

ENVIRONMENT

Richborough Estates Limited
Brascote Lane
Newbold Verdon
Air Quality Assessment

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Newbold Verdon
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 led development located at land off Brascote Lane in Newbold Verdon.

The proposed development Site is located within the administrative area of Hinckley & Bosworth Borough Council. The Site is not located within, or in the vicinity of, an 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 guidance. 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 nitrogen dioxide and particulate matter (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 the current air quality objectives. Pollutant concentrations were predicted to be below the relevant air quality objectives and the Site was therefore considered suitable for the proposed use.

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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-led development located at land off Brascote Lane in Newbold Verdon ('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 proposed development Site to consider the suitability of the Site for the proposed residential use with regard to the current air quality objectives.
- 1.3 This report is necessarily technical in nature so to assist the reader a glossary of air quality terminology can be found in **Appendix A**.

Site Setting

- 1.4 The Site is bound to the south and west by Brascote Lane and lies within the administrative area of Hinckley & Bosworth Borough Council (HBBC).
- 1.5 **Figure 1.1** details the location of the proposed development. The Site currently comprises agricultural land.
- 1.6 To the north of the Site lies allotments and playing fields, with residential dwellings located beyond. To the east of the Site lies agricultural land and residential dwellings. To the south lies allotments, a pond, open grassed land and Brascote Lane, with agricultural land located further beyond. In addition, Brascote Lane lies to the west of the Site with agricultural land, a pond and a small Sewage Treatment Works located beyond.
- 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, or in the vicinity of an Air Quality Management Area.

Proposed Development

- 1.8 The proposed development comprises approximately 239 residential dwellings, a community hall and a country park. The proposed development masterplan is detailed in **Appendix B**.

Legend

Site Boundary

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0 0.5 1 km

Figure 1.1: Site Boundary

Drawn by: JH
Date: 22/02/2022

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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;
- Department for Environment, Air Quality Strategy (1997)⁴;
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)⁵;
- HMSO, Environment Act (2021)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 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)⁹; and
- Hinckley & Bosworth Borough Council, Hinckley and Bosworth Local Plan (Draft) (2021)¹⁰.

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)¹¹;
- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (2014)¹²; and

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

⁵ Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO

⁶ HMSO (2021) The Environment Act 2021, London: TSO

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 & Bosworth Borough Council 2009 Local Development Framework: Core Strategy

¹⁰ Hinckley & Bosworth Borough Council 2021 Hinckley and Bosworth Local Plan (Draft)

¹¹ Defra (2021) Local Air Quality Management Technical Guidance LAQM.TG(16)

¹² Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London

- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)¹³.

¹³ 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 Initial consultation was undertaken with the Environmental Health department at HBBC via email on the 2nd September 2021¹⁴, in which the requirement for an air quality assessment was confirmed and the requirement for an odour assessment was discussed. Further consultation was undertaken on the 22nd October 2021 in which the proposed assessment methodology for the air quality assessment was detailed and a response was received on the 28th October 2021 confirming acceptance of the proposed methodology.
- 3.2 The agreed assessment methodology is detailed 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)¹².
 - 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 (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.TG16)¹¹ and Institute of Air Quality Management and Environmental Protection UK (EPUK)¹³. Pollutant concentrations were predicted across the Site to consider the suitability of the Site for residential use with regard to the current air quality objectives.
 - Odour – An STW was identified approximately 250m west of the Site and consideration was given to the potential for odours associated with the STW to influence amenity for future residents of the Site. Existing sensitive residential dwellings were identified closer to the STW than the proposed development and HBBC confirmed that no odour complaints were recorded in the vicinity of the Site or STW. Additionally, the Site is not located downwind of the STW, therefore minimising the potential for any odours from the STW to be blown towards the Site. The STW was therefore not considered to significantly influence amenity in the area and no odour further consideration of odour was undertaken in the assessment. This was agreed with HBBC during consultation.
- 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 Guidance¹². The full

¹⁴ Initial consultation undertaken with HBBC on 02/09/2021. Further consultation undertaken on 22/02/2021 and response received on 28/02/2021.

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 receptor locations and across the Site.
- 3.6 The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance¹¹ and Institute of Air Quality Management and Environmental Protection UK guidance¹³.

Assessment Scenarios and Traffic Data

- 3.7 The following scenarios were considered in the air dispersion modelling:
- Scenario 1: 2019 Verification Year;
 - Scenario 2: 2021 Base Year;
 - Scenario 3: 2023 Opening Year without development; and
 - Scenario 4: 2023 Opening Year with development.
- 3.8 Traffic data were obtained from Hub Transport Planning Ltd, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:
- B582 Barlestone Road;
 - B582 High Street;
 - B585 Bosworth Lane;
 - Brascote Lane;

- Main Street; and
 - Peckleton Lane.
- 3.9 In addition, traffic data for the M1 motorway, the A47 Hinckley Road and Kirby Lane were obtained from the Department for Transport¹⁵ for use in the verification of the ADMS-Roads model.
- 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 the relevant speed limit. Queuing sections were modelled in accordance with the principles set out in Defra guidance¹¹.
- 3.11 Traffic data used in the air dispersion modelling are provided in **Appendix D** with the road network for the impact and exposure assessment detailed in **Figure D1** and the road network for the verification process detailed in **Figure E1** within **Appendix E**.

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 Toolkit¹⁶ (EFT), version 11.0, for the years of assessment (2019, 2021 and 2023).
 - 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 calculator¹⁷, 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 as this is the closest, most representative recording station in the vicinity of the proposed development. The wind rose for 2019 is provided in **Appendix E**.
 - Surface roughness and Monin-Obukhov length (MO) – Site – a surface roughness of 0.3m and an MO length of 10 were utilised in the air dispersion model to represent the predominantly agricultural conditions at the Site and within the study area.
 - Surface roughness and Monin-Obukhov length (MO) – Model verification and meteorological station – a surface roughness of 0.5m and an MO length of 30 were utilised in the air dispersion model to represent the mixed urban and industrial conditions at the monitoring locations utilised for model verification and 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 maps¹⁸ provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019, 2021 and 2023).
 - Model verification – model verification was undertaken using Blaby District Council (BDC) monitoring data in the Leicester Forest East area. These monitoring locations were the closest monitoring locations to the study area and for which traffic data was available for the roads adjacent to the monitoring locations. The use of these

¹⁵ Department for Transport, traffic counts website <https://roadtraffic.dft.gov.uk/> [accessed September 2020]

¹⁶ Defra (2021) Emission Factor Toolkit [<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>]

¹⁷ Defra (2020) NO_x to NO₂ Calculator [<https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>]

¹⁸ Defra (2020) background pollutant concentration maps [<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>]

monitoring locations was agreed with HBBC during consultation and full details of the verification procedure are provided in **Appendix E**.

