore defined as **Large**.
- Trackout – HDV movement data was unavailable at the time of the assessment. Given the development quantum, it is anticipated that there will be between 20 and 50 outward HDV movements in any one day at the peak of construction. The dust emissions magnitude for trackout was therefore defined as **Medium**. As such, the trackout distance utilised in the assessment was 200m from the Site access locations, in accordance with IAQM guidance¹⁷.

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

Table 5.2: Summary of Project Defined Dust Emissions Magnitudes

Activity	Dust Emissions Magnitude
Demolition	Medium
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.

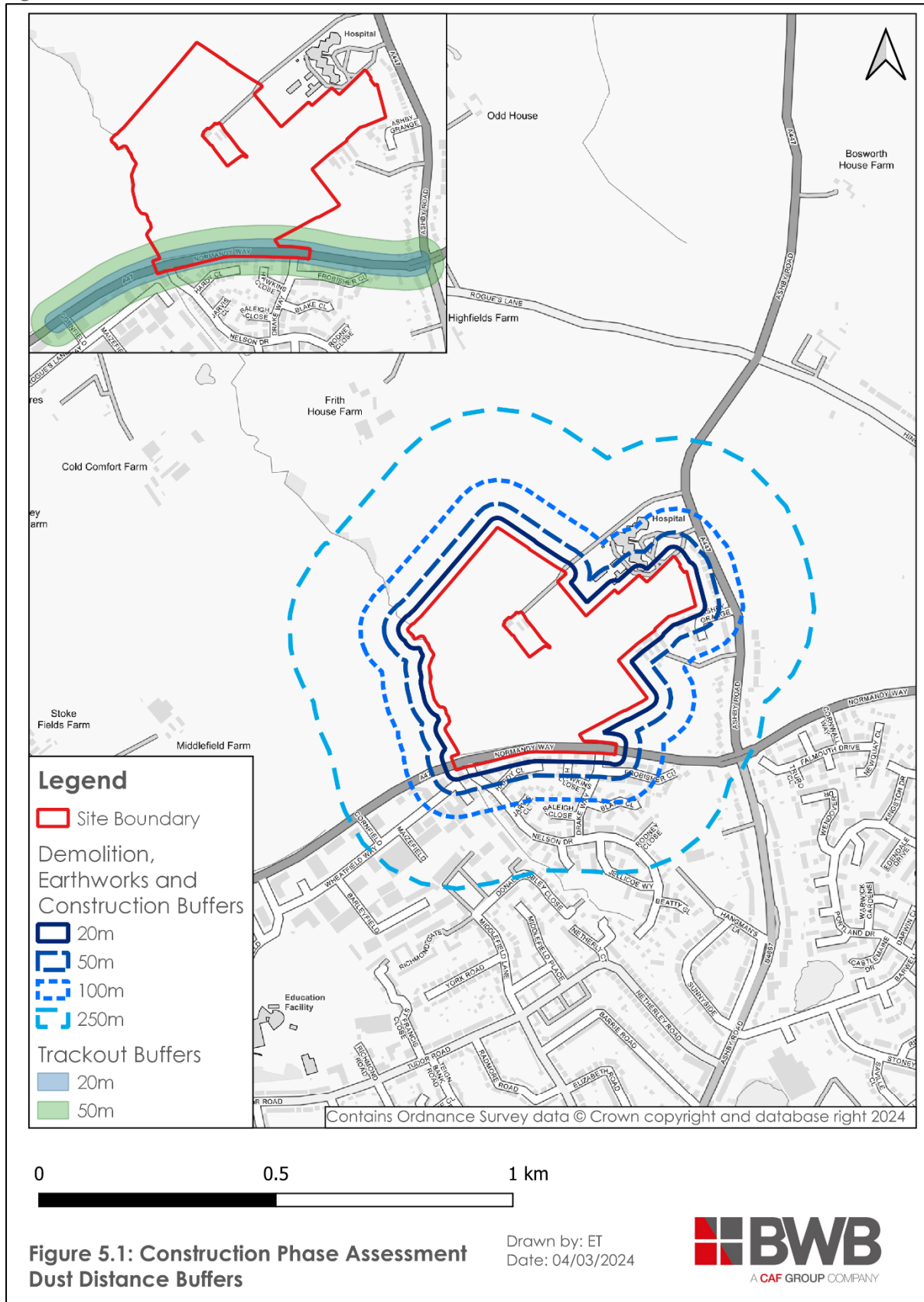
5.10 The sensitivity of the area is defined below, in accordance with IAQM criteria¹⁷ and summarised in **Table 5.3**.

- Dust Soiling – there are between 10 and 100 highly sensitive residential dwellings located within 50m of the Site boundary. The Hinckley and Bosworth Community Hospital and associated car parking, which are both considered to be highly sensitive receptors to dust soiling, are also within 50m of the Site boundary. With regard to trackout, there are between 10 and 100 residential dwellings within 20m of the public roads to be used by construction vehicles up to 200m from the Site access points. As such, the sensitivity of the area to dust soiling is defined as '**High**'.
- Human Health – there are between 10 and 100 residential dwellings located within 50m of the Site boundary, as well as the Hinckley and Bosworth Community Hospital. These are considered to be highly sensitive receptors. With regard to trackout, there are between 10 and 100 residential dwellings within 20m of the public roads to be used by construction vehicles up to 200m from the Site access points. However, as identified in **Table 4.2**, the background PM₁₀ concentration is below 24 µg.m⁻³. The sensitivity of the area to human health impacts is therefore defined as '**Medium**' for demolition, earthworks and construction, and '**Low**' for trackout.

