

ENVIRONMENT

Richborough Estates Limited and Mr. & Mrs. Adcock
Hinckley North
Hinckley
Air Quality Assessment

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Birmingham
Livery Place, 35 Livery Street, Colmore Business District
Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way
Leeds, LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street
Manchester, M1 3HU
T: 0161 233 4260

Nottingham
5th Floor, Waterfront House, Station Street
Nottingham, NG2 3DQ
T: 0115 924 1100

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EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough Estates Limited and Mr. & Mrs. Adcock to undertake an air quality assessment for a proposed residential-led development at land off Normandy Way in Hinckley. The Site is known as Hinckley North.

The proposed development 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 for inclusion in a Dust Management Plan 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. The 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 guidance.

Concentrations of NO₂, PM₁₀ and PM_{2.5} were also predicted across the proposed development Site and the suitability of the Site for the proposed residential use considered with regard to air quality. Pollutant concentrations were predicted to be below the relevant air quality objectives and the Site was therefore considered suitable for the proposed use.

CONTENTS

EXECUTIVE SUMMARY	iii
1. INTRODUCTION.....	1-6
Site Setting	1-6
Proposed Development	1-6
2. LEGISLATION, PLANNING POLICY & GUIDANCE	2-8
National Legislation and Planning Policy	2-8
Local Planning Policy	2-8
Air Quality Assessment Guidance	2-8
3. METHODOLOGY	3-9
Consultation with Hinckley and Bosworth Borough Council	3-9
Construction Phase Dust Assessment	3-9
Operational Phase Road Traffic Emissions – Detailed Assessment	3-10
4. BASELINE CONDITIONS	4-17
Local Air Quality Management	4-17
Local Air Quality Monitoring	4-17
Background Pollutant Concentrations	4-18
5. CONSTRUCTION PHASE DUST ASSESSMENT.....	5-21
Step 1: Screen the Need for a Detailed Assessment.....	5-21
Step 2: Assess the Risk of Dust Impacts.....	5-21
Step 3: Site-Specific Mitigation.....	5-26
Step 4: Determine Significant Effects	5-29
6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT.....	6-30
Baseline Assessment	6-30
Impact Assessment.....	6-31
Site Suitability Assessment	6-36
Mitigation.....	6-40
7. CONCLUSION	7-41

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: Existing Sensitive Receptor Locations
Table 3.2: Air Quality Standards and Objectives (England)
Table 3.3: Impact Descriptors for Individual Receptors
Table 4.1: HBBC and NBBC NO ₂ Monitoring Data in 2015 – 2019
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 Emissions 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 Medium Risk Site
Table 5.6: Mitigation Measures Specific to Earthworks, Construction and Trackout
Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2022 Base Year and Scenario 3: 2024 Opening Year Without Development at Existing Receptor Locations
Table 6.2: Predicted Annual Mean NO ₂ Concentrations and Development Impact at Existing Receptor Locations
Table 6.3: Predicted Annual Mean PM ₁₀ 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 Masterplan
APPENDIX C: Planning Policy
APPENDIX D: Traffic Data
APPENDIX E: Wind Rose
APPENDIX F: Model Verification

1. INTRODUCTION

- 1.1 BWB Consulting Limited (BWB) was instructed by Richborough Estates Limited and Mr. & Mrs. Adcock (the Client) to undertake an air quality assessment for a proposed residential-led development at land off Normandy Way in Hinckley ('the Site'). The Site is referred to as Hinckley North.
- 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 proposed development Site.
- 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**.