- Calculation of short term PM₁₀ concentrations – the following calculation, as detailed in Defra guidance¹¹, 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 statement¹⁹ in July 2018 regarding dealing with the uncertainty in vehicle NO_x emissions within air quality assessments. The position statement recommended that sensitivity analyses be undertaken to consider the scenario where NO_x emissions do not reduce as rapidly in future years as predicted within the EFT¹⁶. The IAQM position statement was withdrawn in July 2021 following extensive research which identified that EFT 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.

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 result of the proposed development.
- 3.14 Receptor heights were modelled at 1.5m to represent the average breathing height at ground floor, with the exception of R15 which was modelled at 0.8m to represent the lower than average child breathing height at the primary school and R17 which was modelled at 3.0m to represent the first floor where the residential dwelling is located above a non-sensitive receptor.
- 3.15 The existing receptor locations are detailed in **Table 3.1** and **Figure 3.1**.

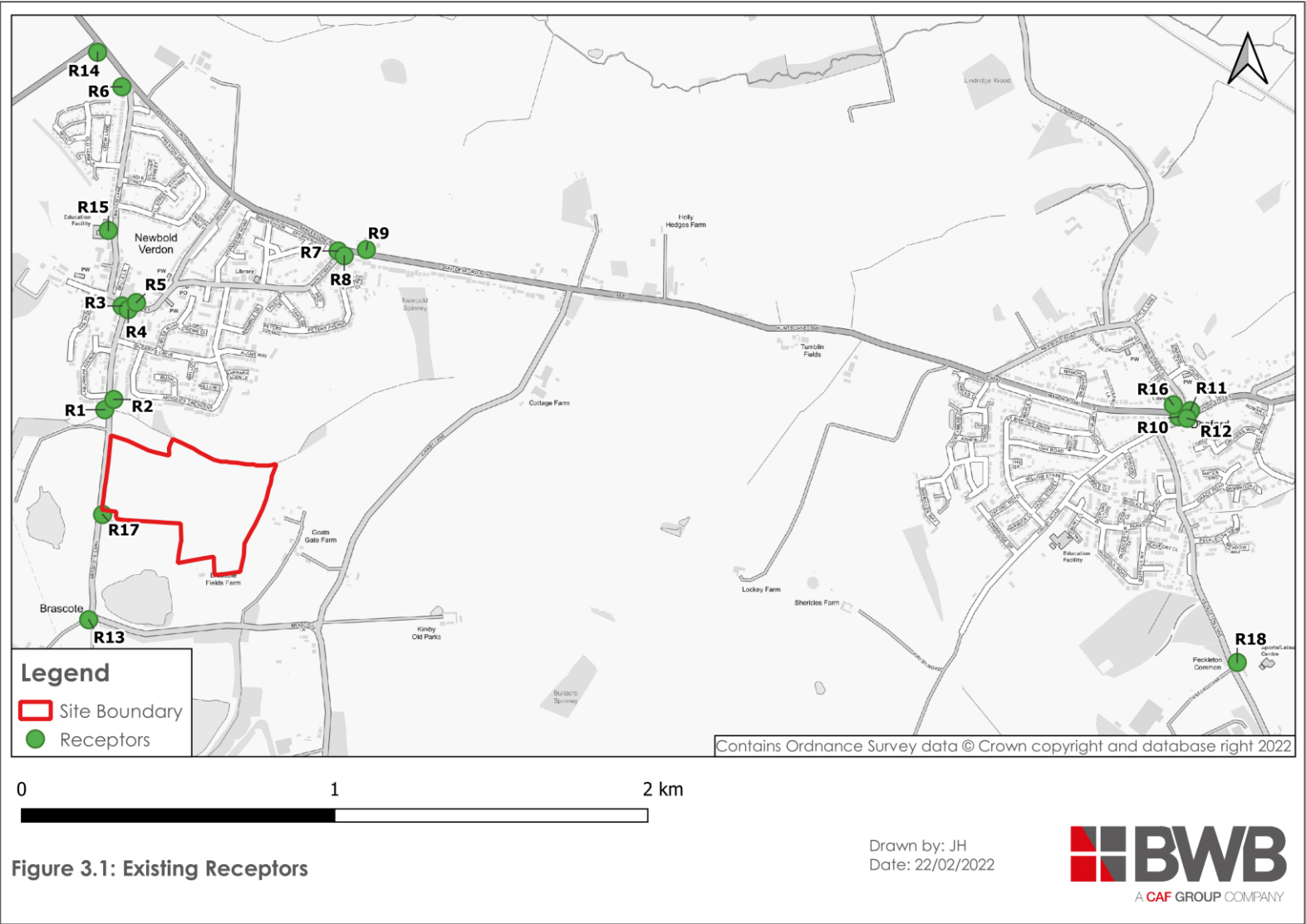
Table 3.1: Existing Sensitive Receptor Locations

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
Long Term Receptors				
R1	444411	303358	Residential dwelling on Laburnum Avenue	1.5
R2	444440	303391	Residential dwelling on Brascote Lane	1.5

¹⁹ Institute of Air Quality Management (2021) Position Statement: Dealing with Uncertainty in Vehicle NO_x Emissions within Air Quality Assessments, Version 1.1