Table 5.3: Determination of the Sensitivity of the Area

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

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
<i>Dust Soiling Effects on People and Property</i>			
Demolition	Medium	High	Medium Risk
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Medium	High	Medium Risk
<i>Human Health Impacts</i>			
Demolition	Medium	Medium	Medium Risk
Earthworks	Large	Medium	Medium Risk
Construction	Large	Medium	Medium Risk
Trackout	Medium	Low	Low 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 demolition, 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 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.	None
	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.	
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.	None
	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	

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
	when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	
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.	
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	None
	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
Demolition (Medium Risk Site)	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
	Avoid explosive blasting, using appropriate manual or mechanical alternatives.	
	Bag and remove any biological debris or damp down such material before demolition.	
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 power 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	None

Category	Mitigation Measures	
	Highly Recommended	Desirable
	the site. This may require the sweeper being continuously in use.	
	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.	
	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: 2023 Base Year and Scenario 3: 2028 Opening Year without development are detailed in **Table 6.1**.

Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2023 Base Year and Scenario 3: 2028 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2023 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2028 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R1	13.5	14.1	8.8	11.2	14.0	8.6
R2	10.2	12.9	8.1	8.7	12.7	7.9
R3	13.2	14.1	8.8	11.0	14.0	8.6
R4	12.1	13.8	8.6	10.1	13.6	8.4
R5	13.1	14.1	8.8	10.8	13.9	8.6
R6	12.2	13.4	8.6	10.3	13.2	8.4
R7	17.1	15.0	9.5	13.8	15.1	9.4
R8	15.6	14.4	9.2	12.7	14.4	9.1
R9	18.2	15.2	9.7	14.5	15.3	9.6
R10	13.0	13.5	9.0	11.2	13.2	8.7
R11	13.2	14.1	8.8	10.9	13.9	8.6
R12	21.0	16.1	10.2	16.9	16.5	10.3
R13	17.7	15.0	9.5	14.3	15.1	9.5
R14	9.4	13.3	8.2	8.1	13.1	8.0
R15	15.0	14.7	9.1	12.4	14.8	9.1

Receptor	Scenario 2: 2023 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2028 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R16	19.0	15.0	9.5	15.3	14.7	9.2
R17	21.0	16.2	10.1	16.4	16.1	9.9
R18	17.9	14.7	9.3	15.1	14.6	9.2
R19	19.7	15.7	9.8	15.7	15.6	9.7
R20	14.2	14.0	9.0	11.6	13.9	8.8
STR1	17.3	15.0	9.5	14.0	15.1	9.5
STR2	22.4	16.7	10.3	17.4	16.6	10.2
DT8	16.2	15.0	9.4	8.5	12.7	8.0
NB35	17.5	15.3	9.6	14.1	15.1	9.3

Italics indicates short-term receptor locations.

- 6.2 The baseline assessment for Scenario 2: 2023 Base Year and Scenario 3: 2028 Opening Year without development indicates that predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} are below the respective current annual mean air quality objectives for England at all receptor locations considered.
- 6.3 In addition, annual mean PM_{2.5} concentrations were predicted to be below the 2028 interim annual mean target of 12 $\mu\text{g.m}^{-3}$ in Scenarios 2 and 3. The majority of receptor locations were also predicted to be below the 2040 future annual mean objective of 10 $\mu\text{g.m}^{-3}$ in Scenarios 2 and 3. This is with the exception of R12 in both Scenarios 2 and 3 and R17 in Scenario 2. Receptor R17 is located on the A5 Watling Street whilst R12 is located at the junction of the A47 Normandy Way and the A447 Ashby Road, in the vicinity of the Site. Exceedances of the 2040 future PM_{2.5} objective were also experienced at STR2; however, in accordance with Defra guidance¹⁶, the annual mean objectives do not apply at short term receptor locations.
- 6.4 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 exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.12 was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

- 6.5 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at identified existing receptor locations for Scenario 4: 2028 Opening Year with development, to consider the impact of development-generated vehicles on local air quality.
- 6.6 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: 2028 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: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	11.2	11.3	+0.1	0	Negligible
R2	8.7	8.8	+0.1	0	Negligible
R3	11.0	11.1	+0.1	0	Negligible
R4	10.1	10.2	+0.1	0	Negligible
R5	10.8	11.0	+0.1	0	Negligible
R6	10.3	10.4	+0.1	0	Negligible
R7	13.8	14.1	+0.3	+1	Negligible
R8	12.7	12.8	+0.1	0	Negligible
R9	14.5	14.7	+0.2	0	Negligible
R10	11.2	11.2	0.0	0	Negligible
R11	10.9	11.0	+0.1	0	Negligible
R12	16.9	17.2	+0.3	+1	Negligible

Receptor	Predicted NO ₂ Concentration (µg.m ⁻³)				
	Scenario 3: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R13	14.3	14.5	+0.1	0	Negligible
R14	8.1	8.2	0.0	0	Negligible
R15	12.4	12.6	+0.1	0	Negligible
R16	15.3	15.4	0.0	0	Negligible
R17	16.4	16.4	0.0	0	Negligible
R18	15.1	15.1	0.0	0	Negligible
R19	15.7	15.7	0.0	0	Negligible
R20	11.6	11.7	+0.1	0	Negligible
STR1	14.0	14.2	+0.3	+1	Negligible
STR2	17.4	17.5	0.0	0	Negligible
DT8	8.5	8.5	0.0	0	Negligible
NB35	14.1	14.1	0.0	0	Negligible

* Discrepancies in changes due to rounding effects. *Italics indicates short-term receptor locations.*