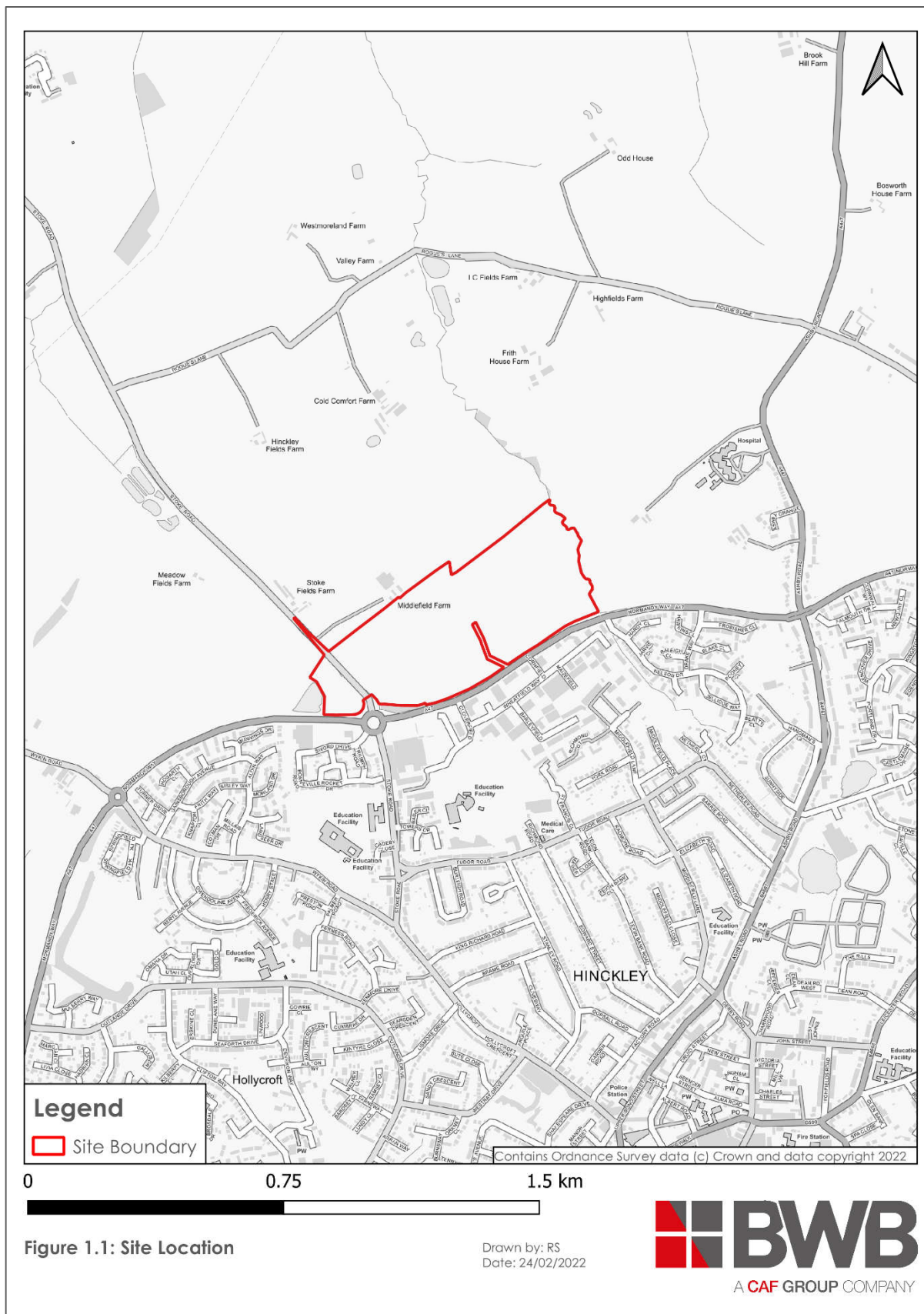
Site Setting

- 1.4 The Site is located off the A47 Normandy Way, on the northern edge of the town of Hinckley and lies within the administrative area of Hinckley and Bosworth Borough Council (HBBC).
- 1.5 The Site is bound to the north by Middlefield Farm and agricultural land. To the east of the Site lies a number of small holdings, residential dwellings and the Hinckley and Bosworth Community Hospital, with the A447 Ashby Road beyond. To the south of the Site lies the A47 Normandy Way with commercial units and residential dwellings beyond. To the west of the Site lies Stoke Road, agricultural land and a number of farms.
- 1.6 **Figure 1.1** details the location of the proposed development. The Site currently comprises open fields.
- 1.7 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions. The Site is not located within an existing Air Quality Management Area (AQMA). The closest AQMA is located 5.9km southwest of the Site in the neighbouring local authority area, Nuneaton and Bedworth Borough Council (NBBC). The AQMA covers sections of the centre of Nuneaton and arterial roads and was declared for the potential exceedance of the annual mean nitrogen dioxide (NO₂) air quality objective.

Proposed Development

- 1.8 The proposed development comprises approximately 500 residential dwellings, a school and open space, with associated access and landscaping. 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;
- Department for Environment, Air Quality Strategy (1997)⁵;
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)⁶;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework (NPPF) (2021)⁷; and
- Ministry for Housing, Communities and Local Government, Planning Practice Guidance (PPG) for air quality (2019)⁸.

Local Planning Policy

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

- Hinckley & Bosworth Borough Council, Core Strategy (2009)⁹.

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(16)) (2021)¹⁰;
- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (2014)¹¹; and
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)¹².

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

⁶ Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO

⁷ Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, HMSO London

⁸ Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality

⁹ Hinckley and Bosworth Borough Council (2009) Core Strategy

¹⁰ Defra (2021) Local Air Quality Management Technical Guidance LAQM.TG(16)

¹¹ Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London

¹² 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 via email on 17th February 2022. A response was received on the 17th February 2022 in which the proposed methodology was accepted by the Environmental Health Officer.
- 3.2 The methodology utilised in the air quality assessment, as agreed with HBBC, 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)¹¹.
 - 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 proposed development Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) 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.TG16)¹⁰ and IAQM and Environmental Protection UK (EPUK) guidance¹². 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 Guidance¹¹. 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

- 3.5 The air dispersion model ADMS-Roads, version 5.0.0.1 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 Local Air Quality Management Technical Guidance¹⁰ and Institute of Air Quality Management and Environmental Protection UK guidance¹².

Assessment Scenarios and Traffic Data

- 3.7 The following scenarios were considered in the air dispersion modelling:
- Scenario 1: 2019 Verification Year;
 - Scenario 2: 2022 Base Year;
 - Scenario 3: 2024 Opening Year without development; and
 - Scenario 4: 2024 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:
- A47 Normandy Way – east and west of Stoke Road and Ashby Road;
 - A447 Ashby Road;
 - A47 Dodwells road;
 - A47 The Long Shoot;
 - A5 Watling Street;
 - B4667 Ashby Road;
 - B4666 Coventry Road; and
 - Stoke Road.
- 3.9 Traffic data for the A47 Normandy Way, east of Leicester Road was obtained from the Pan Regional Transport Model 2 (PRTM2.2) 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 conditions were modelled at speed limits, taking into account driving conditions in the study area. Queuing sections were modelled in accordance with Defra guidance¹⁰.
- 3.11 A reduction in speed limit from 50mph to 40mph is proposed on sections of the A47 Normandy Way as part of planning application reference 15/00188/OUT. Whilst the exact date at which the speed limit change will apply was not known, it was assumed

in Scenario 3 and Scenario 4 that the lower speed limit was in place to provide a conservative assessment.

- 3.12 Traffic data used in the air dispersion modelling are provided in **Appendix D** and illustrated in **Figure D1**.

ADMS-Roads Model Inputs

- 3.13 The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit¹³ (EFT), version 11.0, for the years of assessment (2019, 2022 and 2024).
- 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 calculator¹⁴, version 8.1.
- Meteorological Data – hourly sequential meteorological data for the verification year of assessment (2019) were obtained for the East Midlands Airport recording station. This was the closest, most representative recording station to the proposed Site. The wind rose for 2019 is provided in **Appendix E**.
- Surface roughness and Monin-Obukhov length (MO) – Site and meteorological station – a surface roughness of 0.5m and an 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 and recording station on the edge of urban areas adjacent to open land.
- Background pollutant concentrations – background concentrations of NO₂, PM₁₀ and PM_{2.5} for the study area were obtained from the pollutant concentration maps¹⁵ provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019, 2022 and 2024).
- Model verification – model verification was undertaken using 2019 monitoring data from monitoring locations operated by both HBBC and NBBC due to the presence of sensitive receptors within both administrative areas. The verification points that were utilised 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 guidance¹⁰, was utilised to calculate the number of exceedances of the 24-hour mean PM₁₀ air quality objective:

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

- The IAQM released a position statement¹⁶ in July 2018 regarding dealing with the uncertainty in vehicle NO_x emissions within air quality assessments. This recommends that sensitivity analyses be undertaken and professional judgement be applied to consider the scenario where NO_x emissions do not reduce as rapidly as shown by the EFT. The IAQM position statement was withdrawn in July 2021 following extensive research which identified that Emission Factor Toolkits v8.1 and onwards were considered to more accurately represent real world NO_x emissions. No sensitivity analysis was therefore undertaken as part of the air quality assessment.

