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ENVIRONMENT

Richborough
Land situated to the east of Brascote Lane and south of Arnold's Crescent

Newbold Verdon

Air Quality Assessment

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Land situated to the east of Brascote Lane and south of Arnold's Crescent
Newbold Verdon

Air Quality Assessment

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Notice

EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough to undertake an air quality assessment for an outline planning application for 135 dwellings at land situated east of Brascote Lane and south of Arnold's Crescent, Newbold Verdon ('the Site').

The Site is located within the administrative area of Hinckley & Bosworth Borough Council. The Site is not located within an existing Air Quality Management Area.

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

A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance and Institute of Air Quality Management & Environmental Policy Implementation Community (previously Environmental Protection UK) guidance. The development was not predicted to result in any exceedances of the current relevant air quality objectives and the impact of the development with regard to these objectives was predicted to be 'negligible' in accordance with guidance.

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

Based on the assessment results, the impact of the proposed development with regards to the current relevant air quality objectives was considered to be not significant. No further mitigation is required but measures included in the development that can be considered beneficial to air quality include electric vehicle charging points.

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APPENDICES

1. INTRODUCTION

1.1 BWB Consulting Limited (BWB) was instructed by Richborough (the Client) to undertake an air quality assessment for a residential development at land situated to the east of Brascote Lane and south of Arnold's Crescent, Newbold Verdon.

1.2 The planning application boundary extends in total to 13.77ha hectares (hereinafter referred to as the "Combined Site"), which comprises the following:

- 6.91 hectares of land to the east of Brascote Lane and south of the Thurlaston Brook, as shown shaded grey on the phased boundary plan shown in **Appendix A,** which benefits from an extant planning permission under reference 22/00277/OUT, for the purpose only of providing access/egress to the public highway known as Brascote Lane (hereinafter referred to as "Phase 1"); and
- 6.86 hectares of land to the south of Arnold's Crescent and north of the Thurlaston Brook, as shown shaded pink on the phased boundary plan shown in **Appendix A**, for up to 135 dwellings with associated landscaping, open space, drainage infrastructure and associated works (hereinafter referred to as "Phase 2").

1.3 On the basis Phase 1 has the benefit of planning permission the scope of this air quality report focusses upon Phase 2, (hereinafter referred to as the "Site").

1.4 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 determine the suitability of the Site for the proposed end use with regard to the current relevant air quality objectives.

1.5 This report is necessarily technical in nature so to assist the reader a glossary of air quality terminology can be found in **Appendix B**.

Site Setting

1.6 The Site is located off Arnold's Crescent, adjacent to Brascote Lane, within the administrative area of Hinckley & Bosworth Borough Council (HBBC). The Site is not located within an existing Air Quality Management Area (AQMA).

1.7 The Site currently comprises open green space. The Site is bordered to the north by residential dwellings. To the east and south of the Site is open green space and agricultural land. An outline planning application (planning reference: 23/01037/OUT) was submitted in October 2023 and granted planning permission in May 2024 for Phase 1 of the development, which is located to the south of the Site. The Site is bordered to the west by residential dwellings in addition to allotments with Brascote Lane located beyond. **Figure 1.1** details the location of the proposed development.

1.8 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions from Brascote Lane.

Proposed Development

1.9 The proposed development comprises an outline planning application for construction of up to 135 dwellings with associated landscaping, open space, drainage infrastructure and associated works (all matters reserved except access from Brascote Lane) at land situated to the east of Brascote Lane and south of Arnold's Crescent, Newbold Verdon. The proposed development framework plan is detailed in **Appendix C**.

Figure 1.1: Site Location

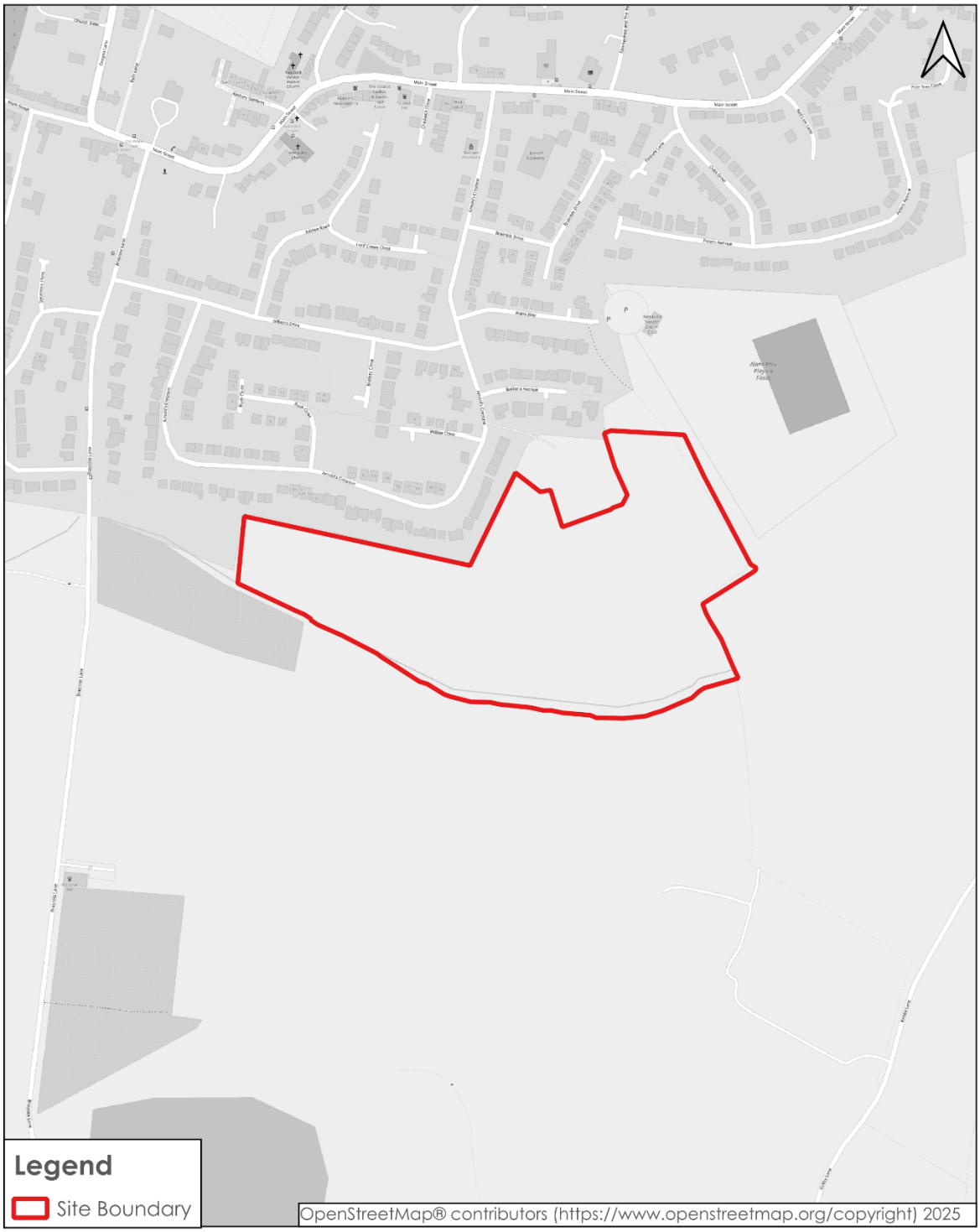

Figure 1.1: Site Location

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 D**:

- European Parliament, EU 2008 ambient Air Quality Directive (2008)[1];
- HMSO, Air Quality (England) Regulations (2000)[2];
- HMSO, Environment Act (1995)[3];
- HMSO, Environment Act (2021)[4];
- HMSO, Air Quality (England) Regulations (2002)[5];
- HMSO, Air Quality Standards Regulations (2010)[6];
- Department for Environment, Air Quality Strategy (1997)[7];
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)[8];
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2023)[9];
- Department for the Environment, Food and Rural Affairs, The Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020)[10];
- HMSO, The Environmental Targets (Fine Particulate Matter) (England) Regulations (2023)[11];
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework (NPPF) (2024)[12]; and
- Ministry for Housing, Communities and Local Government, Planning Practice Guidance (PPG) for air quality (2019)[13].

Local Planning Policy

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

- Hinckley & Bosworth Borough Council, Local Development Framework Core Strategy (2009)[14]; and
- Hinckley & Bosworth Borough Council, Site Allocations and Development Management Policies DPD (2016)[15].