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R3	444466	303689	Residential dwelling on Brascote Lane	1.5
R4	444486	303678	Residential dwelling on Brascote Lane	1.5
R5	444512	303700	Residential dwelling on Main Street	1.5
R6	444466	304389	Residential dwelling on Dragon Lane	1.5
R7	445156	303865	Residential dwelling on Main Street	1.5
R8	445176	303849	Residential dwelling on Desford Road	1.5
R9	445246	303869	Farm on Desford Road	1.5
R10	447840	303336	Residential dwelling on High Street	1.5
R11	447877	303355	Residential dwelling on High Street	1.5
R12	447867	303331	Residential dwelling on High Street	1.5
R13	444360	302688	Residential dwelling on Brascote Lane	1.5
R14	444388	304499	Residential dwelling on Bosworth Lane	1.5
R15	444422	303930	Primary School on Dragon Lane	0.8
R16	447823	303374	Residential dwelling on Manor Road	1.5
R17	444404	303024	Residential dwelling on Brascote Lane	3.0
R18	448027	302551	Residential dwelling on Peckleton Lane	1.5

Figure 3.1: Existing Receptor Locations



Proposed Receptor Locations

- 3.16 The proposed development proposes sensitive uses and therefore pollutant concentrations were predicted across the Site to consider the suitability of the proposed development with regard to the current air quality objectives. Pollutant concentrations were predicted across the Site for Scenario 4: 2023 Opening Year with development. A Cartesian grid was modelled at a height of 1.5m to represent ground floor average breathing height to cover the following grid references: minimum 444234, 302461 to maximum 445213, 303510.

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 Ltd, the transport consultants for the project. As such any assumptions made by the transport consultants may also influence the air quality assessment.
- 3.19 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 EFT¹⁶ 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 guidance¹¹. 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 objectives⁴. 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

Pollutant	Averaging Period	Air Quality Objective ($\mu\text{g.m}^{-3}$)	Date to Achieve by
	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 UK¹³ 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 proposed development Site is not located within, or in the vicinity of, an existing AQMA.

Local Air Quality Monitoring

Nitrogen Dioxide (NO₂)

- 4.2 HBBC undertakes NO₂ monitoring within its administrative boundary using a network of diffusion tubes. The closest monitoring location to the proposed development is located adjacent to Wood Street in Earl Shilton (diffusion tube 9), approximately 5km south of the Site. In addition, the neighbouring local authority of BDC undertakes monitoring in the Leicester Forest East area located approximately 7.5km east of the Site.
- 4.3 Bias adjusted NO₂ monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 4.1**.
- 4.4 At the time of the assessment 2020 monitoring data was not available for review. However, due to the COVID-19 pandemic and associated national lockdowns in place during the 2020 calendar year, monitoring results for 2020 would not be considered to be representative of normal conditions, given the significant decrease in traffic levels.
- 4.5 In addition, the IAQM released a position statement in August 2021 with regards to 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.

Table 4.1: HBBC and BDC 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
8, Earl Shilton Bypass	446695	296771	Suburban	6.2km south	17.4	17.9	17.7	16.2	19.1
9, Wood Street Earl Shilton	446320	297756	Urban Centre	5.1km south	22.8	23.9	21.7	20.9	23.3
CM3 Blaby 3 Hinckley Road	453185	303310	Roadside	8.4km east	26.8	44.0	25.4	27.6	24.8
CM4 Blaby 4 Hinckley Road	453492	303315	Roadside	8.7km east	47.9	24.9	37.1	47.3	38.4
DT17 St Andrews Church, Hinckley Road	453137	393321	Roadside	8.3km east	20.0	26.0	24.5	25.0	19.6

Location and Reference	Grid Reference		Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration ($\mu\text{g.m}^{-3}$)				
					2015	2016	2017	2018	2019
DT18 64 Packer Avenue	453488	303637	Roadside	8.7km east	28.0	34.3	34.7	30.1	24.9
DT51 257 Hinckley Road	452234	302753	Roadside	7.4km east	-	-	22.6	22.4	18.0
DT54 71 Hinckley Road	453592	303415	Roadside	8.8km east	-	-	20.4	32.5	26.6

-, data not available

- 4.6 Monitored concentrations in 2019 were well below the annual mean air quality objective for NO_2 of $40\mu\text{g.m}^{-3}$ at the majority of monitoring locations detailed in **Table 4.1**. Concentrations recorded at the CM4 analyser have fluctuated over the past five years and were higher than the monitored concentrations at other nearby monitoring sites. It is therefore considered that the monitoring recorded at CM4 may be influenced by a source of emissions other than road traffic.
- 4.7 Monitored NO_2 concentrations at the monitoring locations detailed in **Table 4.1** fluctuated between 2015 and 2019, with a slight increase in NO_2 concentrations at monitoring locations located within Earl Shilton and a slight reduction at monitoring locations within Leicester Forest East.
- 4.8 All monitoring locations detailed in **Table 4.1** are situated in more urban areas when compared to the Site, which is located in a rural area. The monitoring locations situated in Leicester Forest East are also located adjacent to the M1 motorway, where higher traffic levels are anticipated in comparison to the Site. Therefore, the monitoring locations detailed in **Table 4.1** were not considered to be representative of the conditions at the Site and the study area
- 4.9 Monitoring locations CM3, CM4, DT18 and DT54 were utilised in model verification. Monitoring locations 8 and 9 were excluded from the verification process, as traffic data was unavailable for the A47 and Wood Street. In addition, monitoring locations DT51 and DT17 were also excluded as they are not classed as roadside locations in accordance with Defra guidance¹¹ due to their distance from the kerb.

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

- 4.10 HBBC does not currently monitor particulate matter (PM_{10} and $\text{PM}_{2.5}$) within its administrative area and there is no particulate matter monitoring undertaken within the study area by HBBC or the neighbouring local authority BDC

Background Pollutant Concentrations

- 4.11 No background air quality monitoring is undertaken by HBBC or BDC within the study area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps¹⁸, 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, 2021 and 2023). The background concentrations used in the assessment are detailed in **Table 4.2**.

- 4.12 The Site covers a number of grid squares and therefore the grid square with the highest background pollutant concentrations was utilised across the whole of the Site to provide a conservative assessment.