¹³ Defra (2021) Emission Factor Toolkit [<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>]

¹⁴ Defra (2020) NO_x to NO₂ Calculator [<https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>]

¹⁵ Defra (2020) background pollutant concentration maps [<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>]

¹⁶ Institute of Air Quality Management (2018) Position Statement: Dealing with Uncertainty in Vehicle NO_x Emissions within Air Quality Assessments, Version 1.1

Receptor Locations

Existing Sensitive Receptors

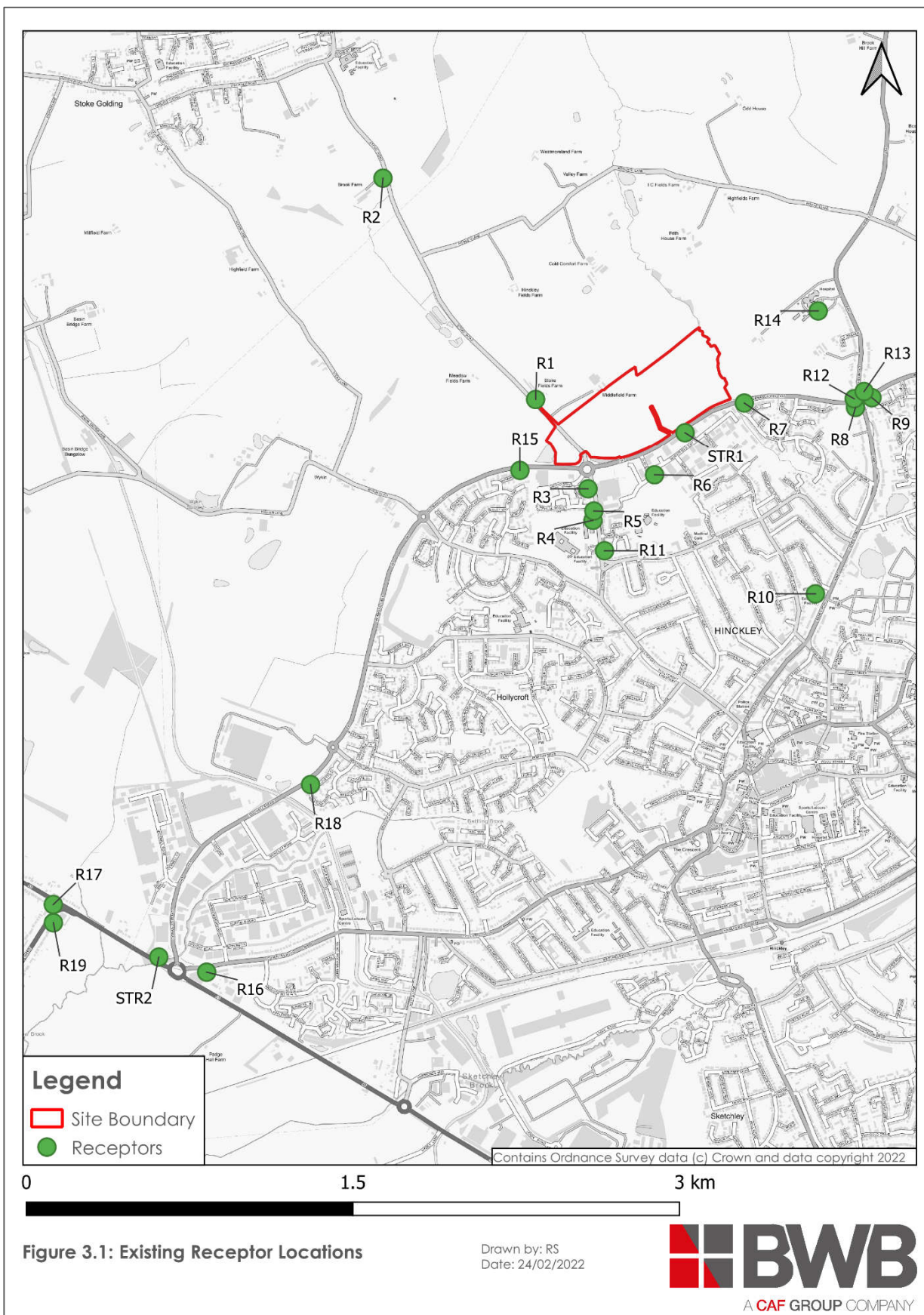
- 3.14 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.8 and considered in the operational phase road traffic emissions assessment. Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at the identified existing receptor locations for the 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 result of the proposed development. Receptor heights were modelled at 1.5m to represent the average breathing height at ground floor. Nurseries and primary schools were modelled at a height of 0.8m to represent the lower than average breathing height for children.
- 3.15 A number of short term receptors were identified where sensitive users may be present for periods of time relevant to the short term air quality objectives, but not for periods of time relevant to the annual mean air quality objectives. Such uses include cafes.
- 3.16 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

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
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
R18	440572	293946	Residential Dwelling on Lovetts Close	1.5
R19	439395	293315	Residential Dwelling on The Long Shoot	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

Figure 3.1: Existing Receptor Locations



Limitations and Assumptions

- 3.17 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.
- 3.18 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.
- 3.19 In future years 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 EFT¹³ to provide the most up to date estimate of current and future emission projections.
- 3.20 To reduce the uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in Defra guidance¹⁰. As the models were verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

Assessment Criteria

- 3.21 Predicted pollutant concentrations were compared to the relevant air quality objectives⁵. 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
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 target (15% cut in annual mean (urban background exposure))	25	2010 - 2020

- 3.22 Guidance is provided by the Institute of Air Quality Management and Environmental Protection UK¹² 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.

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 located approximately 5.9km southwest of the Site, in Nuneaton. The AQMA was designated by the neighbouring local authority of NBBC for the potential exceedance of the annual mean nitrogen dioxide (NO₂) air quality objective.

Local Air Quality Monitoring

Nitrogen Dioxide (NO₂)

- 4.2 HBBC undertakes monitoring within its administrative boundary using a network of diffusion tubes. The closest monitoring location to the Site is DT1 which is located 1.7km south of the Site on Trinity Lane. In addition, NBBC-operated monitoring is located within the study area and was therefore considered in this assessment.
- 4.3 The IAQM released a position statement¹⁷ in August 2021 regarding the use of 2020 and 2021 monitoring data and the COVID-19 pandemic. Until the impact of the pandemic on air quality is fully understood, the IAQM's advice is to use 2019 monitoring data as the last typical year for monitoring data. 2020 monitoring data was therefore not utilised in this assessment.
- 4.4 Bias adjusted NO₂ monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 4.1**.

Table 4.1: HBBC and NBBC NO₂ Monitoring Data in 2015 – 2019

Location and Reference	Grid Reference		Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration (µg.m ⁻³)				
					2015	2016	2017	2018	2019
DT1 – Trinity Lane	442417	293808	Urban Centre	1.7km south	25.9	25.0	21.6	20.3	19.6
NB35 – 60 Watling Street	439268	293457	Roadside	3.2km southwest	24.8	24.8	23.2	22.9	23.2
DT8 – Earl Shilton Bypass	446696	296771	Suburban	4.3km east	17.4	17.9	17.7	16.2	19.1

- 4.5 Monitored concentrations were all below the annual mean air quality objective for NO₂ of 40µg.m⁻³ at the monitoring locations detailed in **Table 4.1** between 2015 and 2019. An overall downward trend in monitored concentrations was observed at monitoring locations DT1 and NB35 between 2015 and 2019. Monitored concentrations at DT8 fluctuated over the past five years for which data were available for review, however they remained well below the relevant objective.