[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] HMSO (2021) The Environment Act 2021, London: TSO
[5] HMSO (2002) Statutory Instruments 2002 No. 3043, The Air Quality (England) (Amendment) Regulations 2002, London: HMSO
[6] HMSO (2010) Statutory Instruments 2010 No. 1001 Air Quality Standards Regulations 2010. London: HMSO
[7] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[8] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[9] Department for the Environment, Food and Rural Affairs (Defra) (2023) Air Quality Strategy: Framework for Local Authority
[10] Department of the Environment, Food and Rural Affairs (Defra) (2020) The Environment (Miscellaneous Amendments) (EU Exit) Regulations, London: HMSO
[11] HMSO (2023) Statutory Instruments 2023 No. 96 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
[12] Ministry of Housing, Communities & Local Government (2024) National Planning Policy Framework, HMSO London
[13] Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality
[14] Hinckley & Bosworth Borough Council (2009) Local Development Framework
[15] Hinckley & Bosworth Borough Council (2016) Site Allocations and Development Management Policies DPD

Defra $PM_{2.5}$ targets: Interim Planning Guidance

2.3 Defra is developing guidance in relation to the new targets for $PM_{2.5}$ to be considered in planning. The new guidance will require planning applications to consider how the development will reduce population exposure to $PM_{2.5}$ from design stage. At the time of writing, the planning guidance has not been published (expected to be published in 2025). An interim guidance[16] has been published by Defra, which advises planning applications to consider the following:

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

2.4 Consideration to the interim guidance[16] has therefore been included within the assessment.

Air Quality Assessment Guidance

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

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(22)) (2022)[17];
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (2024)[18]; and
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)[19].

[16] Defra (2024) $PM_{2.5}$ Targets: Interim Planning Guidance
[17] Defra (2022) Local Air Quality Management Technical Guidance LAQM.TG(22)
[18] Institute of Air Quality Management (2024) Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London
[19] 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 & Bosworth Borough Council

3.1 Consultation was undertaken with HBBC on 26th April 2024. At the time of writing, no response was received. The methodology that was outlined to HBBC is provided below:

- Construction Phase - A construction phase dust assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)[18].
- Operational Phase – A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated traffic on local air quality and predict pollutant concentrations at the Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) at identified existing receptor locations for both without and with development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG22)[17] and IAQM and Environmental Policy Implementation Community (EPIC) (previously Environmental Protection UK (EPUK))[19]. Pollutant concentrations were predicted across the Site to consider the suitability of the Site for residential use.

3.2 Full details of the methodology used in the assessment, as provided to with HBBC, are provided below.

Construction Phase Dust Assessment

3.3 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM guidance[18]. 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

3.4 The air dispersion model ADMS-Roads, version 5.0.1.3 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ at existing receptors and across the Site.

3.5 The assessment was undertaken in accordance with Defra LAQM.TG(22)[17] and IAQM and EPIC (previously EPUK) guidance[19].

Assessment Scenarios and Traffic Data

3.6 The following scenarios were considered in the air dispersion modelling:

- Scenario 1: 2023 Verification Year;
- Scenario 2: 2025 Base Year;
- Scenario 3: 2028 Opening Year without development; and
- Scenario 4: 2028 Opening Year with development.

3.7 The operational phase road traffic emissions study area is defined by the road network modelled as part of the assessment. Traffic data were obtained from 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 use in the assessment. Further details on the traffic data used in the assessment are detailed in **Appendix E**.

ADMS-Roads Model Inputs

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

Table 3.1: Model Inputs Used in the Assessment Model Inputs Used in the Assessment

Parameter	Input
Emission factors	Emission factors were utilised from the Defra Emission Factor Toolkit[20] (EFT), version 13.1, for the years of assessment (2023, 2025 and 2028).
Conversion of oxides of nitrogen	Concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO_2) using the Defra NOx to NO_2 calculator[21], version 9.1.
Meteorological data	Hourly sequential meteorological data for the verification year of assessment (2023) were obtained for the East Midlands recording station. This is considered the closest and most representative station to the Site. The wind rose for 2023 is provided in **Appendix E.**
Surface roughness and Monin-Obukhov length (MO) – Site	A surface roughness of 0.3m and a MO length of 10m were utilised in the air dispersion model to represent the rural conditions at the Site and within the Study area.

[20] Defra (2025) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]
[21] Defra (2024) NOx to NO_2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]

Parameter	Input
Surface roughness and Monin-Obukhov length (MO) – Meteorological Station	A surface roughness of 0.5m and a MO length of 30m were utilised in the air dispersion model to represent the mixed urban/industrial conditions at the meteorological station
Background pollutant concentrations	Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentration maps[22] provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2023, 2025 and 2028)).
Model verification	Model verification was undertaken using 2023 monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix E**.
Calculation of short term PM_{10} concentrations	The following calculation, as detailed in Defra guidance[17], was utilised to calculate the number of exceedances of the 24-hour mean PM_{10} air quality objective: *Number of 24-Hour Mean Exceedance = -18.5 + 0.00145 * Annual Mean^3 + (206 / Annual Mean)*

Receptor Locations

Existing Sensitive Receptors

3.9 Existing receptor locations were identified within close proximity of the road links detailed in **Appendix E** and considered in the operational phase road traffic emissions assessment. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the identified existing receptor locations for the assessment scenarios detailed in paragraph 3.6. 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 ground floor breathing height. Receptors at first floor level were modelled at 3m. Primary schools included in the assessment were modelled at 0.8m to the lower average breathing height of primary school children.

3.10 The existing receptor locations are detailed in **Table 3.2** and **Figure 3.1**.

Table 3.2: Existing Sensitive Receptor Locations

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R1	444411	303358	Residential dwelling on Laburnum Avenue	1.5
R2	444440	303391	Residential dwelling on Brascote Lane	1.5
R3	444466	303689	Residential dwelling on Brascote Lane	1.5

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

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
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	444388	304499	Residential dwelling on Bosworth Lane	1.5
R11	444422	303930	Primary School on Dragon Lane	0.8
R12	444404	303024	Residential dwelling on Brascote Lane	3.0

Site Suitability

3.11 Pollutant concentrations were predicted across the Site to consider exposure of future residents of the proposed development to air quality. A Cartesian grid from minimum X 444360, Y 302987 to maximum X 445194, Y 303634, modelled at a height of 1.5m to represent the average ground floor breathing height, was included to predict pollutant concentrations across the Site to consider its suitability for the proposed sensitive end use.

Figure 3.1: Existing Receptor Locations

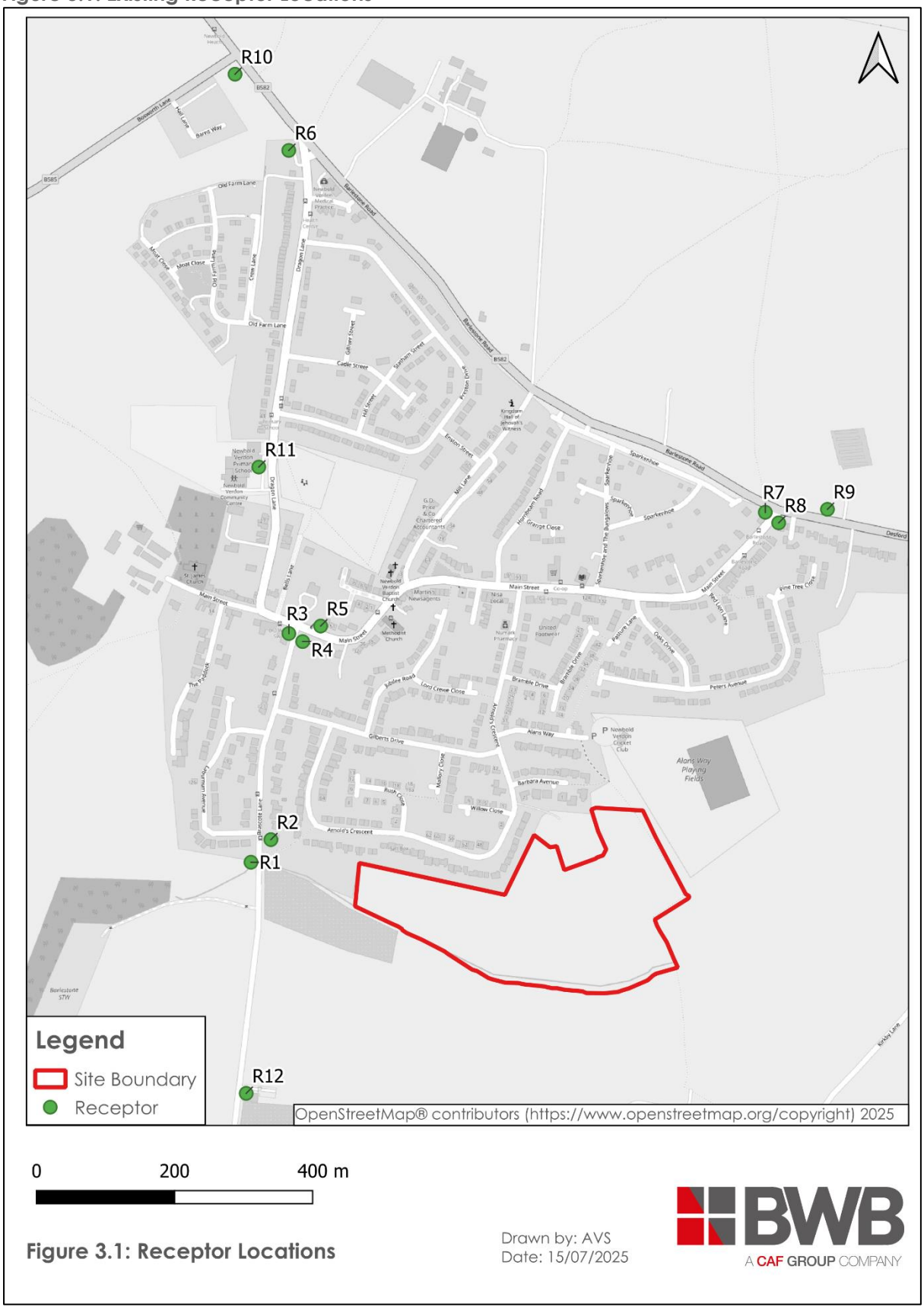

Figure 3.1: Receptor Locations

Drawn by: AVS
Date: 15/07/2025

Limitations and Assumptions

3.12 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.