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: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	14.0	14.1	+0.1	0	Negligible
R2	12.7	12.7	0.0	0	Negligible
R3	14.0	14.0	+0.1	0	Negligible

Receptor	Predicted PM ₁₀ Concentration (µg.m ⁻³)				
	Scenario 3: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R4	13.6	13.6	0.0	0	Negligible
R5	13.9	14.0	+0.1	0	Negligible
R6	13.2	13.2	0.0	0	Negligible
R7	15.1	15.2	+0.1	0	Negligible
R8	14.4	14.5	+0.1	0	Negligible
R9	15.3	15.4	+0.1	0	Negligible
R10	13.2	13.2	0.0	0	Negligible
R11	13.9	14.0	+0.1	0	Negligible
R12	16.5	16.7	+0.1	0	Negligible
R13	15.1	15.2	+0.1	0	Negligible
R14	13.1	13.1	0.0	0	Negligible
R15	14.8	14.9	+0.1	0	Negligible
R16	14.7	14.7	0.0	0	Negligible
R17	16.1	16.1	0.0	0	Negligible
R18	14.6	14.7	0.0	0	Negligible
R19	15.6	15.6	0.0	0	Negligible
R20	13.9	14.0	+0.1	0	Negligible
STR1	15.1	15.3	+0.1	0	Negligible
STR2	16.6	16.6	0.0	0	Negligible
DT8	12.7	12.7	0.0	0	Negligible

Receptor	Predicted PM ₁₀ Concentration (µg.m ⁻³)				
	Scenario 3: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
NB35	15.1	15.1	0.0	0	Negligible

* Discrepancies in changes due to rounding effects. *Italics indicates short-term receptor locations.*

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: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	8.6	8.7	0.0	0	Negligible
R2	7.9	7.9	0.0	0	Negligible
R3	8.6	8.7	0.0	0	Negligible
R4	8.4	8.4	0.0	0	Negligible
R5	8.6	8.6	0.0	0	Negligible
R6	8.4	8.4	0.0	0	Negligible
R7	9.4	9.5	+0.1	0	Negligible
R8	9.1	9.1	0.0	0	Negligible
R9	9.6	9.7	+0.1	0	Negligible
R10	8.7	8.7	0.0	0	Negligible
R11	8.6	8.6	0.0	0	Negligible
R12	10.3	10.4	+0.1	0	Negligible
R13	9.5	9.6	0.0	0	Negligible
R14	8.0	8.0	0.0	0	Negligible

Receptor	Predicted PM _{2.5} Concentration (µg.m ⁻³)				
	Scenario 3: 2028 Without Development (µg.m ⁻³)	Scenario 4: 2028 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R15	9.1	9.1	0.0	0	Negligible
R16	9.2	9.2	0.0	0	Negligible
R17	9.9	9.9	0.0	0	Negligible
R18	9.2	9.2	0.0	0	Negligible
R19	9.7	9.7	0.0	0	Negligible
R20	8.8	8.9	0.0	0	Negligible
STR1	9.5	9.5	+0.1	0	Negligible
STR2	10.2	10.2	0.0	0	Negligible
DT8	8.0	8.0	0.0	0	Negligible
NB35	9.3	9.3	0.0	0	Negligible

* Discrepancies in changes due to rounding effects. *Italics indicates short-term receptor locations.*

- 6.7 The predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 3: 2028 Opening Year without development and Scenario 4: 2028 Opening Year with development are below the respective current annual mean air quality objectives for England at all receptor locations considered. The proposed development does not lead to any exceedances of the current relevant annual mean air quality objectives.
- 6.8 Predicted changes in NO₂, PM₁₀ and PM_{2.5} concentrations were compared to the assessment criteria detailed in **Table 3.3**. The predicted changes were considered to be 'negligible', in accordance with IAQM and EPUK guidance¹⁸.
- 6.9 In addition, annual mean PM_{2.5} concentrations were predicted to be below the 2028 interim annual mean target of 12µg.m⁻³ in Scenarios 3 and 4. The majority of receptor locations were also predicted to be below the 2040 future annual mean objective of 10µg.m⁻³ in Scenarios 3 and 4. This is with the exception of R12. However, the proposed development does not lead to any new exceedances, as predicted PM_{2.5} concentrations at R12 are above the 2040 future annual mean objective in Scenario 3: 2028 Opening Year without development. Exceedances of the 2040 future objective were also observed in both Scenarios 3 and 4 at STR2; however, in accordance with Defra guidance¹⁶, the annual mean objectives do not apply at short term receptor locations.

- 6.10 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 paragraph 3.12 was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Impact Significance Summary

- 6.11 Relevant guidance, legislation and professional judgement was utilised to determine the significance of the findings of the air quality assessment. The air quality assessment was supervised by a full member of the Institute of Air Quality Management. A summary of the impact significance and justification of this are provided below.
- 6.12 The impact of the proposed development on air quality is considered to be 'not significant':
- Consideration was given to local planning policy^{14, 15} and the development proposals are considered to be in accordance with this policy with regard to air quality.
 - Existing concentrations of NO₂, PM₁₀ and PM_{2.5} in the study area are predicted to be below the current relevant air quality objectives.
 - The air quality assessment undertaken utilised robust model inputs including slowing traffic sections at junctions and appropriate meteorological data and surface roughness.
 - The change in pollutant concentrations as a result of development-generated road traffic on local air quality is defined as negligible in accordance with IAQM and EPUK guidance¹⁸.