¹⁷ IAQM (2021) Position Statement: Use of 2020 and 2021 Monitoring Datasets

- 4.6 Monitoring locations NB35 and DT8 were considered to be most representative of conditions at the Site and in the study area due to their location adjacent to A5 Watling Street and A47 Normandy Way which are considered the primary emission sources in the area.
- 4.7 The monitoring locations detailed in **Table 4.1** were utilised in model verification with the exception of DT1. This monitoring location was excluded from model verification due to its location outside the study area and in the urban centre of Hinckley, which was not considered representative of conditions in the study area. Full details of model verification are provided in **Appendix F**.

Particulate Matter (PM₁₀ and PM_{2.5})

- 4.8 No monitoring of PM₁₀ or PM_{2.5} is undertaken by HBBC and NBBC within their administrative areas.

Background Pollutant Concentrations

- 4.9 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 maps¹⁵, 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 (2019, 2022 and 2024). The background concentrations used in the assessment are detailed in **Table 4.2**.

Table 4.2: Background Pollutant Concentrations used in the Assessment

Table 11: Background Ambient Concentration Used in the Assessment					
Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m ⁻³)		
			2019	2022	2024
Monitoring Locations Used in Verification					
NO ₂	439500, 293500	NB35	15.0	-	-
NO ₂	446500, 296500	DT8	11.5	-	-
Receptors					
NO ₂	441500, 295500	R1, R3 – R5, R11, R15	-	10.4	9.7
PM ₁₀			-	13.4	13.1
PM _{2.5}			-	8.4	8.2
NO ₂	440500, 296500	R2	-	8.7	8.1

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration ($\mu\text{g.m}^{-3}$)		
			2019	2022	2024
PM ₁₀			-	12.6	12.4
PM _{2.5}			-	8.0	7.8
NO ₂	442500, 295500	R6, R7, STR1	-	10.9	10.2
PM ₁₀			-	13.1	12.8
PM _{2.5}			-	8.5	8.3
NO ₂	443500, 295500	R8, R9, R12, R13	-	10.7	9.9
PM ₁₀			-	13.0	12.8
PM _{2.5}			-	8.5	8.3
NO ₂	442500, 294500	R10	-	12.1	11.4
PM ₁₀			-	13.3	13.1
PM _{2.5}			-	8.9	8.7
NO ₂	442500, 296500	R14	-	8.7	8.2
PM ₁₀			-	13.2	12.9
PM _{2.5}			-	8.2	7.9
NO ₂	440500, 293500	R16, R18	-	13.8	13.0
PM ₁₀			-	13.4	13.1
PM _{2.5}			-	8.7	8.4
NO ₂	439500, 293500	R17, R19, STR2	-	13.4	12.5
PM ₁₀			-	13.9	13.6
PM _{2.5}			-	8.8	8.6

- Data not utilised in scenario

- 4.10 2019, 2022 and 2024 background concentrations were all below the relevant annual mean objectives for NO₂, PM₁₀ and PM_{2.5}.
- 4.11 Background PM₁₀ concentrations were greater than background NO₂ concentrations at all receptors except R16 and R18. A review of the Defra background maps¹⁵ showed a significant proportion of residual and secondary particulate matter contributing to the overall 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 guidance¹¹ 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 350m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m 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 500m from the site entrances.
- 5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website¹⁸, 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 Stoke 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 guidance¹¹ as detailed in **Table 5.1**. Demolition is not proposed as part of the development and therefore wasn't considered further in the assessment.

¹⁸ 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 >10,000m 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 >8 m in height, total material moved >100,000 tonnes.
	Medium	Total site area 2,500m ² – 10,000m ² , moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m - 8m in height, total material moved 20,000 tonnes – 100,000 tonnes.
	Small	Total site area <2,500m 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, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Large	Total building volume >100,000m ³ , on site concrete batching, sandblasting.
	Medium	Total building volume 25,000m ³ – 100,000m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching.
	Small	Total building volume <25,000m 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	10 - 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	<10 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:

- Earthworks – The total Site area upon which earthworks will be taking place is greater than 10,000m². Therefore, the dust emissions magnitude for earthworks was defined as **Large**.
- Construction – The total volume of buildings to be constructed is greater than 100,000m³. Therefore, the dust emission magnitude for construction was defined as **Large**.
- Trackout – It is estimated that there may be between 10 – 50 outward HDV movements per day during the peak of the construction phase. Therefore, the dust emissions magnitude for trackout was defined as **Medium**.