3.13 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.

3.14 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 EFT[20] to provide the most up to date estimate of current and future emission projections.

3.15 The opening year with development assessment scenario assumes that all operational phase traffic associated with the development will be present in the opening year. This provides a conservative assessment to align with the assessment year likely to experience the highest background pollutant emissions.

3.16 To reduce the uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in Defra guidance[17]. As the models were verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

3.17 Consideration of committed local developments that may represent sensitive receptors to dust during the construction phase was undertaken through a review of the HBBC planning portal. Any applications submitted following the review, or not present on the portal at the time of review, were not considered.

Assessment Criteria

3.18 Predicted pollutant concentrations were compared to the current relevant air quality objectives for England. The current relevant air quality standards and objectives are detailed in **Table 3.3.**

Table 3.3: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective ($\mu g.m^{-3}$)	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 (µg.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	20	1 January 2020
	Annual mean interim target as detailed within the Environmental Improvement Plan[26]	*12*	*31 January 2028*
	Annual mean	*10*	*31 December 2040*

Italics notes future objective

3.19 Guidance is provided by the IAQM and EPIC (previously EPUK)[19] 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 3.4.** These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the current relevant air quality objectives.

Table 3.4: 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.

3.20 In accordance with IAQM and EPIC (previously EPUK) guidance[19], negligible and slight impacts at are considered to be 'not significant' at individual receptor locations and moderate and substantial impacts are considered to be 'significant' at individual receptor locations. Overall significance is determined by professional judgement.

4. BASELINE CONDITIONS

Local Air Quality Management

4.1 The Site is not located within an existing AQMA. The closest AQMA to the Site is the Blaby District Council (BDC) AQMA 6 which is located 9km south east of the Site and was declared by the neighbouring authority of BDC for potential exceedances of the annual mean nitrogen dioxide (NO_2) air quality objective.

Local Air Quality Monitoring

Nitrogen Dioxide

4.2 HBBC undertakes NO_2 monitoring using a network diffusion tubes and automatic stations. The neighbouring authority of BDC also undertakes NO_2 monitoring using a network of diffusion tubes and automatic stations. The closest monitoring location to the Site is the HBBC diffusion tube '5' which is located 3km east of the Site in Desford,

4.3 Bias adjusted NO_2 monitoring results, for the locations in the vicinity of the Site, are detailed in **Table 4.1** and the locations are shown in **Figure 4.1.**

4.4 None of the HBBC monitoring in the vicinity of the Site was considered representative of the study area and therefore was not included in the model verification process. BDC monitoring located along the A47 Hinckley Road was therefore utilised in the model verification process. The BDC diffusion tubes used in the model verification process are also detailed in **Table 4.1** and the locations are shown in **Figure 4.1.**

Table 4.1: HBBC and BDC NO_2 Monitoring Data in 2016– 2023[23]

ID	Grid Reference (X,Y)	Site Type	Monitored Annual Average Concentration (µg.m^{-3})							
			2016	2017	2018	2019	2020	2021	2022	2023
HBBC										
5	448012, 302544	Suburban	22.6	23.0	19.9	-	-	10.9	12.4	11.4
8	446320, 297756	Urban Centre	17.9	17.7	20.9	23.3	18.8	21.6	19.1	17.7
13	451560, 306273	Suburban	-	-	-	28.6	15.3	15.9	15.3	15.3+
BDC										

[23] The IAQM released a position statement (Institute of Air Quality Management (2021) Position Statement: Use of 2020 and 2021 Monitoring Datasets) in August 2021 with regard to 2020 and 2021 monitoring datasets. Due to the influence of the COVID-19 pandemic lockdown restrictions, 2020 and 2021 monitoring data are not considered representative of normal conditions. Data is reported for completeness.

ID	Grid Reference (X,Y)	Site Type	Monitored Annual Average Concentration (µg.m^{-3})							
			2016	2017	2018	2019	2020	2021	2022	2023
93	453140, 303311	Roadside	**44**	25.4	27.6	24.8	18.2	20.0	23.5	19.9+
99	453219, 303310	Roadside	-	-	30.4	22	-	17.3	19.4	16.7
54	453591, 303420	Roadside	-	20.4	32.5	26.6	22.1	20.7	22.6	23.6
68	453592, 303415	Roadside	-	-	25.7	23.8	18.4	19.2	23.4	22.4
CM4	454020, 303473	Roadside	24.9	37.1	**47.3+**	38.4	23.3	26.9	23.3	18.9

-data not available, data presented to available accuracy, + data capture less than 75%,

4.5 Monitored annual mean NO_2 concentrations were below the current annual mean objective for England at all reported monitoring locations in all years where data is available with the exception of '93' in 2016 and CM4 in 2018. An overall general decreasing trend is observed and 2023 concentrations were below the current annual mean air quality objectives.

4.6 A summary of the monitoring locations considered for the model verification process are detailed below:

- HBBC diffusion tube '5' is located along Peckleton Lane, south of Desford, adjacent to a small industrial estate. Conditions at this tube are not considered to representative of the Site or study area and this location was therefore not included in the model verification process.
- HBBC diffusion tube '8' is located along Wood Street within Earl Shilton along a shopping high street. As such, conditions at this tube are not considered to representative of the Site or study area and this location was therefore not included in the model verification process.
- HBBC diffusion tube '13' is located within the residential area of Ratby. However, in 2023, data capture at this location was less than 75% and was therefore suitable for use in the model verification process in accordance with Defra guidance[17].
- BDC monitoring locations '93', '99', '54', '68' and CM4 are all located adjacent to the A47 with surrounding residential properties and are therefore considered the most suitable monitoring for use in the model verification process. All these locations were therefore included and further details can be found in **Appendix E.**

Figure 4.1: HBBC and BDC NO_2 Monitoring Locations

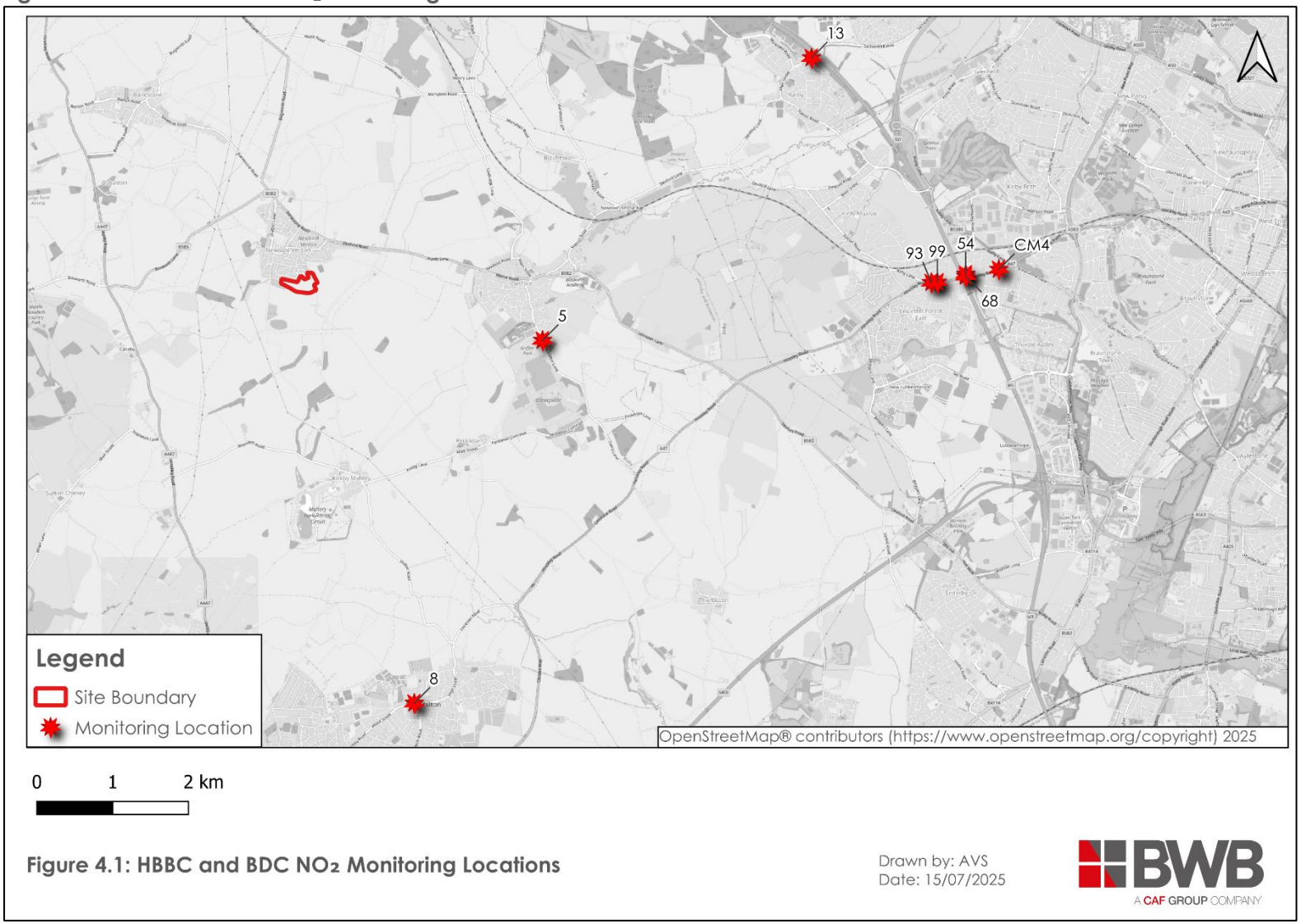

Figure 4.1: HBBC and BDC NO_2 Monitoring Locations

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Particulate Matter (PM_{10} and $PM_{2.5}$)