Site Suitability Assessment

- 6.13 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted across the Site to determine the suitability of the Site for the proposed residential use with regard to air quality.
- 6.14 A Cartesian grid was modelled at a height of 1.5m, to represent average ground floor breathing height, from minimum X 442000 Y 295500 to maximum X 443500 Y 296500. Pollutant concentrations were predicted for Scenario 4: 2028 Opening Year with development. **Figures 6.1 – 6.3** illustrate annual mean pollutant concentration contours for NO₂, PM₁₀ and PM_{2.5} respectively across the Site.

Figure 6.1: Predicted Annual Mean NO₂ Concentrations Across the Site for Scenario 4: 2028 Opening Year With Development

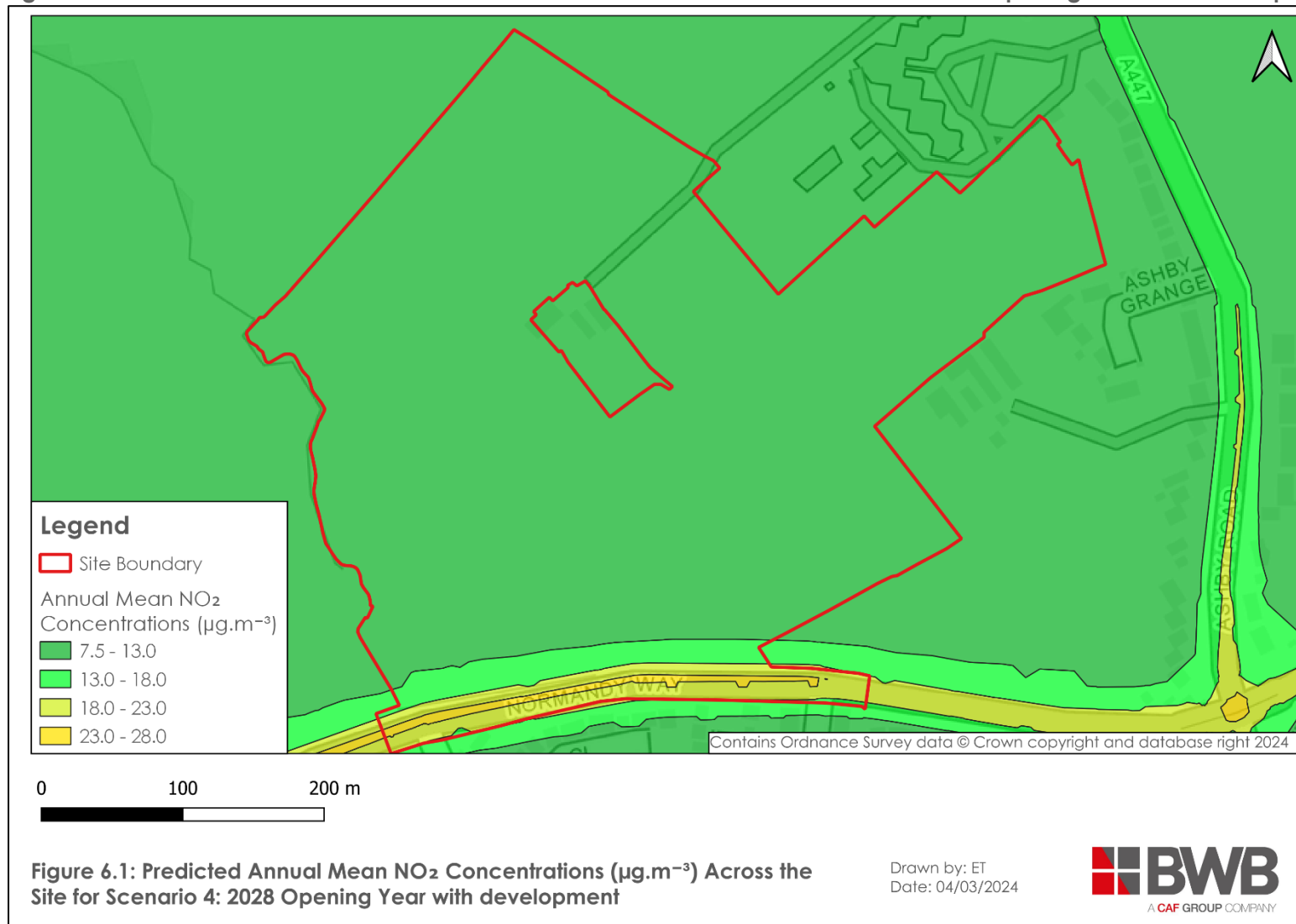


Figure 6.2: Predicted Annual Mean PM₁₀ Concentrations Across the Site for Scenario 4: 2028 Opening Year With Development