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

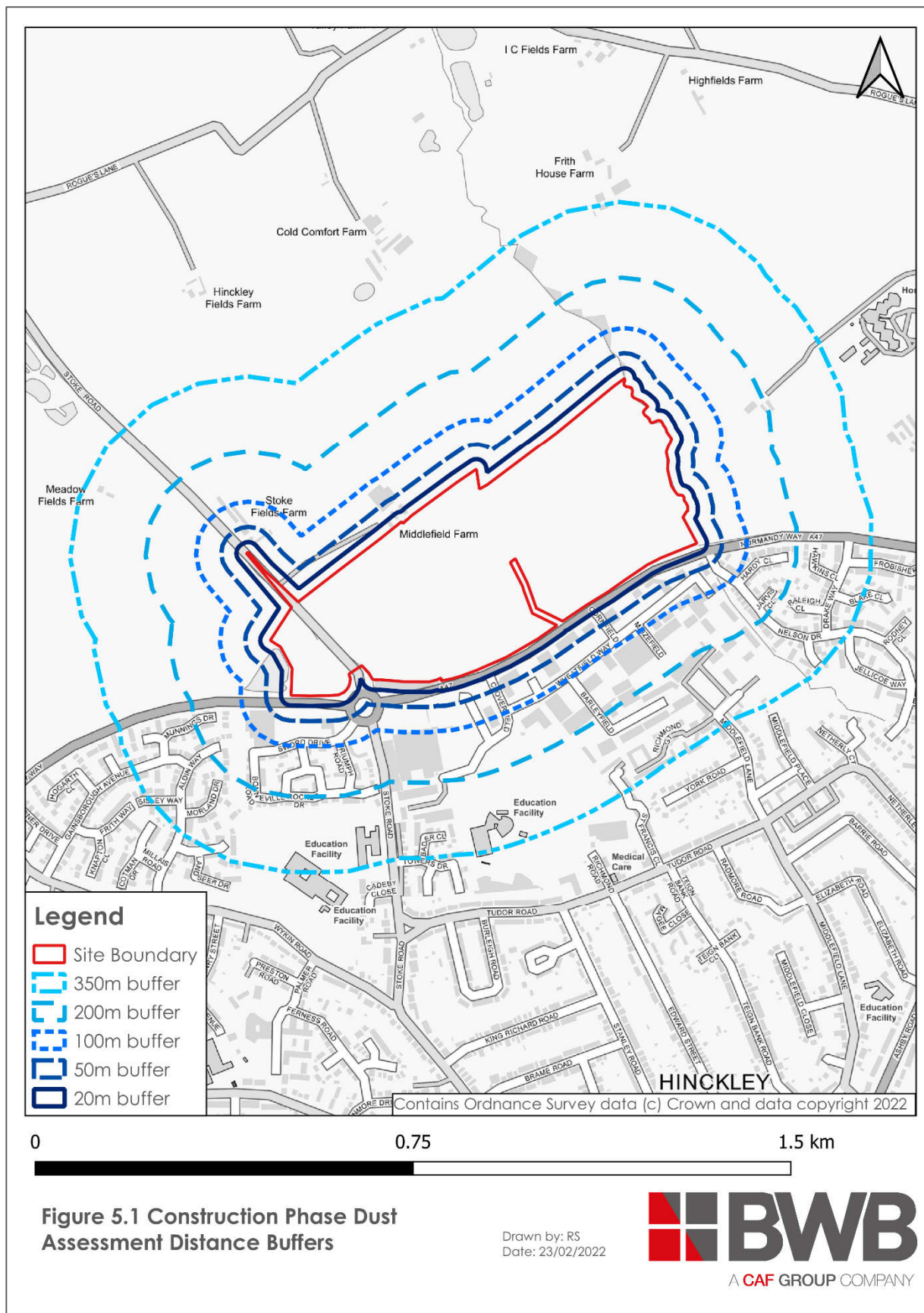
Table 5.2: Summary of Project Defined Dust Emissions Magnitudes

Activity	Dust Emissions Magnitude
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. 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 guidance¹¹ for determining receptor sensitivity.

Figure 5.1: Construction Phase Assessment Dust Distance Buffers



5.10 The sensitivity of the area is defined below, in accordance with IAQM criteria¹¹ and summarised in **Table 5.3**.

- Dust Soiling – There are between one and 10 highly sensitive residential receptors located within 20m of the proposed Site boundary. Additionally, there are commercial buildings located within 50m of the proposed Site boundary which are considered to be medium sensitivity receptors. Therefore, the sensitivity of the area to dust soiling is defined as '**Medium**'.
- Human Health – There are between one and 10 highly sensitive residential receptors within 20m of the proposed Site boundary. Additionally, there are places of work within 50m of the proposed Site boundary which are considered to be of medium sensitivity to human health effects. The 2022 background PM₁₀ concentration is less than 24µg.m⁻³. Therefore, the sensitivity of the area to human health effects is defined as '**Low**'.

Table 5.3: Determination of the Sensitivity of the Area

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

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	Medium	Medium Risk
Construction	Large	Medium	Medium Risk
Trackout	Medium	Medium	Low Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low 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 guidance¹¹ 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 guidance¹¹. The highest risk category identified was 'Medium Risk' and the recommended mitigation taken from the IAQM guidance¹¹ is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a Medium Risk Site

Category	Mitigation Measures for a Medium 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.	
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.	
Monitoring	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.	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
	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.	

Category	Mitigation Measures for a Medium Risk Site	
	Highly Recommended	Desirable
		cleaning to be provided as necessary.
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.	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 and with the agreement of the local authority, where appropriate).
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
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-potable water where possible and appropriate.	

Category	Mitigation Measures for a Medium Risk Site	
	Highly Recommended	Desirable
	Use enclosed chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
	Ensure equipment is readily available on site to clean 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 Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Earthworks (Medium Risk Site)	None	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
		Use Hessian, mulches or tackifiers 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 (Medium Risk Site)	Ensure sand and other aggregates are stored in banded 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.	Avoid scabbling (roughening of concrete surfaces) if possible.
		Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
		For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
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 guidance¹¹, 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: 2022 Base Year and Scenario 3: 2024 Opening Year without development are detailed in **Table 6.1**.

Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2022 Base Year and Scenario 3: 2024 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2022 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2024 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R1	13.8	14.2	8.9	13.0	14.0	8.7
R2	10.3	13.0	8.2	9.7	12.8	8.0
R3	13.5	14.2	8.9	12.5	14.0	8.7
R4	12.4	13.9	8.7	11.5	13.6	8.5
R5	13.3	14.1	8.8	12.3	13.9	8.6
R6	12.5	13.5	8.7	11.7	13.3	8.5
R7	17.3	14.9	9.5	16.2	14.9	9.4
R8	16.3	14.6	9.3	15.2	14.5	9.2
R9	19.2	15.4	9.8	17.7	15.3	9.7
R10	13.6	13.7	9.1	12.6	13.4	8.9
R11	13.5	14.2	8.9	12.4	13.9	8.7
R12	22.1	16.2	10.2	20.9	16.4	10.3
R13	18.7	15.1	9.7	17.5	15.2	9.6
R14	9.7	13.5	8.3	9.1	13.2	8.1
R15	15.2	14.7	9.2	14.4	14.7	9.1

Receptor	Scenario 2: 2022 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2024 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R16	20.7	15.4	9.7	18.6	15.1	9.5
R17	22.6	16.5	10.3	20.2	16.3	10.1
R18	22.5	15.0	9.5	17.7	14.9	9.4
R19	20.6	15.9	9.9	18.7	15.7	9.8
ST1	20.6	15.0	9.5	16.4	15.0	9.4
ST2	24.8	17.2	10.7	22.2	17.0	10.5

Italics denotes receptors relevant to the short term air quality objectives only.