Table 4.2: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m ⁻³)		
			2019	2021	2023
Monitoring Locations Used in Verification					
NO ₂	453500, 303500	CM3, CM4, DT18, DT54	23.1	Data not required for these scenarios	
Receptors					
NO ₂	444500, 303500	R1 – R5, R15, R17 and Proposed Receptor Cartesian Grid	Data not required for these scenarios	8.7	8.3
PM ₁₀				13.8	13.5
PM _{2.5}				8.5	8.3
NO ₂	444500, 304500	R6 and R14		8.5	8.0
PM ₁₀				13.1	12.8
PM _{2.5}				8.2	8.0
NO ₂	445500, 303500	R7 – R9		8.5.	8.1
PM ₁₀				13.5	13.2
PM _{2.5}				8.3	8.1
NO ₂	447500, 303500	R10 – R12 and R16		9.3	8.8
PM ₁₀				13.0	12.7
PM _{2.5}				8.3	8.0
NO ₂	444500, 302500	R13		8.3	7.9
PM ₁₀				14.1	13.8

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration ($\mu\text{g.m}^{-3}$)		
			2019	2021	2023
PM _{2.5}	448500, 302500	R18		8.4	8.2
NO ₂				9.2	8.7
PM ₁₀				14.6	14.4
PM _{2.5}				8.6	8.3

- 4.13 2019, 2021 and 2023 background concentrations are below the relevant annual mean air quality objectives for NO₂, PM₁₀ and PM_{2.5}. A review of Defra background concentration maps¹⁸ highlighted a significant contribution of residual and secondary particulate matter towards the total background PM₁₀ concentration. It is likely that this contributes towards background PM₁₀ concentrations exceeding background NO₂ 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 guidance¹² 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) website²⁰, 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 Brascote Lane. 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 guidance¹² as detailed in **Table 5.1**. Demolition is not proposed as part of the development and therefore wasn't considered further in the assessment.

²⁰ 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 is greater than 10,000m² and therefore the dust emissions magnitude for earthworks was defined as **Large**.
- Construction – The total building volume is greater than 100,000m³ and therefore the dust emissions for construction was defined as **Large**.
- Trackout – There is anticipated to be between 10 and 50 HDV outward movements in any one day during the construction phase and 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 guidance¹² for determining receptor sensitivity.
- 5.10 The sensitivity of the area is defined below, in accordance with IAQM criteria¹² and summarised in **Table 5.3**.
- Dust Soiling – A long stay car park, which is considered a highly sensitive receptor in accordance with IAQM guidance¹², is located within 20m of the Site boundary and contains between 10 and 100 car parking spaces. In addition, there is a residential dwelling located within 50m of the proposed Site boundary. Therefore, the sensitivity of the area to dust soiling is defined as '**High**'.
 - Human Health – There are 1 - 10 highly sensitive human receptors located within 50m of the proposed Site boundary and the 2021 background concentration of PM₁₀ is less than 24 µg.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	High	High	High
Human Health	Low	Low	Low

Legend

- Site Boundary
- 20m Buffer
- 50m Buffer
- 100m Buffer
- 200m Buffer
- 350m Buffer

0 0.5 1 km

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Step 2C: Define the Risk of Impacts

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

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

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Earthworks	Large	High	High Risk
Construction	Large	High	High Risk
Trackout	Medium	High	Medium Risk
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	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 guidance¹² 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 guidance¹². The highest risk category identified was 'High Risk' and the recommended mitigation taken from the IAQM guidance¹² is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a High Risk Site

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

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
	be the environmental manager/engineer or the site manager. Display the head or regional office contact information. Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken. Make the complaints log available to the local authority when asked. Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book. Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	None
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary. Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	None

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
	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.	
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).	

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	Desirable
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.	
	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 Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (High Risk Site)	Avoid scabbling (roughening of concrete surfaces) if possible.	For smaller supplies of fine 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 the site. This may require the sweeper being continuously in use.	None
	Avoid dry sweeping of large areas.	

Category	Mitigation Measures	
	Highly Recommended	Desirable
	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 bowsers and regularly cleaned.	
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	
	Access gates to be located at least 10m from receptors where possible.	

Step 4: Determine Significant Effects

- 5.13 In accordance with IAQM guidance¹², 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: 2021 Base Year and Scenario 3: 2023 Opening Year without development are detailed in **Table 6.1**.

Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2021 Base Year and Scenario 3: 2023 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2021 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2023 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R1	8.9	13.8	8.5	8.4	13.5	8.3
R2	8.9	13.8	8.5	8.5	13.5	8.3
R3	9.2	13.9	8.6	8.7	13.6	8.3
R4	9.1	13.9	8.6	8.6	13.6	8.3
R5	9.5	14.0	8.6	9.0	13.7	8.4
R6	9.2	13.2	8.3	8.6	13.0	8.1
R7	10.2	13.9	8.5	9.5	13.6	8.3
R8	9.6	13.7	8.4	9.0	13.5	8.2
R9	10.0	13.8	8.5	9.4	13.6	8.3
R10	12.5	13.7	8.7	11.4	13.4	8.4
R11	12.5	13.7	8.7	11.6	13.4	8.4
R12	12.3	13.6	8.6	11.3	13.4	8.4
R13	8.4	14.1	8.4	8.0	13.8	8.2
R14	9.6	13.4	8.4	9.0	13.1	8.1
R15	9.0	13.8	8.6	8.5	13.6	8.3

Receptor	Scenario 2: 2021 Base Year ($\mu\text{g.m}^{-3}$)			Scenario 3: 2023 Opening Year Without Development ($\mu\text{g.m}^{-3}$)		
	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
R16	10.6	13.3	8.4	9.9	13.0	8.2
R17	8.9	13.8	8.5	8.4	13.5	8.3
R18	10.1	14.8	8.7	9.4	14.6	8.4

- 6.2 The baseline assessment for Scenario 2 and Scenario 3 indicates that predicted concentrations of NO₂, PM₁₀ and PM_{2.5} are below the respective annual mean air quality objectives at all receptors locations considered.
- 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 guidance¹¹ 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

- 6.4 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted at identified existing receptor locations for Scenario 4: 2023 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: 2023 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 ($\mu\text{g.m}^{-3}$)				
	Scenario 3: 2023 Without Development ($\mu\text{g.m}^{-3}$)	Scenario 4: 2023 With Development ($\mu\text{g.m}^{-3}$)	Concentration Change* ($\mu\text{g.m}^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	8.4	8.5	+0.1	0	Negligible
R2	8.5	8.6	+0.2	0	Negligible