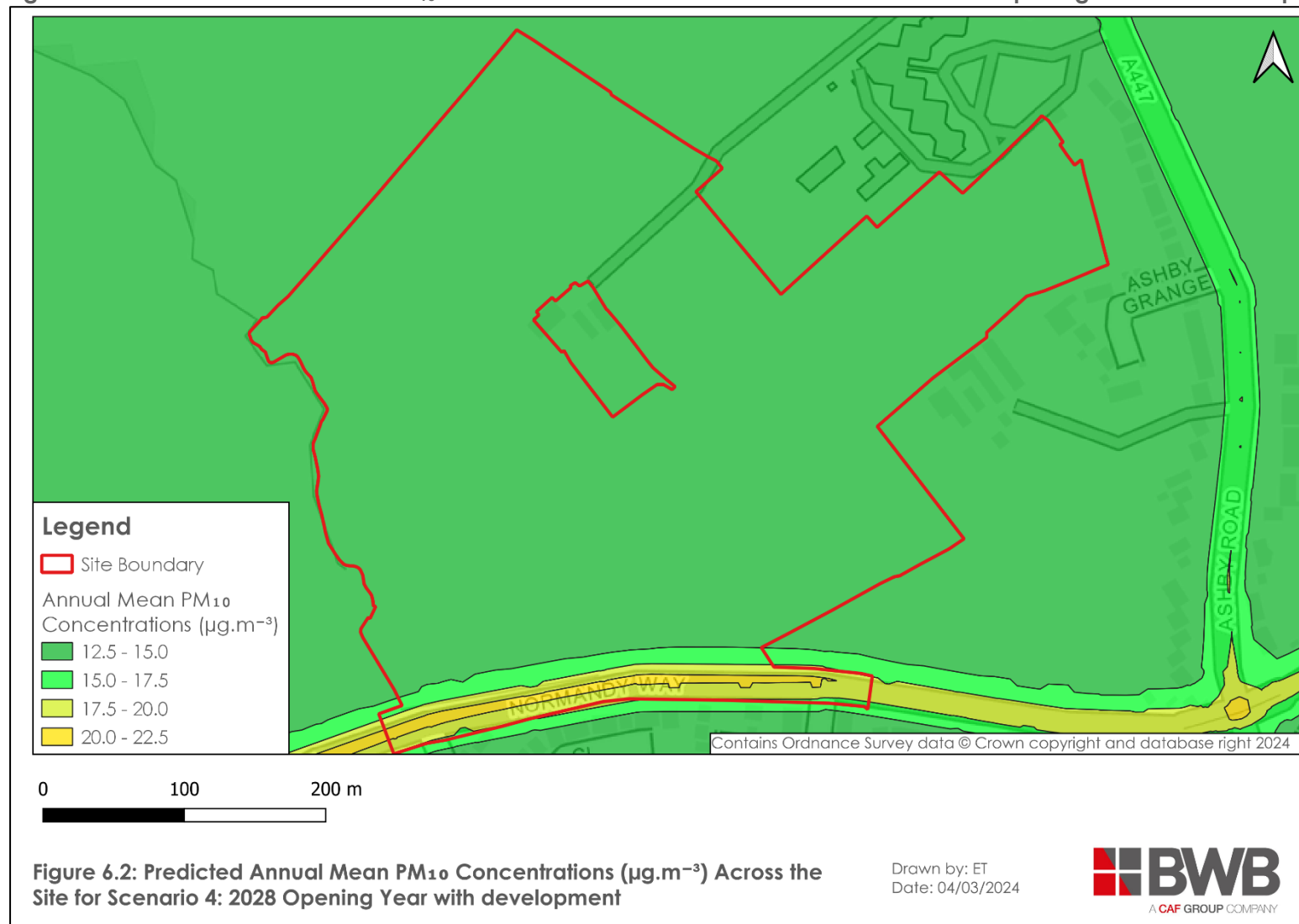
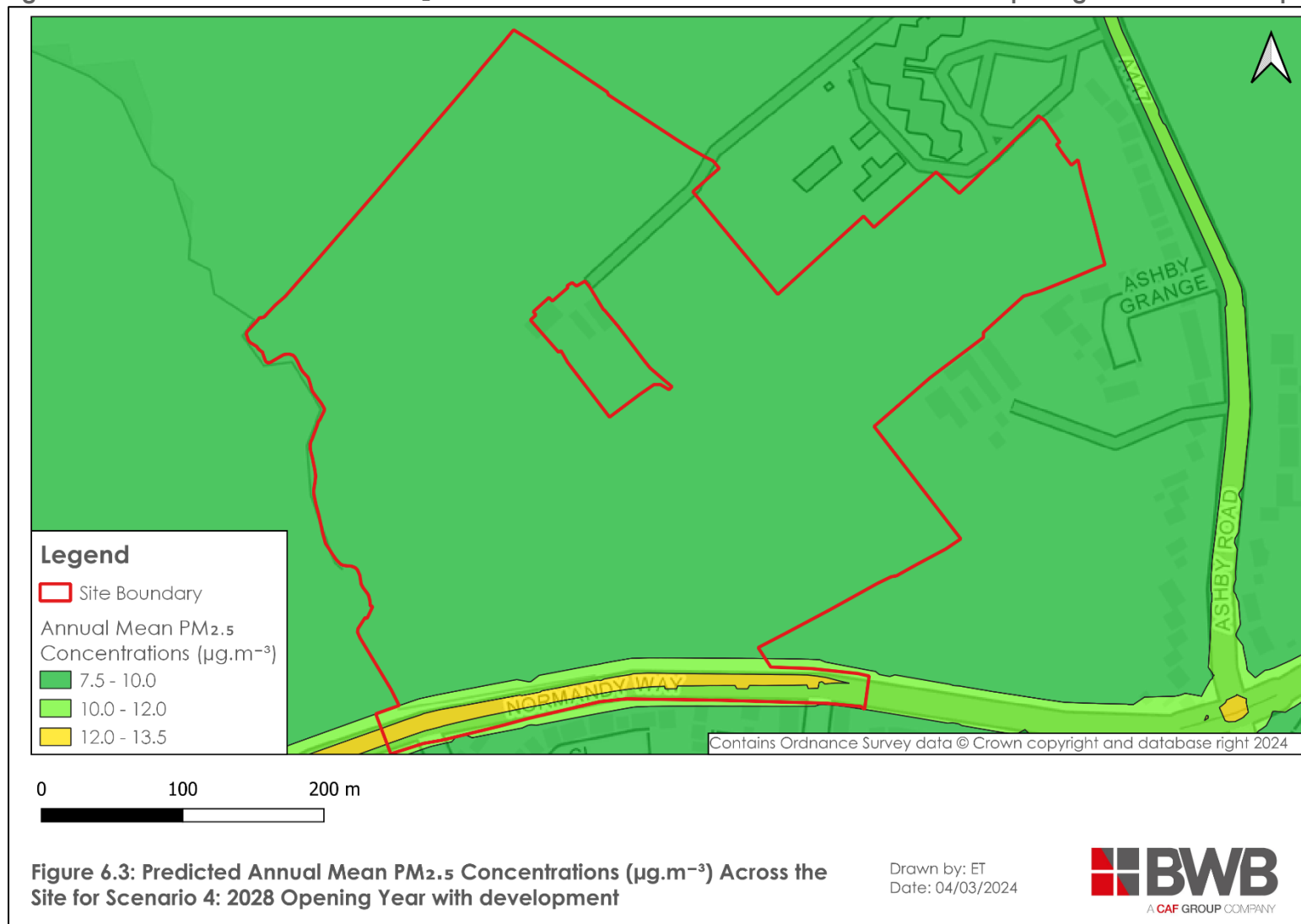