- 6.2 The baseline assessment for Scenario 2 and Scenario 3 show that predicted concentrations of NO₂, PM₁₀, and PM_{2.5} are below the annual mean air quality objectives 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 guidance¹⁰ it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.13 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

- 6.4 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at identified existing receptor locations for Scenario 4: 2024 Opening Year with development, to consider the impact of development-generated vehicles on local air quality.
- 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: 2024 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: 2024 Without Development (µg.m ⁻³)	Scenario 4: 2024 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	13.0	13.1	+0.1	0	Negligible
R2	9.7	9.8	0.0	0	Negligible
R3	12.5	12.6	+0.1	0	Negligible
R4	11.5	11.6	+0.1	0	Negligible
R5	12.3	12.5	+0.2	0	Negligible
R6	11.7	11.7	0.0	0	Negligible
R7	16.2	16.4	+0.2	0	Negligible
R8	15.2	15.3	+0.1	0	Negligible
R9	17.7	17.9	+0.2	0	Negligible
R10	12.6	12.6	0.0	0	Negligible
R11	12.4	12.6	+0.2	0	Negligible
R12	20.9	21.2	+0.3	1	Negligible
R13	17.5	17.6	+0.1	0	Negligible
R14	9.1	9.1	0.0	0	Negligible
R15	14.4	14.6	+0.2	1	Negligible
R16	18.6	18.6	0.0	0	Negligible
R17	20.2	20.2	0.1	0	Negligible
R18	17.7	17.9	+0.1	0	Negligible
R19	18.7	18.8	+0.1	0	Negligible

Receptor	Predicted NO ₂ Concentration (µg.m ⁻³)				
	Scenario 3: 2024 Without Development (µg.m ⁻³)	Scenario 4: 2024 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
ST1	16.4	16.6	+0.2	0	Negligible
ST2	22.2	22.3	+0.1	0	Negligible

* Discrepancies in changes due to rounding effects. *Italics denotes receptors relevant to the short term air quality objectives only.*

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: 2024 Without Development (µg.m ⁻³)	Scenario 4: 2024 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	0.0	0	Negligible
R2	12.8	12.8	0.0	0	Negligible
R3	14.0	14.0	0.0	0	Negligible
R4	13.6	13.7	0.0	0	Negligible
R5	13.9	14.0	+0.1	0	Negligible
R6	13.3	13.3	0.0	0	Negligible
R7	14.9	14.9	+0.1	0	Negligible
R8	14.5	14.5	0.0	0	Negligible
R9	15.3	15.4	+0.1	0	Negligible
R10	13.4	13.4	0.0	0	Negligible
R11	13.9	14.0	+0.1	0	Negligible
R12	16.4	16.5	+0.1	0	Negligible

Receptor	Predicted PM ₁₀ Concentration (µg.m ⁻³)				
	Scenario 3: 2024 Without Development (µg.m ⁻³)	Scenario 4: 2024 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R13	15.2	15.2	0.0	0	Negligible
R14	13.2	13.2	0.0	0	Negligible
R15	14.7	14.8	+0.1	0	Negligible
R16	15.1	15.1	0.0	0	Negligible
R17	16.3	16.3	0.0	0	Negligible
R18	14.9	14.9	0.0	0	Negligible
R19	15.7	15.7	0.0	0	Negligible
ST1	15.0	15.0	+0.1	0	Negligible
ST2	17.0	17.1	0.0	0	Negligible

* Discrepancies in changes due to rounding effects. *Italics denotes receptors relevant to the short term air quality objectives only.*

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: 2024 Without Development (µg.m ⁻³)	Scenario 4: 2024 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	8.7	8.7	0.0	0	Negligible
R2	8.0	8.0	0.0	0	Negligible
R3	8.7	8.7	0.0	0	Negligible
R4	8.5	8.5	0.0	0	Negligible
R5	8.6	8.7	0.0	0	Negligible

Receptor	Predicted PM _{2.5} Concentration (µg.m ⁻³)				
	Scenario 3: 2024 Without Development (µg.m ⁻³)	Scenario 4: 2024 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R6	8.5	8.5	0.0	0	Negligible
R7	9.4	9.4	0.0	0	Negligible
R8	9.2	9.2	0.0	0	Negligible
R9	9.7	9.7	0.0	0	Negligible
R10	8.9	8.9	0.0	0	Negligible
R11	8.7	8.7	0.0	0	Negligible
R12	10.3	10.3	+0.1	0	Negligible
R13	9.6	9.6	0.0	0	Negligible
R14	8.1	8.1	0.0	0	Negligible
R15	9.1	9.1	0.0	0	Negligible
R16	9.5	9.5	0.0	0	Negligible
R17	10.1	10.1	0.0	0	Negligible
R18	9.4	9.4	0.0	0	Negligible
R19	9.8	9.8	0.0	0	Negligible
ST1	9.4	9.5	0.0	0	Negligible
ST2	10.5	10.5	0.0	0	Negligible

* Discrepancies in changes due to rounding effects. *Italics denotes receptors relevant to the short term air quality objectives only.*

6.6 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 3: 2024 Opening Year without Development and Scenario 4: Opening Year with Development are below the relevant annual mean air quality objectives at all receptors.

- 6.7 The proposed development does not lead to any exceedances of the annual mean air quality objectives.
- 6.8 Predicted changes in the concentrations of NO₂, PM₁₀ and PM_{2.5} were compared to the assessment criteria detailed in **Table 3.3** and are considered to be negligible in accordance with IAQM and EPUK guidance¹².
- 6.9 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 guidance¹⁰ it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.13 was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Impact Significance Summary

- 6.10 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.
- 6.11 The impact of the proposed development on air quality is considered to be 'negligible':
- Consideration was given to local planning policy⁹ 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 relevant air quality objectives.
 - The air quality assessment undertaken utilised robust model inputs including slowing traffic sections at junctions, appropriate meteorological data and surface roughness.
 - The impact of development-generated road traffic on local air quality is defined as negligible in accordance with IAQM and EPUK guidance¹².

Site Suitability Assessment

- 6.12 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted across the proposed development to determine the suitability of the Site for the proposed residential use with regard to the current air quality objectives.
- 6.13 A cartesian grid was modelled across the Site between the following grid points: minimum X441399, Y295261 and maximum X442805, Y296171. The Cartesian grid was modelled at a height of 1.5m to represent the average breathing height at ground floor level. Pollutant concentrations were predicted at the Site for Scenario 4: 2024 Opening Year with Development.
- 6.14 **Figures 6.1 – 6.3** illustrate the annual mean pollutant concentration contours for NO₂, PM₁₀ and PM_{2.5} across the Site.