4.7 No PM_{10} or $PM_{2.5}$ monitoring is undertaken by HBBC. The neighbouring BDC undertakes PM_{10} and $PM_{2.5}$ monitoring using automatic monitors. The monitoring results are detailed in **Table 4.2** and the locations are shown in **Figure 4.2.**

Table 4.2: BDC PM_{10} and $PM_{2.5}$ Monitoring Data in 2016 – 2023

ID	Grid Reference X,Y	Site Type	Monitored Annual Average Concentration (µg.m^{-3})							
			2016	2017	2018	2019	2020	2021	2022	2023
PM_{10}										
CM1	454482, 298573	Roadside	12	14.8	11	11.8	11.5	10.8	11.7	13
$PM_{2.5}$										
CM1	454482, 298573	Roadside	8.4	10.4	7.7	8.3	8.1	7.6	8.2	7.1

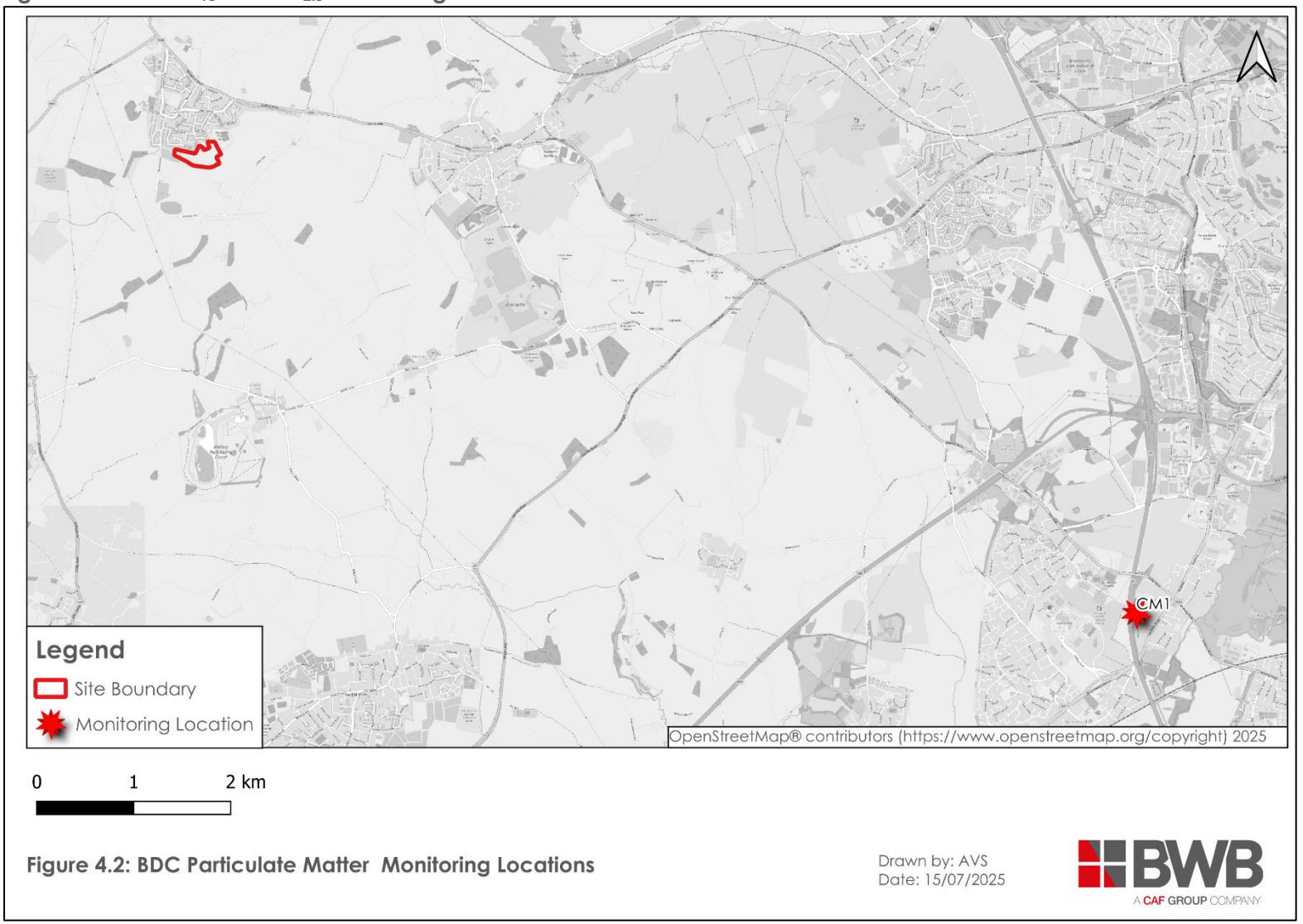
Data presented to available accuracy

4.8 Monitored PM_{10} and $PM_{2.5}$ concentrations were below the annual mean objective in all reported years. Concentrations of $PM_{2.5}$ were also below the annual mean interim target of 12µg.m^{-3} to be achieved by 2028 since 2016, and concentrations were below future annual mean objective of 10µg.m^{-3} to be achieved by 2040 since 2018.

4.9 Concentrations of both $PM_{2.5}$ and PM_{10} increased between 2016 and 2017 at CM1 and then decreased from 2017 to 2018. Since 2018, no trend in concentrations could be determined.

4.10 CM1 is located in close proximity to the M1 motorway where traffic flows and therefore pollutant concentrations are expected to be higher than at the Site. CM1 is located along a small residential road, 45m from the M1 motorway and could not therefore be used in the model verification process.

Figure 4.2: BDC PM_{10} and $PM_{2.5}$ Monitoring Locations



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 maps[22], which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2021 monitoring and meteorological data. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the years of assessment (2023, 2025 and 2028). The background concentrations used in the assessment are detailed in **Table 4.3.**

Table 4.3: Background Pollutant Concentrations used in the Assessment (µg.m^{-3})

Receptor	2023			2025			2028		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
Site	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
Verification Locations									
CM4	12.6	Not required for these scenarios							
54	14.8								
68	14.8								
93	14.8								
99	14.8								
Receptors									
R1	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
R2	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
R3	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
R4	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
R5	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
R6	6.8	12.0	6.8	6.4	11.8	6.6	5.9	11.6	6.4
R7	7.1	12.3	6.8	6.7	12.2	6.7	6.2	11.9	6.5
R8	7.1	12.3	6.8	6.7	12.2	6.7	6.2	11.9	6.5

Receptor	2023			2025			2028		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R9	7.1	12.3	6.8	6.7	12.2	6.7	6.2	11.9	6.5
R10	6.8	12.0	6.8	6.4	11.8	6.6	5.9	11.6	6.4
R11	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7
R12	6.8	12.6	7.0	6.5	12.4	6.9	6.0	12.2	6.7

4.12 Predicted concentrations are below the current relevant annual mean objectives. $PM_{2.5}$ concentrations are also below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}. PM_{10} concentrations are higher than NO_2 concentrations across the Site and at all receptor locations, this is due to a high contribution from residual and secondary sources.

5. CONSTRUCTION PHASE DUST ASSESSMENT

5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality.

5.2 The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

Step 1: Screen the Need for a Detailed Assessment

5.3 Step 1 of the IAQM guidance[18] involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.

5.4 In accordance with the guidance, a detailed assessment is required if:

- Human receptors are located within 250m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 250m from the site entrances; or
- Ecological receptors are located within 50m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 250m from the site entrances.

5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[24], 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 Arnold's Crescent. 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 guidance[18] as detailed in **Table 5.1**. Demolition is not proposed as part of the development and therefore was not considered further in the assessment.

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

Table 5.1: Dust Emission Magnitude Criteria and Definition

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

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

- Earthworks – The total site area is between 18,000m^2 and 110,000m^2. Therefore the dust emission magnitude for earthworks was defined as **Medium.**
- Construction – The proposed development will require the construction of 135 dwellings with a total building volume of over 75,000m^3. The dust emission magnitude for construction was therefore defined as **Large.**
- Trackout – Due to the magnitude of the Site it is unlikely that there will be more than 20 outward HDV movements in any one day. The dust emissions magnitude was therefore defined as **Small.** The trackout distance utilised in the assessment was set to 250m from the Site access in accordance with the guidance[17].