Figure 6.3: Predicted Annual Mean NO₂ Concentrations Across the Site for Scenario 4: 2028 Opening Year With Development



- 6.15 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 4: 2028 Opening Year with development, indicate that pollutant concentrations at the Site will be below the respective current air quality objectives for England in 2028 with the proposed development in place. In addition, predicted PM_{2.5} concentrations are also below the 2028 interim annual mean target of 12µg.m⁻³ across the Site. Predicted PM_{2.5} concentrations are also below the 2040 future annual mean objective of 10µg.m⁻³ across the majority of the Site, with the exception of a small portion of the Site adjacent to the A47 Normandy Way, where no residential dwellings are proposed.
- 6.16 With regard to short term air quality objectives for NO₂ and PM₁₀ at the proposed residential development, 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 NO₂ objective are unlikely. The calculation detailed in paragraph 3.12 was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Development Measures

- 6.17 The proposed development will result in negligible increases in pollutant concentrations and no exceedances of the current relevant air quality objectives for England are predicted. No mitigation measures are therefore required to minimise development-generated road traffic emissions.
- 6.18 However, a Travel Plan will be submitted with the application for the proposed development, which will promote the use of sustainable transport methods such as walking, cycling and public transport. These measures may have beneficial impacts with regard to air quality.

7. CONCLUSION

- 7.1 An air quality impact assessment was undertaken for the proposed residential development at land off Normandy Way, Hinckley.
- 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 local air quality 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 LAQM.TG22 guidance¹⁶. The proposed development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be 'negligible' in accordance with IAQM and EPUK guidance¹⁸.
- 7.4 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 residential use with regard to air quality.
- 7.5 No mitigation measures are required to minimise development-generated road traffic emissions. However, the proposed development includes measures, such as the implementation of a Travel Plan, which may have beneficial impacts with regard to air quality.

APPENDICES

APPENDIX A: GLOSSARY OF TERM

Term	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.
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 MASTERPLAN



- Key
- Application site boundary
 - Other land under control of applicant
 - Existing (retained) trees & hedgerow
 - Indicative proposed planting
 - Proposed community orchard
 - Open space
 - Indicative surface water attenuation basin
 - Existing Public Right of Way
 - Proposed pedestrian/cycle link
 - Potential for open space play/LEAP
 - Potential for children's play (LAP)
 - Indicative buildings

APPENDIX C: PLANNING POLICY AND LEGISLATION

National Legislation and Planning Policy

The UK Air Quality Strategy

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 2023¹¹ with an interim target to be achieved by 2028²³.

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 reviewed and updated in 2007⁸ and 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.

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.

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 (AQMAs). 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

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.

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."

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

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.

The PPG¹² 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".*

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.

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".*

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".*

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

Hinckley & Bosworth Borough Council, Local Development Framework Core Strategy

The Local Development Framework Core Strategy¹⁴ was adopted by HBBC in December 2009 and sets out the strategies and policies to be used to guide development until 2026. This document was reviewed; however, there were no policies related to air quality.

Hinckley & Bosworth Borough Council, Hinckley and Bosworth Draft Local Plan 2020-2039, Regulation 19

HBBC is currently preparing a new Local Plan¹⁵ for 2020 – 2039, which was open to public consultation in 2022. The following draft policies relate to air quality:

"PMD01 High Quality Design

The Borough Council will require the highest standards of design, architecture, inclusivity and place-making.

[...]

Development will be supported where the following requirements are met:

[...]

b) The amenity and privacy of nearby residents are not adversely affected, including by matters of lighting, air quality, odour, noise, vibration and visual intrusion;

[...]."

"PMD03 Preventing Pollution

Adverse impacts from pollution will be prevented by ensuring that development proposals demonstrate that:

[...]

f) It will not and significantly impact air quality in terms of additional nitrogen and emissions and ammonia levels which can be damaging to the natural environment;

[...]."

The above policies were taken into consideration throughout the undertaking of the assessment.