Figure 6.1: Predicted Annual Mean NO₂ Concentrations across the Site

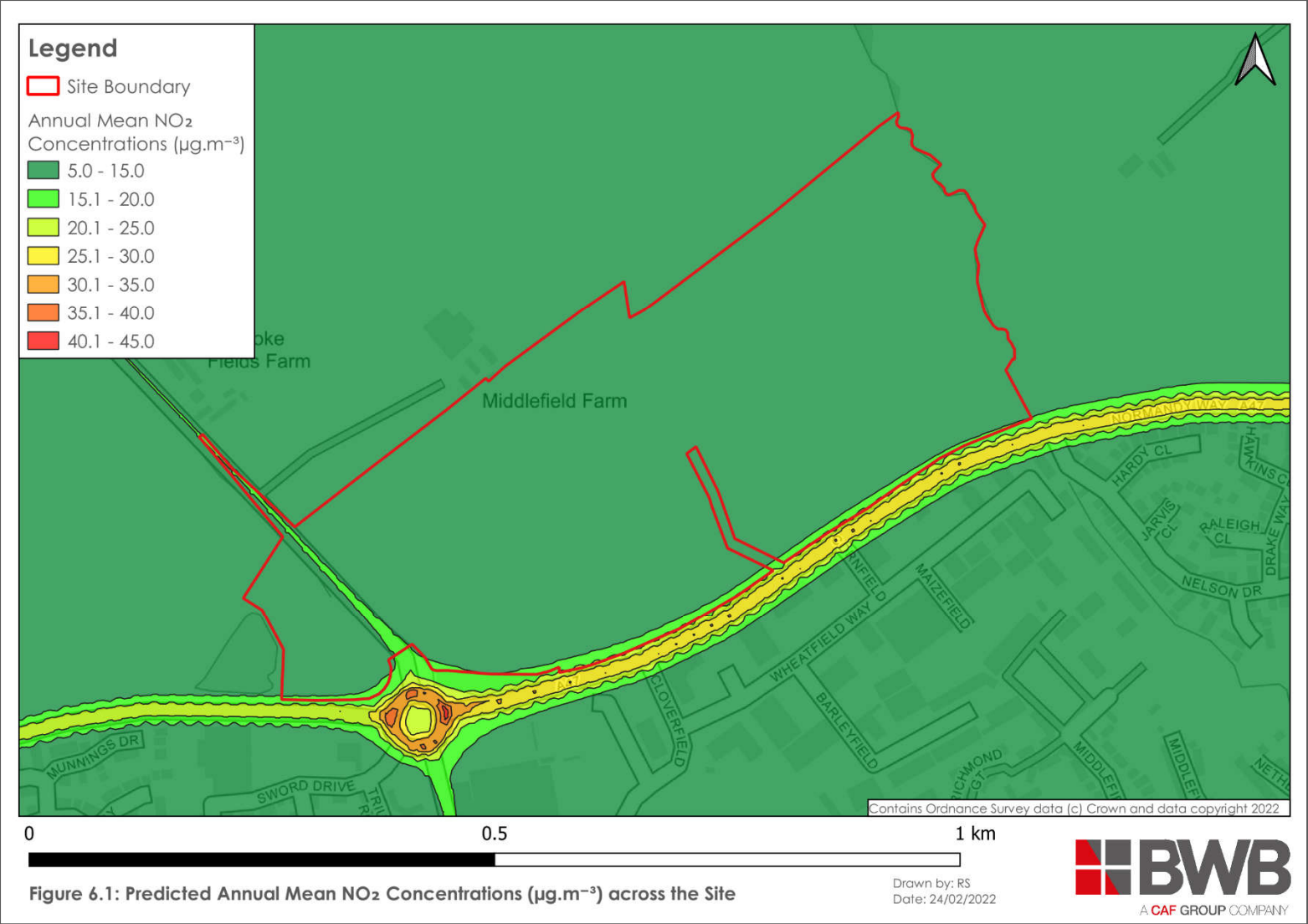


Figure 6.2: Predicted Annual Mean PM₁₀ Concentrations across the Site

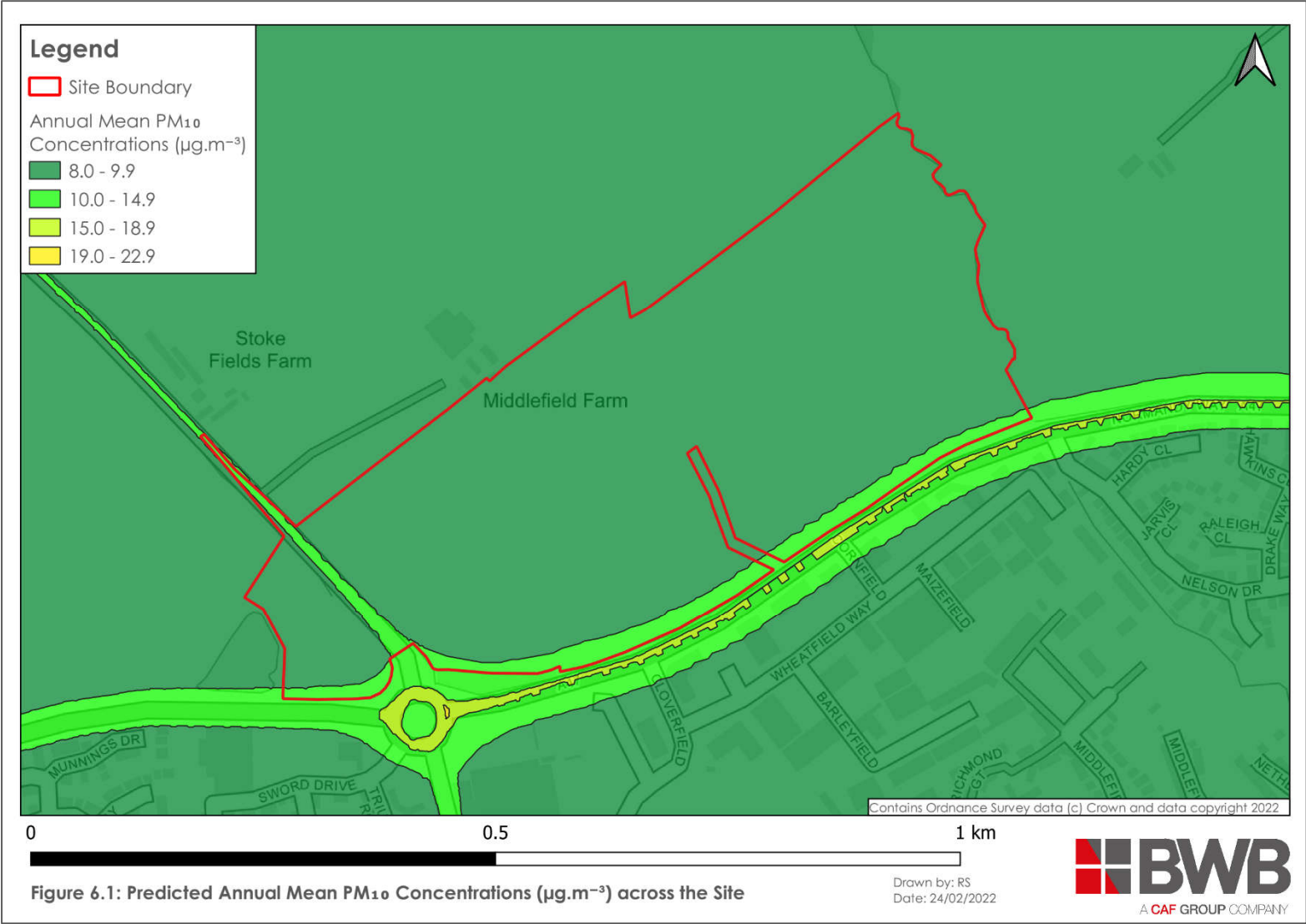
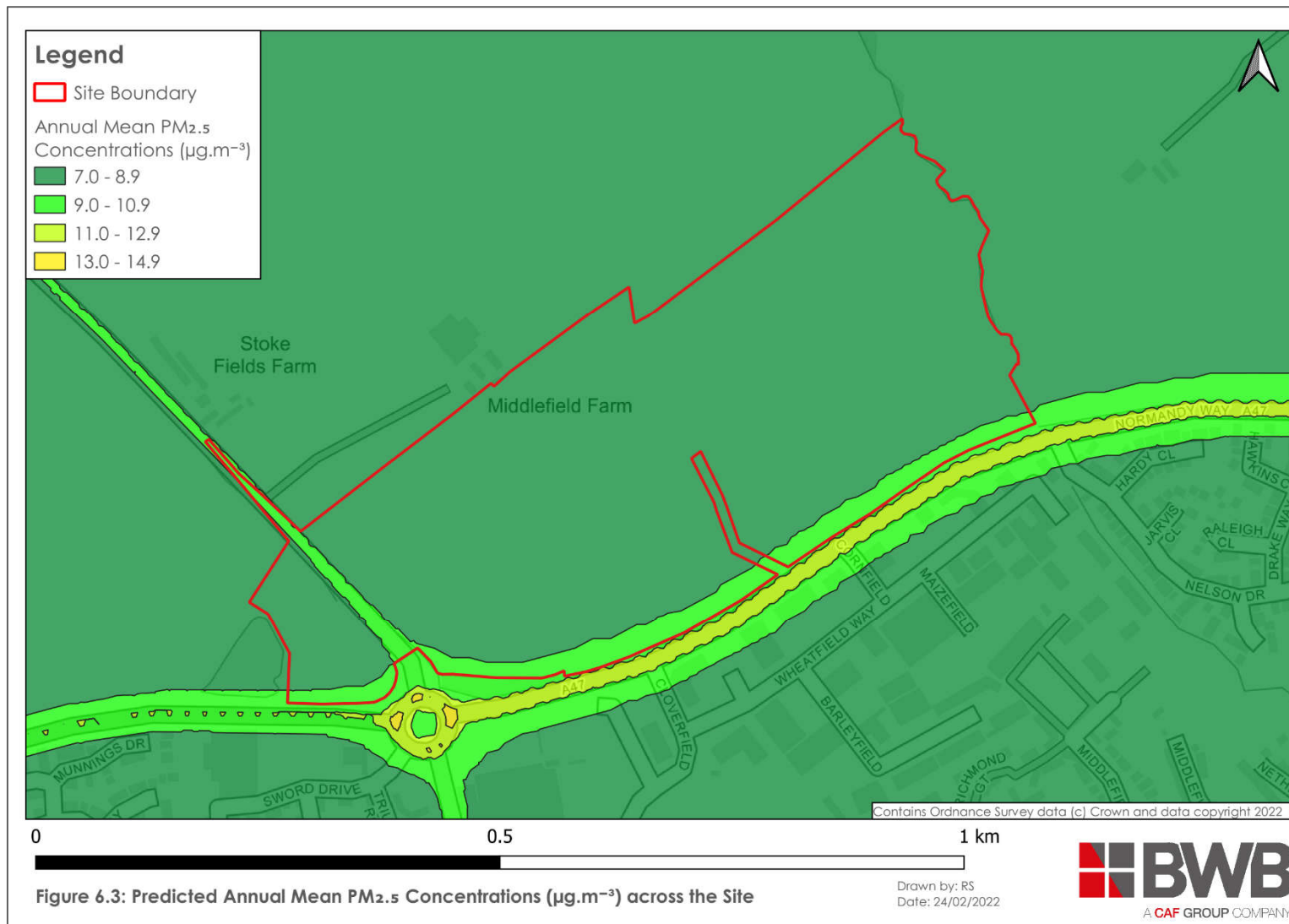


Figure 6.3: Predicted Annual Mean PM_{2.5} Concentrations across the Site



- 6.15 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 4: 2024 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2024 with the development in place.
- 6.16 With regard to short term air quality objectives for NO₂ and PM₁₀ at the residential development, the predicted annual mean NO₂ concentrations are less than 60µg.m⁻³ and therefore in accordance with Defra guidance¹⁰ it may be assumed that exceedance of the 1-hour mean NO₂ objective are unlikely. The calculation detailed in paragraph 3.13 was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Mitigation

- 6.17 The proposed development will result in minimal increases in pollutant concentrations and no new exceedances of the relevant air quality objectives are predicted.
- 6.18 Although the proposed development is not considered to significantly influence local air quality, a Framework Travel Plan will be submitted alongside the planning application. This will include measures to further reduce road traffic emissions associated with the Site.
- 6.19 A Framework Travel Plan will be prepared for the development which will encourage the use of public transport and sustainable transport methods such as walking or cycling. Furthermore, a travel plan coordinator will be appointed and a residents travel pack will be distributed.