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

Table 5.2: Summary of Project Defined Dust Emission Magnitudes

Activity	Dust Emission Magnitude
Earthworks	Medium
Construction	Large
Trackout	Small

Step 2B: Define the Sensitivity of the Area

5.9 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling and human health impacts. The sensitivity of the Site takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM_{10} and site-specific factors. **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance[18] for determining receptor sensitivity.

5.10 The sensitivity of the area is defined below, in accordance with IAQM criteria[18] and summarised in Table 5.3.

- Dust Soiling – there are between 10 and 100 highly sensitive residential receptors located within 20m of the proposed Site boundary and the assumed routes to be used by construction vehicles, including consideration of Phase 1 receptors. The sensitivity of the area to dust soiling impacts was therefore defined as **High.**
- Human Health –between 10 and 100 highly sensitive residential receptors are located within 20m of the proposed Site boundary and the assumed routes to be used by construction vehicles, including construction of Phase 1 receptors. The background annual mean PM_{10} concentration is less than 24µg.m^{-3} as provided by Defra background mapping[25]. The sensitivity of the area to human health impacts was therefore 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

[25] https://laqm.defra.gov.uk/air-quality/air-quality-assessment/background-maps/

Figure 5.1: Construction Phase Assessment Dust Distance Buffers

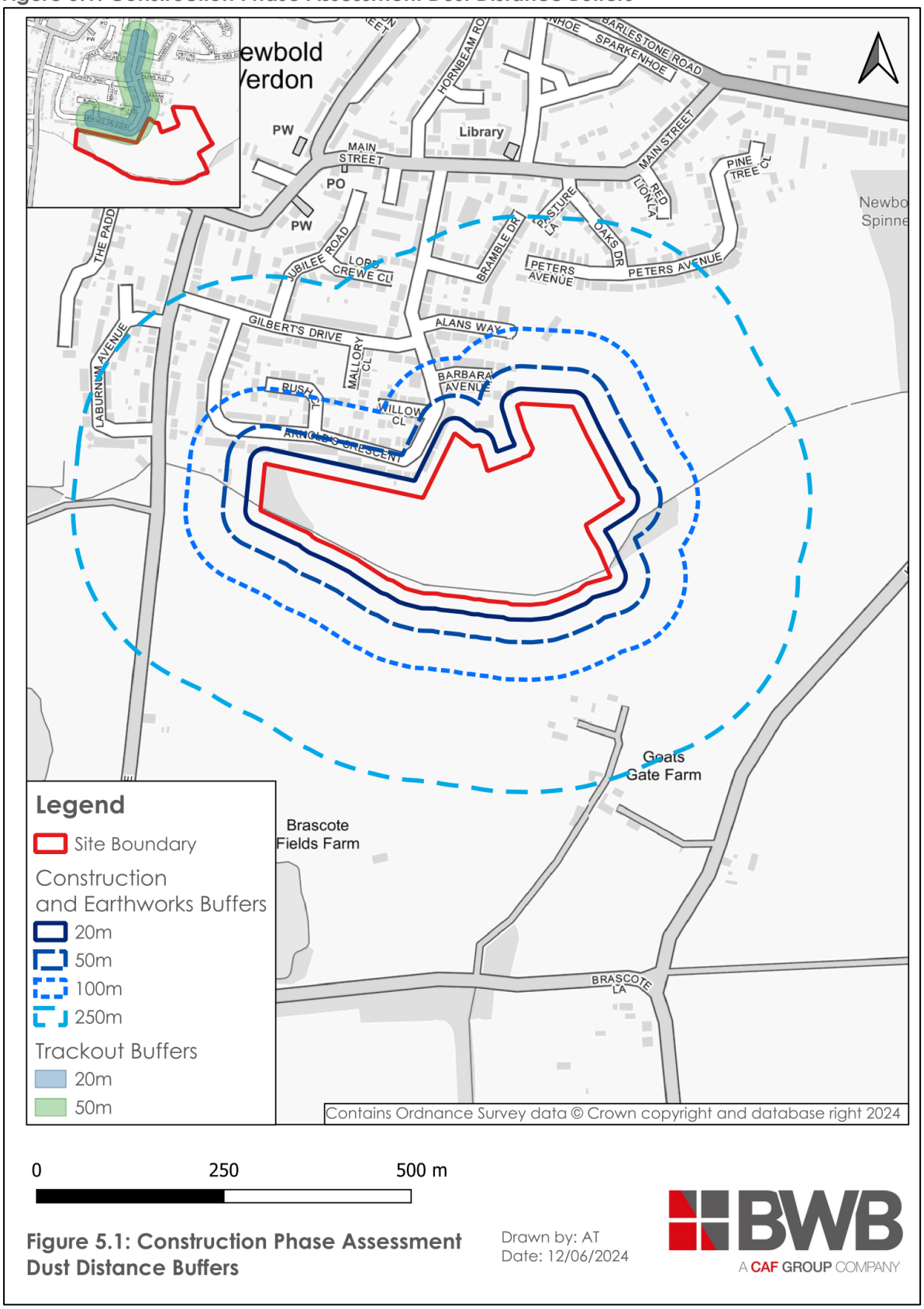


Figure 5.1: Construction Phase Assessment Dust Distance Buffers

Drawn by: AT
Date: 12/06/2024

BWB
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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	Medium	High	Medium Risk
Construction	Large	High	High Risk
Trackout	Small	High	Low Risk
Human Health Impacts			
Earthworks	Medium	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Small	Low	Negligible 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 guidance[18] 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 guidance[18]. The highest risk category identified was **'High Risk'** and the recommended mitigation taken from the IAQM guidance[18] is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a High Risk Site

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

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	**Desirable**
	be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	None
	Make the complaints log available to the local authority when asked.	
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
	Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.	None
	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site 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 High Risk Site	
	Highly Recommended	**Desirable**
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.	
	Avoid site runoff of water or mud.	
	Keep site fencing, barriers and scaffolding clean using wet methods.	
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	
	Cover, seed or fence stockpiles to prevent wind whipping.	
Operating vehicle/ machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.	None
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	
	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker with the agreement of the local authority, where appropriate).	
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	None
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-	

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	**Desirable**
	potable water where possible and appropriate.	
	Used enclose chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
	Ensure equipment is readily available on site to clean and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	
Waste Management	Avoid bonfires and burning of waste materials.	None

Table 5.6: Mitigation Measures Specific to 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 (High Risk Site)	Avoid scabbling (roughening of concrete surfaces) if possible.	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	
	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.	
Trackout (Medium Risk Site)	None	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.
		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.
		Record all inspections of haul routes and any subsequent action in a site log book.
		Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Step 4: Determine Significant Effects

5.13 In accordance with IAQM guidance[18], 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: 2025 Base Year and Scenario 3: 2028 Opening Year without development are detailed in **Table 6.1.**

Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2 and Scenario 3 at Existing Receptor Locations (µg.m^{-3})

Receptor	Scenario 2: 2025 Base Year			Scenario 3: 2028 Opening Year Without Development		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	6.8	12.6	6.9	6.4	12.4	6.8
R2	6.9	12.6	7.0	6.5	12.4	6.8
R3	7.0	12.6	7.0	6.6	12.5	6.8
R4	7.1	12.6	7.0	6.6	12.5	6.8
R5	6.9	12.6	7.0	6.4	12.4	6.8
R6	7.0	12.0	6.7	6.4	11.8	6.6
R7	7.4	12.4	6.8	6.9	12.2	6.6
R8	7.3	12.3	6.8	6.8	12.2	6.6
R9	7.5	12.4	6.8	6.9	12.2	6.6
R10	7.5	12.1	6.8	6.9	12.0	6.7
R11	6.7	12.5	6.9	6.2	12.3	6.7
R12	6.9	12.6	7.0	6.4	12.4	6.8

6.2 Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant current annual mean air quality objectives at all receptors in both Scenario 2 and Scenario 3. Furthermore, annual mean $PM_{2.5}$ concentrations are also below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

6.3 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[17] it may be assumed that exceedance of the 1-hour mean objective is

unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

6.4 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for Scenario 4: 2028 Opening Year with development, to consider the impact of development-generated vehicles on with regard to the current relevant air quality objectives.

6.5 Predicted pollutant concentrations are detailed in **Table 6.2, Table 6.3** and **Table 6.4** or NO_2, PM_{10} and $PM_{2.5}$ respectively together with Scenario 3: 2028 Opening Year without development concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided.