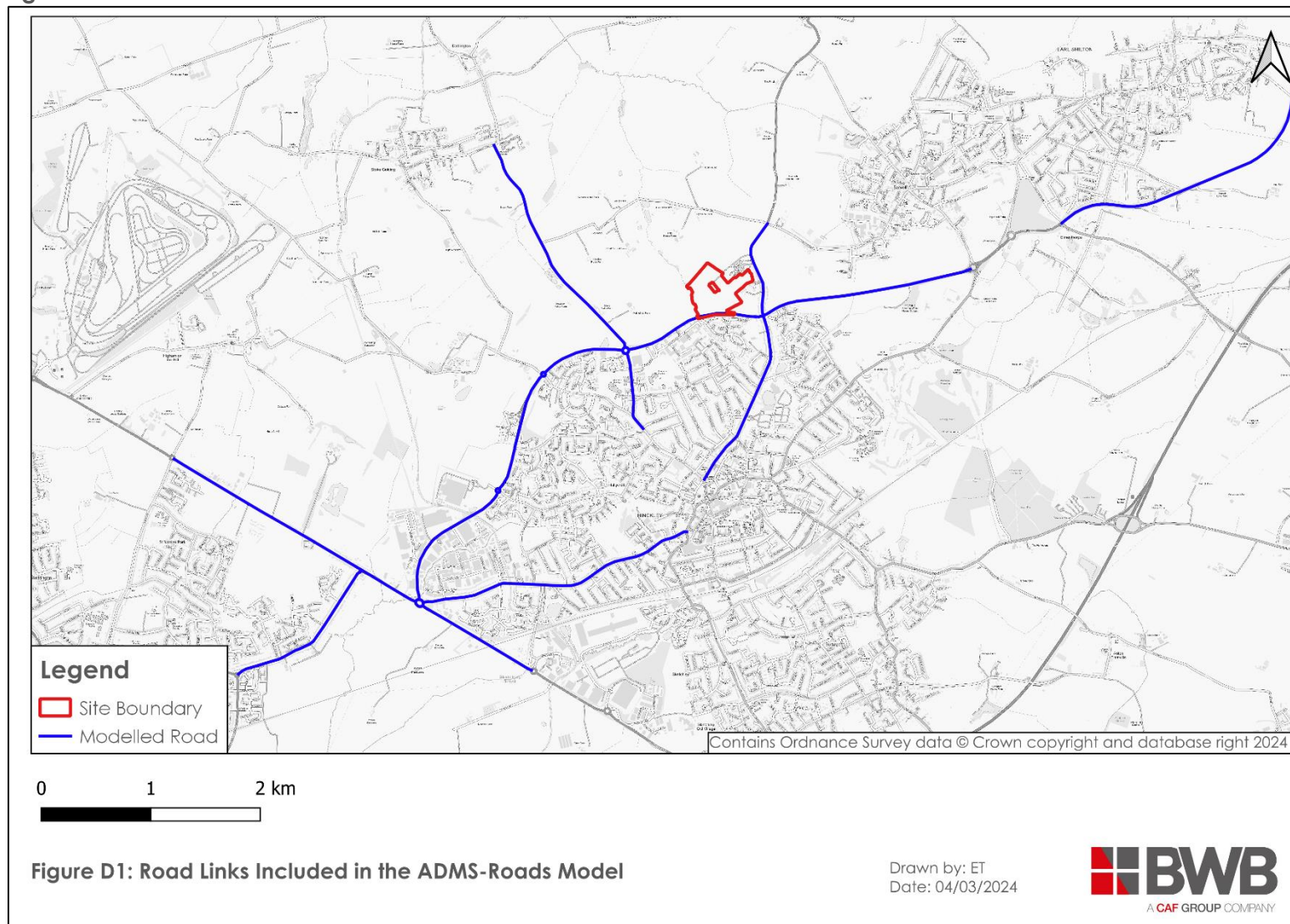
APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

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

Road Link	Speed	Scenario 1: 2022 Verification Year		Scenario 2: 2023 Base Year		Scenario 3: 2028 Opening Year Without Development		Scenario 4: 2028 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
Stoke Road (north of A47 Normandy Way)	96	5,695	53	5,745	53	7,151	56	7,632	56
A47 Normandy Way (east of Stoke Road)	64	23,746	618	23,953	623	29,629	649	31,462	649
Stoke Road (south of A47 Normandy Way)	64/48	8,066	82	8,136	83	9,674	86	10,317	86
A47 Normandy Way (west of Stoke Road)	64	15,265	571	15,398	576	20,469	599	21,178	599
A47 Normandy Way (west of A447 Ashby Road)	64	18,136	589	18,294	594	23,987	618	25,069	618
B4667 Ashby Road (south of A47 Normandy Way)	48	9,669	180	9,753	182	10,252	189	10,382	189
A47 Normandy Way (east of A447 Ashby Road)	96/64	14,114	415	14,237	419	17,151	436	17,984	436
A447 Ashby Road (north of A47 Normandy Way)	48	11,880	474	11,983	478	15,637	497	15,756	497
A5 Watling Street (between A47 The Long Shoot and A47 Dodwells)	64	28,664	1,675	28,913	1,690	32,195	1,758	32,259	1,758
A47 Dodwells Road (north of A5 Watling Street)	64/48	14,795	1,039	14,924	1,048	18,466	1,090	18,842	1,090
B4666 Coventry Road (north of A5 Watling Street)	48	9,919	393	10,005	396	9,679	412	9,713	412
A5 Watling Street (south of A47 Dodwells Road)	80	17,349	1,600	17,500	1,614	18,866	1,679	19,144	1,679
A47 The Long Shoot (south of A5 Watling Street)	48	19,357	894	19,525	902	22,032	938	22,064	938
A5 Watling Street (north of A47 The Long Shoot)	80/64	12,776	1,789	12,887	1,805	13,937	1,877	13,969	1,877
A47 Clickers Way (east of Leicester Road/ Station Road)	64	13,905	533	14,026	538	Data not required for these scenarios.			