- 6.20 Existing cycle and footpaths will be linked to the Site to encourage the use of these transport methods, with secure cycle storage provided on Site. Additionally, new pedestrian crossings will be added in the vicinity of the Site to make walking routes more accessible.
- 6.21 To promote the use of public transport, information relating to public transport options will be provided in the travel pack. The travel pack will also promote sustainable car journeys by promoting the benefits of car sharing and in addition to this, electric vehicle charging points will be provided at each dwelling.
- 6.22 The implementation of mitigation measures will benefit air quality and further reduce emissions associated with the development.

7. CONCLUSION

- 7.1 An air quality impact assessment was undertaken for the proposed residential-led development at land off Normandy Way in Hinckley.
- 7.2 A qualitative construction phase assessment was undertaken and measures were recommended for inclusion in a DMP 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 guidance¹¹.
- 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 Local Air Quality Management Technical Guidance¹⁰. The 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 guidance¹².
- 7.4 Pollutant concentrations were also predicted across the proposed development Site. Concentrations of NO₂, PM₁₀ and PM_{2.5} were all predicted to be below the 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 The inclusion of mitigation measures from the travel plan will act to minimise emissions associated with the proposed development.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

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 1µg.m ⁻³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX B: PROPOSED DEVELOPMENT MASTERPLAN