Receptor	Predicted NO ₂ Concentration (µg.m ⁻³)				
	Scenario 3: 2023 Without Development (µg.m ⁻³)	Scenario 4: 2023 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R3	8.7	8.9	+0.2	1	Negligible
R4	8.6	8.9	+0.2	1	Negligible
R5	9.0	9.3	+0.3	1	Negligible
R6	8.6	8.7	0.0	0	Negligible
R7	9.5	9.8	+0.2	1	Negligible
R8	9.0	9.2	+0.2	1	Negligible
R9	9.4	9.5	+0.2	0	Negligible
R10	11.4	11.6	+0.1	0	Negligible
R11	11.6	11.8	+0.3	1	Negligible
R12	11.3	11.4	+0.2	0	Negligible
R13	8.0	8.0	0.0	0	Negligible
R14	9.0	9.1	0.0	0	Negligible
R15	8.5	8.6	0.0	0	Negligible
R16	9.9	10.0	+0.1	0	Negligible
R17	8.4	8.5	0.0	0	Negligible
R18	9.4	9.4	0.0	0	Negligible

* Discrepancies in changes due to rounding effects

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

Receptor	Predicted PM ₁₀ Concentration (µg.m ⁻³)				
	Scenario 3: 2023 Without Development (µg.m ⁻³)	Scenario 4: 2023 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	13.5	13.6	0.0	0	Negligible
R2	13.5	13.6	+0.1	0	Negligible
R3	13.6	13.7	+0.1	0	Negligible
R4	13.6	13.6	+0.1	0	Negligible
R5	13.7	13.8	+0.1	0	Negligible
R6	13.0	13.0	0.0	0	Negligible
R7	13.6	13.7	+0.1	0	Negligible
R8	13.5	13.5	+0.1	0	Negligible
R9	13.6	13.6	0.0	0	Negligible
R10	13.4	13.5	0.0	0	Negligible
R11	13.4	13.5	+0.1	0	Negligible
R12	13.4	13.4	0.0	0	Negligible
R13	13.8	13.8	0.0	0	Negligible
R14	13.1	13.1	0.0	0	Negligible
R15	13.6	13.6	0.0	0	Negligible
R16	13.0	13.0	0.0	0	Negligible
R17	13.5	13.5	0.0	0	Negligible
R18	14.6	14.6	0.0	0	Negligible

* Discrepancies in changes due to rounding effects

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

Receptor	Predicted PM _{2.5} Concentration (µg.m ⁻³)				
	Scenario 3: 2023 Without Development (µg.m ⁻³)	Scenario 4: 2023 With Development (µg.m ⁻³)	Concentration Change* (µg.m ⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	8.3	8.3	0.0	0	Negligible
R2	8.3	8.3	0.0	0	Negligible
R3	8.3	8.4	0.0	0	Negligible
R4	8.3	8.4	0.0	0	Negligible
R5	8.4	8.4	+0.1	0	Negligible
R6	8.1	8.1	0.0	0	Negligible
R7	8.3	8.3	0.0	0	Negligible
R8	8.2	8.3	0.0	0	Negligible
R9	8.3	8.3	0.0	0	Negligible
R10	8.4	8.5	0.0	0	Negligible
R11	8.4	8.5	0.0	0	Negligible
R12	8.4	8.4	0.0	0	Negligible
R13	8.2	8.2	0.0	0	Negligible
R14	8.1	8.1	0.0	0	Negligible
R15	8.3	8.3	0.0	0	Negligible
R16	8.2	8.2	0.0	0	Negligible
R17	8.3	8.3	0.0	0	Negligible
R18	8.4	8.4	0.0	0	Negligible

* Discrepancies in changes due to rounding effects

- 6.6 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 3: 2023 Opening Year without development and Scenario 4: 2023 Opening Year with development are below the relevant annual mean air quality objectives for all the receptor locations considered.
- 6.7 The proposed development does not lead to any additional exceedances of the 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** and are considered to be negligible in accordance with IAQM and EPUK guidance¹³.
- 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 guidance¹¹ 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

- 6.10 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 guidance¹³.

Site Suitability Assessment

- 6.12 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted across the proposed development Site to determine the suitability for the proposed residential use with regard to the current air quality objectives.
- 6.13 A Cartesian grid was modelled covering the area between the following grid references: minimum 444234, 302461 to maximum 445213, 303510. The Cartesian grid was modelled over the Site and the surrounding area to capture Brascote Lane as the primary emission source in the vicinity of the Site. The grid was run at a height of 1.5m to represent the average breathing height at ground floor level across the proposed development Site for Scenario 4: 2023 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.