Table 6.2: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)		Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Long Term Average Concentration as % of Air Quality Assessment Level	Impact
	Scenario 3: 2028 Opening Year Without Dev	Scenario 4: 2028 Opening Year With Dev				
R1	6.4	6.4	+0.1	0	11	Negligible
R2	6.5	6.6	+0.1	0	16	Negligible
R3	6.6	6.7	+0.1	0	17	Negligible
R4	6.6	6.7	+0.1	0	17	Negligible
R5	6.4	6.5	+0.1	0	16	Negligible
R6	6.4	6.5	<0.1	0	16	Negligible
R7	6.9	6.9	<0.1	0	17	Negligible
R8	6.8	6.8	<0.1	0	17	Negligible
R9	6.9	6.9	<0.1	0	17	Negligible
R10	6.9	6.9	<0.1	0	17	Negligible

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)		Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Long Term Average Concentration as % of Air Quality Assessment Level	Impact
	Scenario 3: 2028 Opening Year Without Dev	Scenario 4: 2028 Opening Year With Dev				
R11	6.2	6.3	<0.1	0	16	Negligible
R12	6.4	6.5	+0.1	0	16	Negligible

** Discrepancies in changes due to rounding effects*

Table 6.3: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)		Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Long Term Average Concentration as % of Air Quality Assessment Level	Impact
	Scenario 3: 2028 Opening Year Without Dev	Scenario 4: 2028 Opening Year With Dev				
R1	12.4	12.4	<0.1	0	31	Negligible
R2	12.4	12.5	<0.1	0	31	Negligible
R3	12.5	12.5	<0.1	0	31	Negligible
R4	12.5	12.6	+0.1	0	31	Negligible
R5	12.4	12.5	<0.1	0	31	Negligible
R6	11.8	11.8	<0.1	0	30	Negligible
R7	12.2	12.3	<0.1	0	31	Negligible
R8	12.2	12.2	<0.1	0	31	Negligible
R9	12.2	12.2	<0.1	0	31	Negligible
R10	12.0	12.0	<0.1	0	30	Negligible
R11	12.3	12.3	<0.1	0	31	Negligible
R12	12.4	12.4	<0.1	0	31	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 ($\mu g.m^{-3}$)		Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Long Term Average Concentration as % of Air Quality Assessment Level	Impact
	Scenario 3: 2028 Opening Year Without Dev	Scenario 4: 2028 Opening Year With Dev				
R1	6.8	6.8	<0.1	0	34	Negligible
R2	6.8	6.8	<0.1	0	34	Negligible
R3	6.8	6.9	<0.1	0	34	Negligible
R4	6.8	6.9	<0.1	0	34	Negligible
R5	6.8	6.8	<0.1	0	34	Negligible
R6	6.6	6.6	<0.1	0	33	Negligible
R7	6.6	6.6	<0.1	0	33	Negligible
R8	6.6	6.6	<0.1	0	33	Negligible
R9	6.6	6.6	<0.1	0	33	Negligible
R10	6.7	6.7	<0.1	0	33	Negligible
R11	6.7	6.8	<0.1	0	34	Negligible
R12	6.8	6.8	<0.1	0	34	Negligible

** Discrepancies in changes due to rounding effects*

6.6 Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant current annual mean air quality objectives at all receptors in both Scenario 3 and Scenario 4. Furthermore, annual mean $PM_{2.5}$ concentrations are also below the 2028 interim target of $12\mu g.m^{-3}$ and the 2040 future objective of $10\mu g.m^{-3}$.

6.7 The impact of the proposed development in accordance with IAQM and EPIC (previously EPUK) guidance[19] is 'negligible' and therefore not significant.

6.8 The impact predicted at receptors R1 and R2 are considered to be representative of the impact of Phase 2 of the proposed development on Phase 1 of the proposed development.

6.9 No mitigation is therefore required, however measures included in the development that can be considered beneficial to air quality include electric vehicle charging points.

6.10 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[17] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Site Suitability Assessment

6.11 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the proposed residential dwellings within the Site for Scenario 4: 2028 Opening Year with development. Predicted pollutant concentrations are detailed in **Figure 6.1** to **Figure 6.3.**

6.12 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 4: 2028 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2028 with the development in place. Furthermore, annual mean $PM_{2.5}$ concentrations are predicted to be below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

6.13 With regard to short term air quality objectives for NO_2 and PM_{10} at the residential development, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[17] it may be assumed that exceedance of the 1-hour mean NO_2 objective are unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Figure 6.1: Predicted Annual Mean NO_2 Concentrations Across the Site