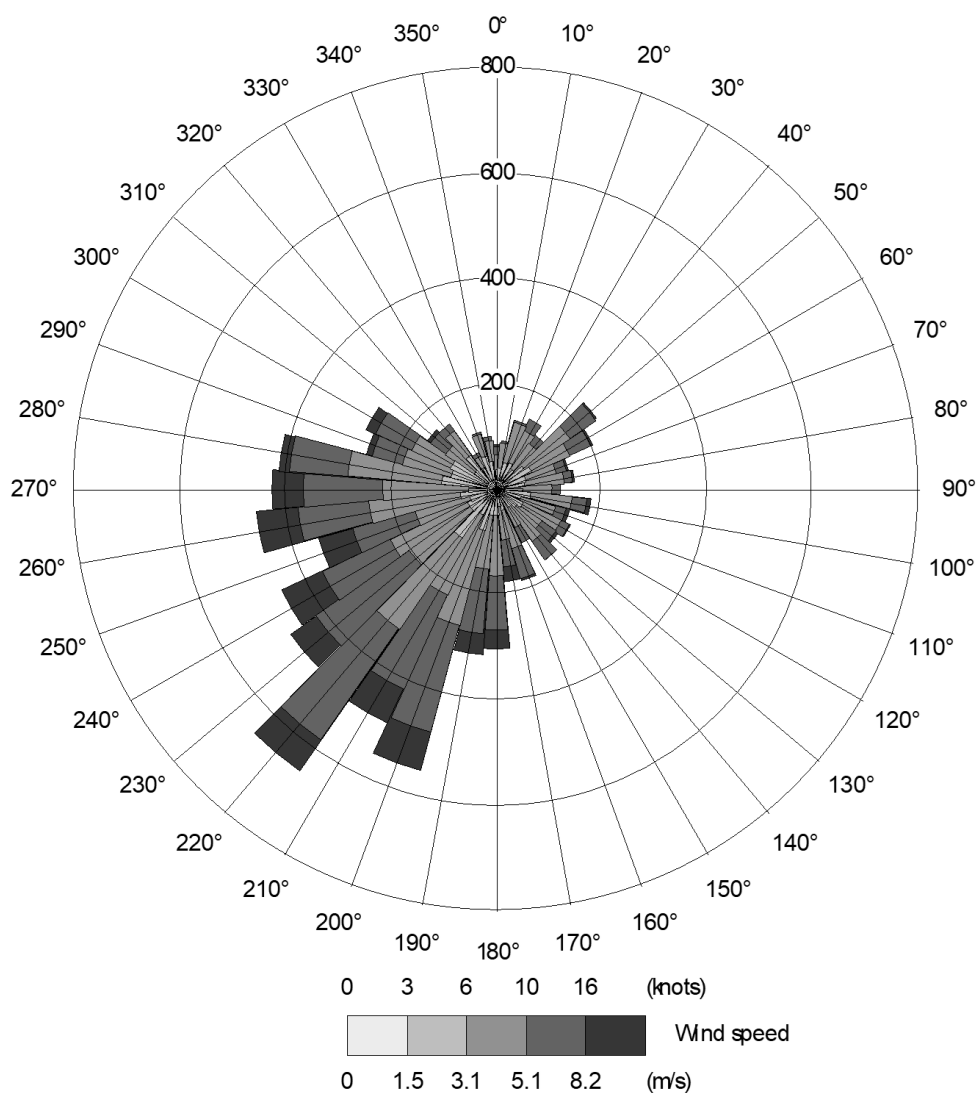
An illustration of the road links included in the ADMS-Roads model is provided in **Figure D1**.

Figure D1: Road Links Included in the ADMS-Roads Model



**APPENDIX E: WIND ROSE FOR 2022 FOR EAST MIDLANDS AIRPORT METEOROLOGICAL
RECORDING STATION**

Meteorological data for Scenario 1: 2022 Verification Year for the East Midlands Airport 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 south-west.



APPENDIX F: MODEL VERIFICATION

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.

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 this location 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.

Monitoring locations DT8 and NB35 were utilised in the model verification process. Monitoring locations DT1, DT6, DT7, DT15 and DT16 were excluded from the model verification process due to its location within the urban centre of Hinckley, which was not considered to be representative of conditions in the study area. Monitoring location DT69, within the administrative area of BDC, was also excluded from the model verification process as its rural setting, adjacent to a railway line, was also not considered to be representative of conditions at the Site.

No monitoring of PM₁₀ or 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	DT8	NB35
2022 monitored total NO ₂ (µg.m ⁻³)	17.7	17.6
2022 background NO ₂ concentration (µg.m ⁻³)	10.1	13.4
Monitored road contribution NO _x (µg.m ⁻³)	14.0	7.8
Modelled road contribution NO _x (µg.m ⁻³)	3.5	2.5
Ratio of monitored road NO _x to modelled road NO _x	4.0	3.1
Adjustment factor for modelled road contribution NO_x	3.7280	
Adjusted modelled road contribution NO _x (µg.m ⁻³)	12.9	9.3
Modelled total NO ₂ concentration (µg.m ⁻³)	17.1	18.4
Monitored total NO ₂ concentration (µg.m ⁻³)	17.7	17.6
% difference between modelled and monitored total NO ₂ concentration	-3.2	4.5
RMSE % (should be less than 25% and ideally less than 10%)	1.7%	

* Road-NO_x component, determined from NO_x to NO₂ calculator

A road-NO_x factor of **3.7280** 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 Defra²⁰ and the adjusted NO₂ background concentration.

The RMSE calculated for the verification is within the 25% threshold in Defra guidance¹⁶ and within the ideal 10% range.

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