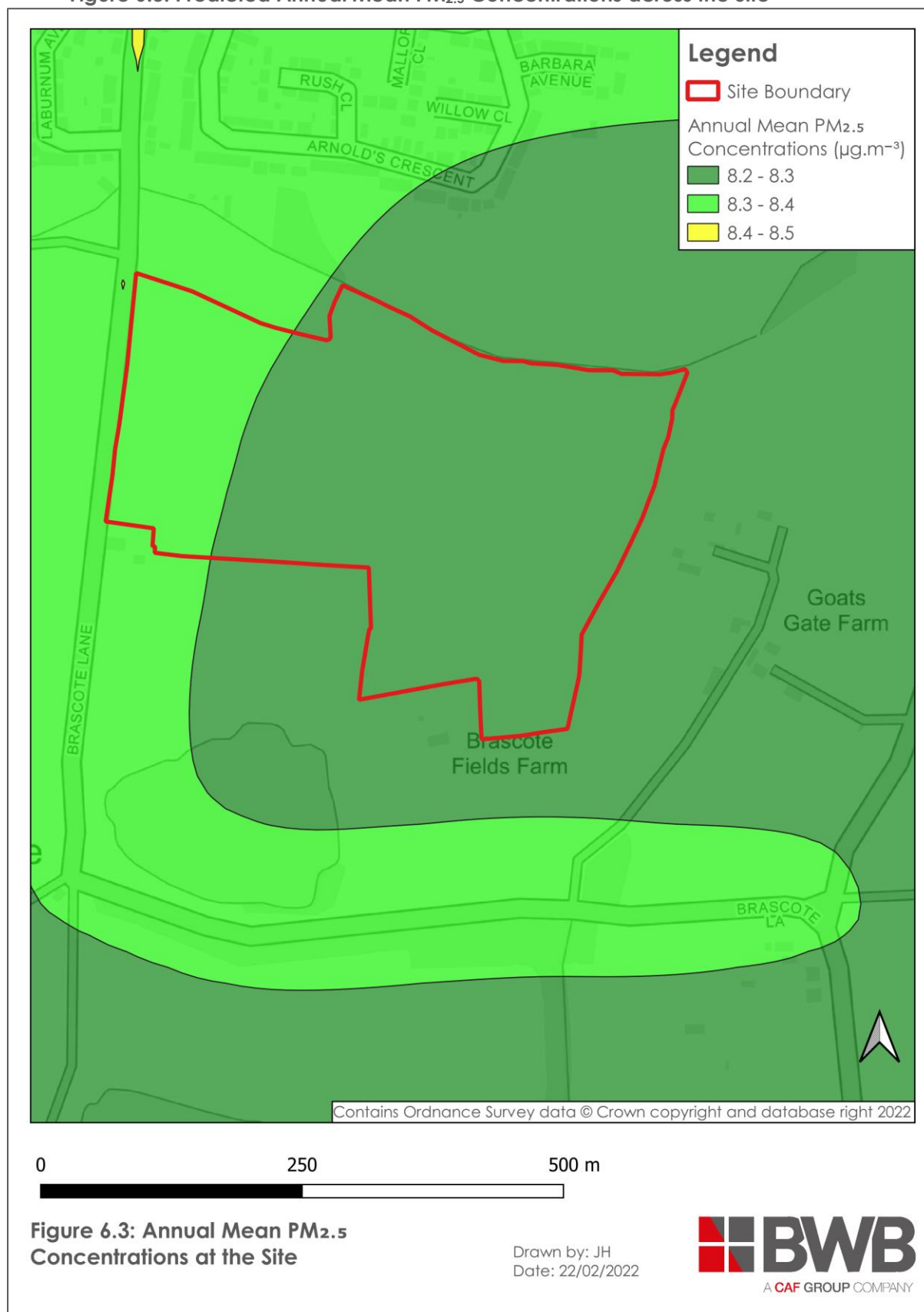
Figure 6.1: Predicted Annual Mean NO₂ Concentrations across the Site



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: 2023 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2023 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 guidance¹¹ 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.

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 Whilst the proposed development is not considered to significantly influence local air quality, a Travel Plan will be submitted with the planning application which includes the following measures that will further reduce road traffic emissions associated with the Site:
- A Travel Plan Co-ordinator (TPC) will be appointed for the proposed development and will be responsible for the overall management and implementation of the Travel Plan.
 - Each household will be provided with a Travel Pack detailing information regarding sustainable travel information.
 - Cycling will be encouraged by the provision of on-plot cycle storage and maps of local cycle routes.
 - Walking will be promoted by the provision of a map of local walking routes.
 - Public transport use will be promoted through the provision of detailed public transport information including timetables and fares in Travel Packs and each dwelling will be provided with 6-month taster bus pass.
 - Car sharing will be encouraged.

7. CONCLUSION

- 7.1 An air quality impact assessment was undertaken for the proposed residential led development located at land off Brascote Lane in Newbold Verdon.
- 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 guidance¹².
- 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 Guidance¹¹. 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 guidance¹³.
- 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 the current air quality objectives.
- 7.5 Mitigation measures will be incorporated into the Site to minimise emissions associated with the operation of 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 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
- Proposed tree/hedge removal
- Indicative proposed planting
- Potential for fruit-tree planting
- Areas of new publicly-accessible open space
- Potential for equipped area of children's play (with min 20m development offset shown)
- Potential for children's play area and/or event along a trim-trail (with min 5m development offset shown)
- Indicative marginal wildflower and grassland planting
- Indicative surface water attenuation basin
- Existing Public Right of Way
- Proposed pedestrian/cycle routes
- Proposed vehicular access from Brascote Lane
- Visual link with the spire of The Church of St. James
- Potential for improvements at Windmill pub
- Indicative dwellings (and associated garages)

0 10 50m

Richborough Estates

nineteen47
CHARTERED TOWN PLANNERS & URBAN DESIGNERS

Project
Brascote Lane, Newbold Verdon

Drawing Title
Illustrative Layout

Project Code n1741	Drawing No 006	Rev A
Date 16.02.2022	Drawing Scale 1:1,250 @ A1	

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 UK Government are required under the Environment Act 1995³ to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997⁴ and was most recently reviewed and updated in 2007⁵. 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.

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.

The Environment Act 2021⁶ was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995⁵ with regard to the Local Air Quality Management regime. Under the Environment Act 2021⁶, 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 2021⁶ 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.

National Planning Policy Framework

The National Planning Policy Framework (NPPF)⁷ was amended in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

The NPPF⁷ 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 NPPF⁷ 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 quality⁸ 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 PPG⁸ 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 PPG⁸ 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 PPG⁸ 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 PPG⁸ 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 PPG⁸ 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

Local Development Framework: Core Strategy.

The HBBC Local Development Framework includes the Core Strategy which was adopted in December 2009 and provides the over-arching strategy and long term vision for HBBC up to 2026. There are no relevant policies for air quality within the current Core Strategy.

Hinckley and Bosworth Local 2020 – 2039 (Draft)

HBBC are currently preparing a new local plan which set outs the policies for development in Hinckley and Bosworth up until 2039. The following policy relates 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 it positively takes into consideration the adopted Hinckley & Bosworth Good Design Guide (SPD), the National Design Guide and National Model Design Code, any Design Guide contained in a made Neighbourhood Plan, and any other relevant national design guidance.