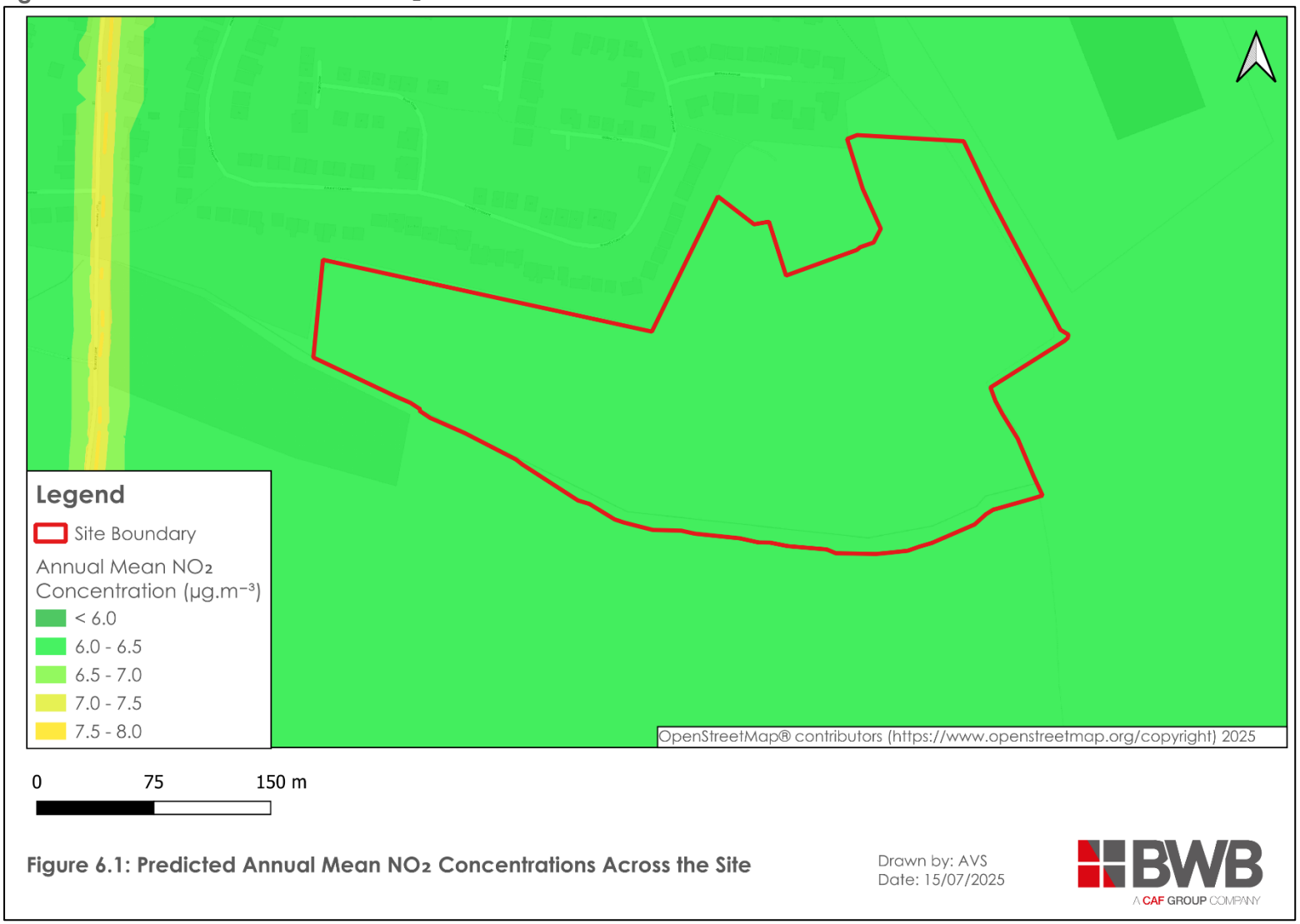

Figure 6.1: Predicted Annual Mean NO_2 Concentrations Across the Site

Drawn by: AVS
Date: 15/07/2025

Figure 6.2: Predicted Annual Mean PM_{10} Concentrations Across the Site

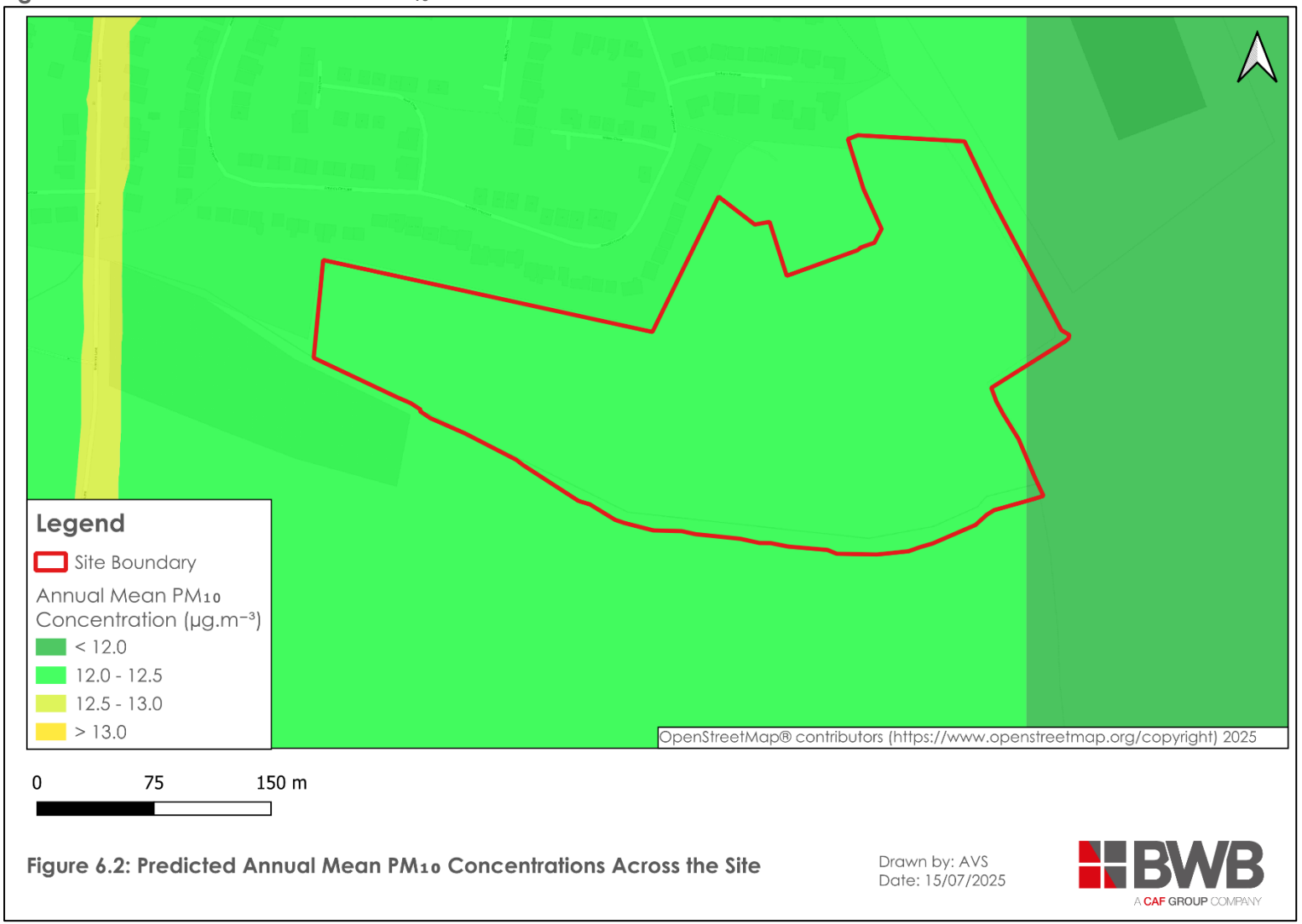

Figure 6.2: Predicted Annual Mean PM_{10} Concentrations Across the Site

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

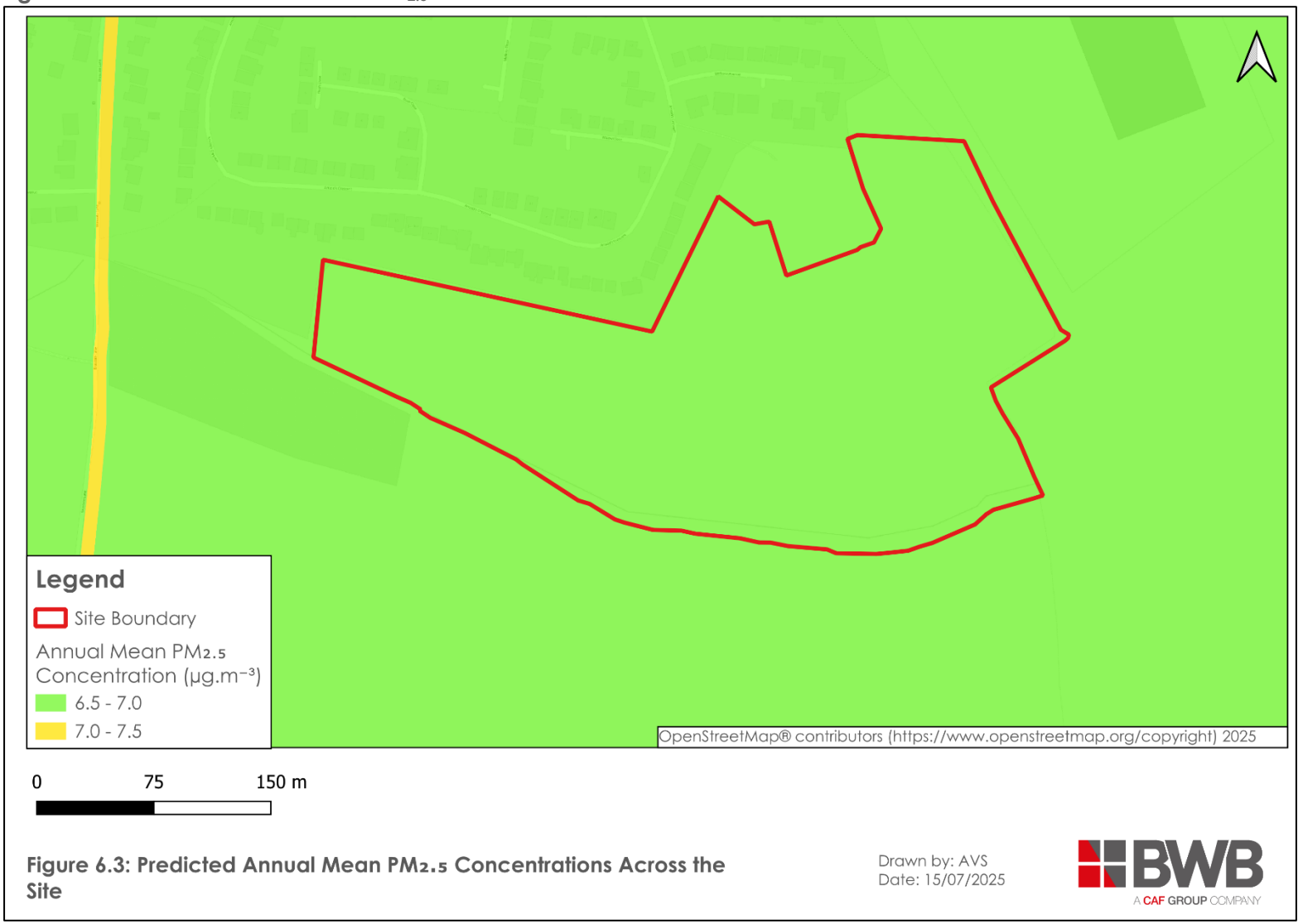

Figure 6.3: Predicted Annual Mean $PM_{2.5}$ Concentrations Across the Site

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Date: 15/07/2025

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Defra $PM_{2.5}$ Targets: Interim Planning Guidance

6.14 Defra is developing new guidance which will require planning applications to reduce population exposure to $PM_{2.5}$ from design stage. Consideration to the interim planning guidance[16], as considered in the development design, is summarised below:

- A review of nearby pollution sources identified road traffic emissions as the main pollutant source in the vicinity of the Site. Upon review of publicly available data, annual mean $PM_{2.5}$ concentrations across and in the vicinity of the Site suggest no exceedances of the 2040 future objective of 10µg.m^{-3}. In addition, dispersion modelling was undertaken to predict pollutant concentrations across the Site and $PM_{2.5}$ concentrations were predicted to be below the 2040 future objective of 10µg.m^{-3}.
- When considering the design of the Site, the proposed residential dwellings are set back from any major roads and is not expected to experience concentrations exceeding the 2040 future objective of 10µg.m^{-3}.
- As part of the operational phase road emissions assessment, existing sensitive receptors were identified and pollutant concentrations at these receptors were predicted. These included nearby schools which are classified as vulnerable groups. The assessment considered the annual mean $PM_{2.5}$ concentrations against the 2040 future objective of 10µg.m^{-3}.
- A construction phase dust assessment was conducted to consider the impact of dust. On review of background mapping[22], annual mean $PM_{2.5}$ concentrations across and in the vicinity of the Site are below 10µg.m^{-3}. Therefore, it is considered that with the implementation of the mitigation measures detailed in Section 5, the residual impacts from the construction phase are considered to be 'not significant'.

6.15 Based on the above, the Site was considered suitable for the proposed residential use, when considering the 2040 future objective of 10µg.m^{-3}. Based on the above and as summarised in Section 6, no exceedances of the 2040 future objective were predicted at any existing receptors, including identified vulnerable groups. Therefore, no further mitigation is required but measures included in the development that can be considered beneficial to air quality include electric vehicle charging points.

7. CONCLUSION

7.1 An air quality impact assessment was undertaken for the proposed residential development at land situated to the east of Brascote Lane and south of Arnold's Crescent, Newbold Verdon.

7.2 A qualitative construction phase assessment was undertaken and measures were recommended to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance[18].