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 adversely impact air quality;

NAT01 Green Infrastructure

Development proposals will be supported which contribute to the growth and enhancement of the Borough's multi-functional green infrastructure network in line with the following requirements:

[...]

c) Proposals should ensure that green infrastructure is resilient to climate change; minimises the scheme's environmental impact with respect to air, soil, light, noise, and water; and enhances the quality of air, soil and water.

[...]"

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

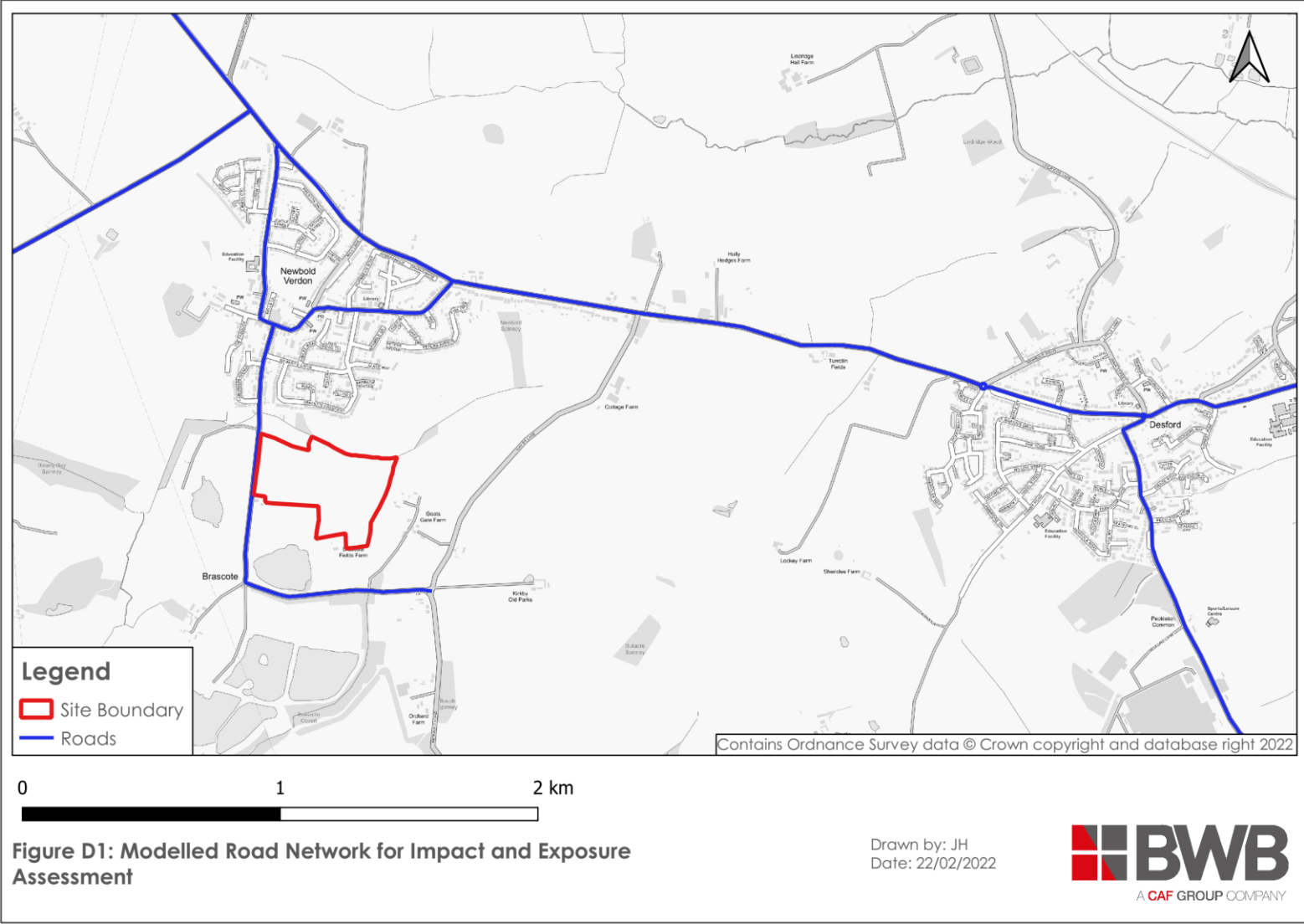
APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

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

Road Link	Speed	Scenario 1: 2019 Verification Year		Scenario 2: 2021 Base Year		Scenario 3: 2023 Opening Year Without Development		Scenario 4: 2023 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
A47 Hinckley Road West of Kirby Lane	64	11,691	728	Data not required for these scenarios					
A47 Hinckley Road (between Kirby Lane and M1)	64	20,734	803						
Kirby Lane	48	6,802	137						
M1 motorway	96	148,942	19,922						
Brascote Lane, South of main access	64	Data not required for these scenarios		1,338	10	1,362	10	1,672	13
Brascote Lane, North of main access	64			1,338	10	1,362	10	2,956	26
Main Street, West of Brascote Lane	48			2,263	96	2,304	98	2,770	103
Main Street, East of Brascote Lane	48			2,263	37	2,304	38	3,428	49
B582, Northwest of Dragon Lane	54			9,993	289	10,683	299	11,149	304
B582, Southeast of Main Street	64			9,807	198	10,434	206	11,558	217
Bosworth Lane,	69			7,885	251	8,590	262	8,751	263
B582, Northwest of Bosworth Lane	96			8,143	235	8,344	240	8,655	243
High Street, Desford, East of Peckleton Lane	48			9,807	198	10,434	206	11,558	217
Peckleton Lane, South of High Street, Desford	48			5,588	505	5,690	514	5,690	514

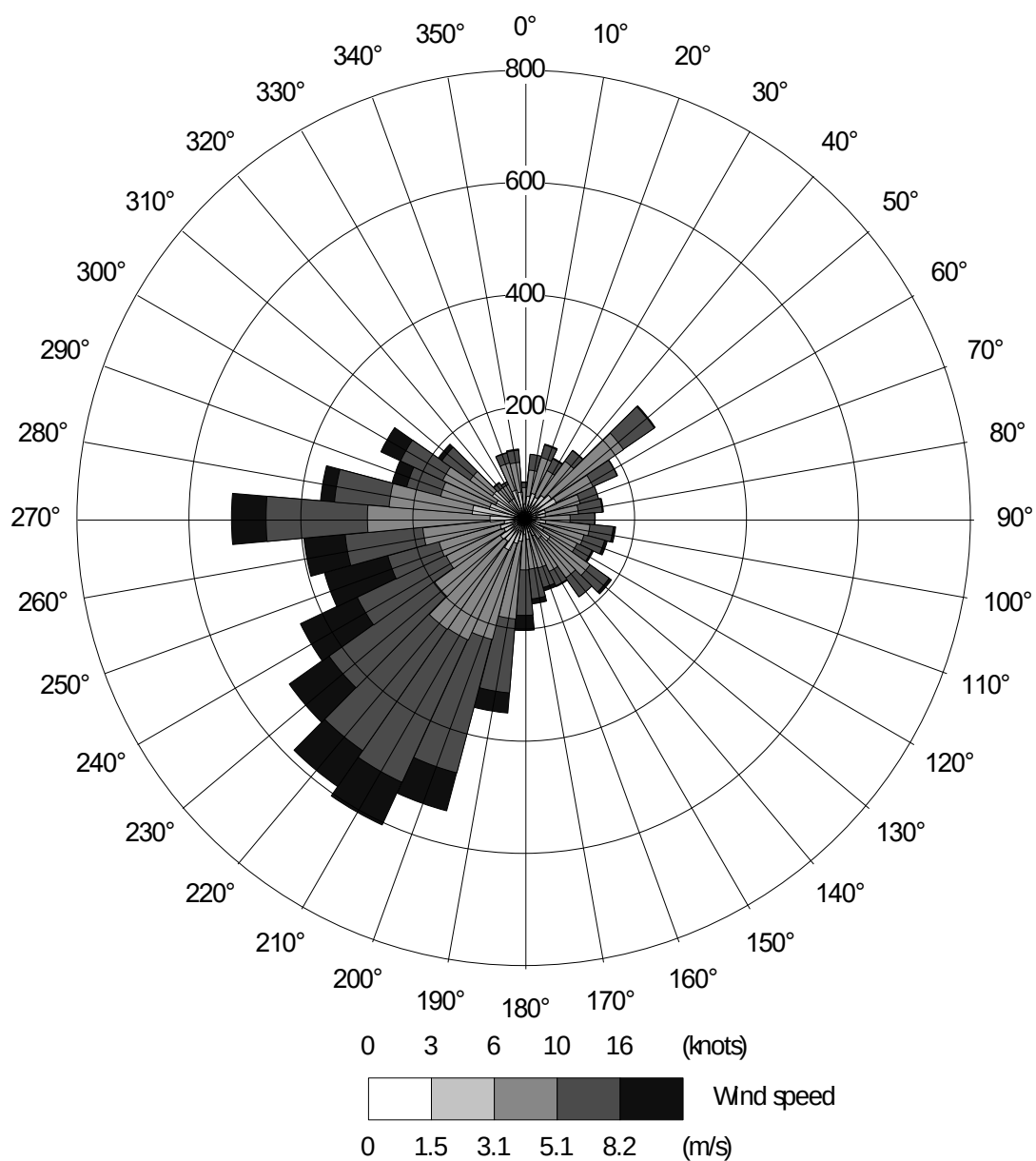
An illustration of the road links included in the ADMS-Roads model for the exposure assessment is provided in **Figures D1** and an illustration of the road links included in the verification process are provided in **Figure F1** within **Appendix F**.

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



**APPENDIX F: WIND ROSE FOR 2019 FOR EAST MIDLANDS AIRPORT METEOROLOGICAL
RECORDING STATION**

Meteorological data for 2019 Verification Year scenario for the East Midlands Airport recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2019 is detailed below and illustrates a predominant wind direction from the southwest.



APPENDIX E: 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 Defra. 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: 2019 Verification Year to predict the 2019 annual mean road contributions of NO_x at the monitoring locations in the study area. The model NO_x outputs at these locations were compared to the 2019 monitored concentrations to provide adjustment factors. **Table E1** presents the verification process for NO_x and **Figure E1** details the monitoring locations utilised in the model verification.

Monitoring locations 8 and 9 were excluded as traffic data was unavailable for the A47 and Wood Street. In addition, monitoring locations DT51 and DT17 were also excluded as these are located 11.3m and 19.4m away from the kerb, respectively. Therefore, they are considered to being not sufficiently close to the main primary emission source to enable sufficient representation of conditions within model verification.

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 E1: NO_x Verification Process

Model Verification Steps	CM3	CM4	DT18	DT54
2019 monitored total NO ₂ (µg.m ⁻³)	24.8	38.4	24.9	26.6
2019 background NO ₂ concentration (µg.m ⁻³)	23.1	23.1	23.1	23.1
Monitored road contribution NO _x (µg.m ⁻³)	3.3	30.9	3.4	6.7
Modelled road contribution NO _x (µg.m ⁻³)	4.2	6.2	11.0	10.9
Ratio of monitored road NO _x to modelled road NO _x	0.8	5.0	0.3	0.6
Adjustment factor for modelled road contribution NO_x	1.0735			
Adjusted modelled road contribution NO _x (µg.m ⁻³)	4.6	6.7	11.8	11.7
Modelled total NO ₂ concentration (µg.m ⁻³)	25.4	26.6	29.2	29.1
Monitored total NO ₂ concentration (µg.m ⁻³)	24.8	38.4	24.9	26.6
% difference between modelled and monitored total NO ₂ concentration	2.5	-44.6	14.6	8.6
RMSE % (should be less than 25% and ideally less than 10%)	16.1			

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

A road-NO_x factor of **1.0753** 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 Defra and the adjusted NO₂ background concentration.

The RMSE derived for the model verification was more than 10% however, remained below 25%. It was considered that the automatic analyser CM4 was influencing the RMSE due to its significantly greater monitored annual mean NO₂ concentration compared to other local monitoring. The inclusion of CM4 derived a higher verification factor and therefore, it was retained within model verification to enable a conservative assessment to be carried out using a greater verification factor than would be derived without CM4.

Figure E1: Monitoring Locations Utilised in the ADMS-Roads Model Verification Process