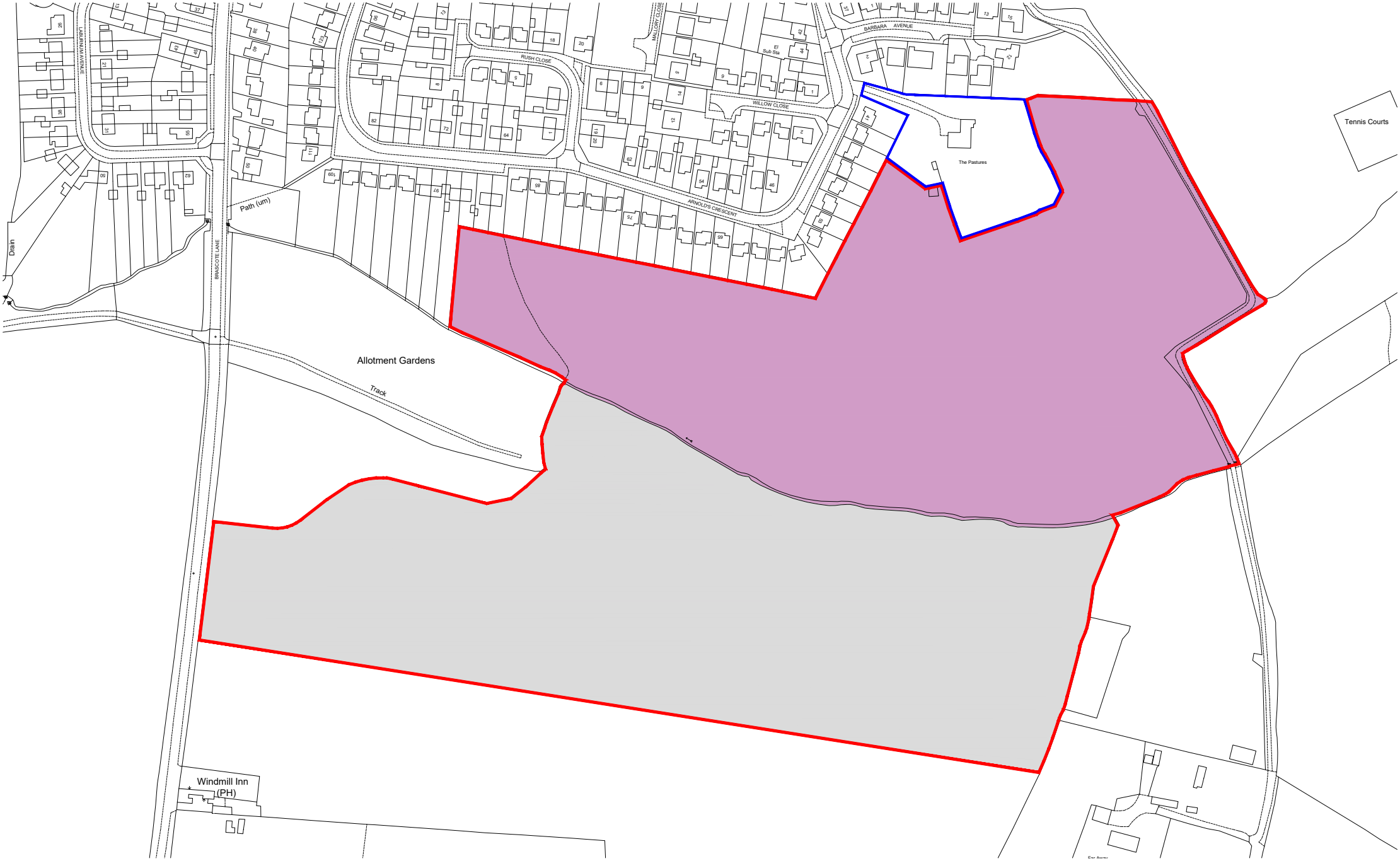
7.3 A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on with regard to the current relevant air quality objectives at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} 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[17]. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development with regard to the current relevant air quality objectives was predicted to be 'negligible' in accordance with IAQM and EPIC (previously EPUK) guidance[19].

7.4 Pollutant concentrations were also predicted across the Site. Concentrations of NO_2, PM_{10} 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 relevant air quality objectives.

7.5 Based on the assessment results, the impact of the proposed development on local air quality with regards to the current relevant air quality objectives was considered to be not significant. No mitigation is required, however measures included in the development that can be considered beneficial to air quality include electric vehicle charging points.

APPENDICES

APPENDIX A: PHASED BOUNDARY PLAN



0 20m 40m 60m 80m 100m

Status: **Planning**

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Client:	Richborough
Project title:	Land off Arnold's Crescent, Newbold Verdon
Drawing title:	Phased Boundary Plan
Scale:	1:2000 (A3)
Date:	June 2024
Drawn by:	JMP
Checked by:	LH
Drawing no.:	902832.36.05
Revision:	-

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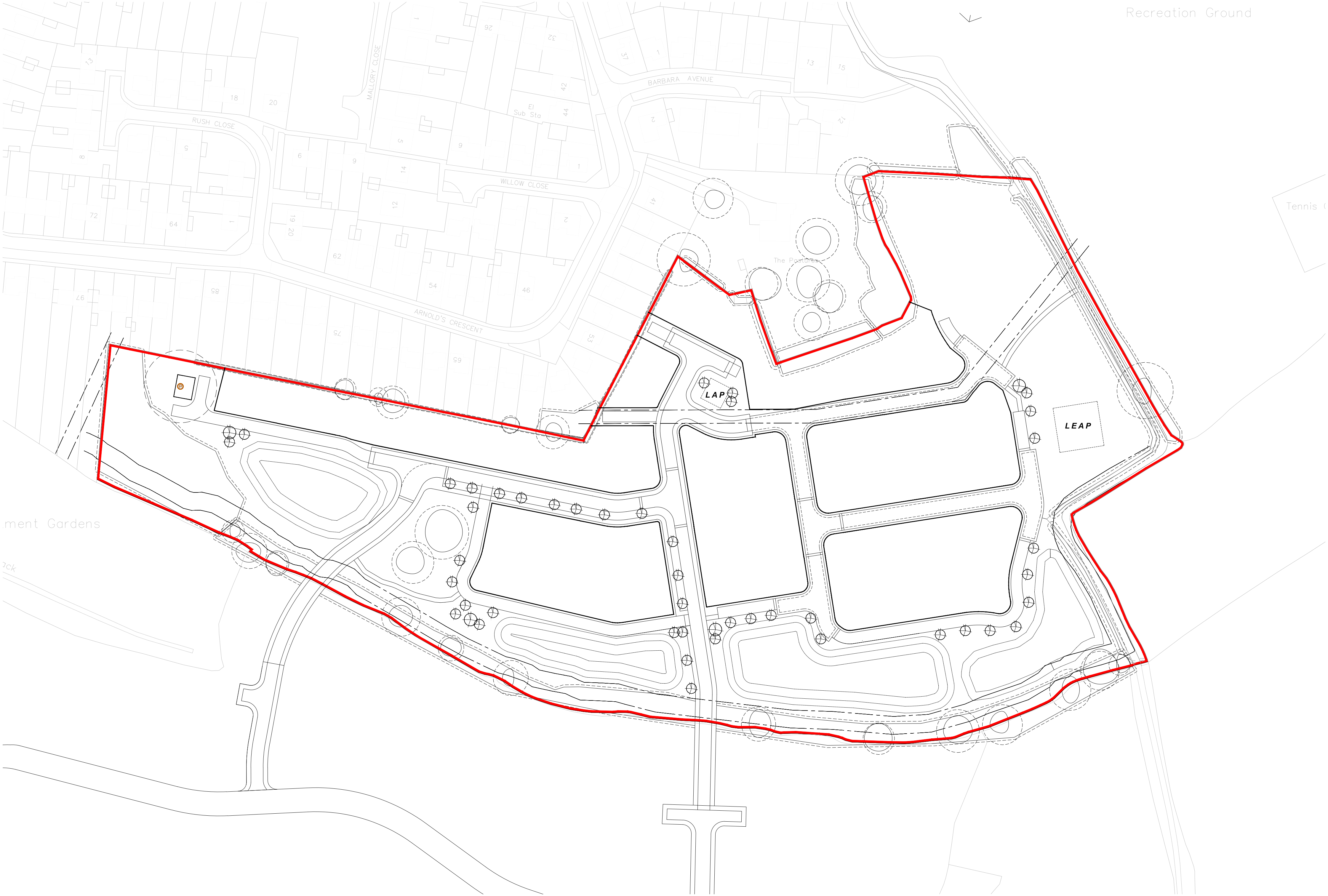
APPENDIX B: GLOSSARY OF TERMS

	Definition
AADT	Annual Average Daily Traffic flow.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
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.
NOx	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 ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1 \mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX C: PROPOSED DEVELOPMENT FRAMEWORK PLAN



Status	PLANNING
Client:	Richborough
Project title:	Land South of Arnold's Crescent Newbold Verdon
Drawing title:	Development Framework Plan
Scale:	1:500@A0
Date:	June 2024
Drawn by:	JMP
Checked by:	LH
Drawing no.:	902832.36.03
Revision:	E

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APPENDIX D: PLANNING POLICY AND LEGISLATION

National Legislation and Planning Policy

The UK Air Quality Strategy

D.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework. The Air Quality (England) Regulations were amended in 2002[5] and again in 2010[6], with miscellaneous amendments added in 2020[10] following the UK exit from the EU. Additionally, an updated $PM_{2.5}$ objective was published in 2023[9] with an interim target to be achieved by 2028[26].

D.2 The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[7] and was most recently reviewed and updated in 2007[8] and most recently reviewed and updated in 2023[9]. 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.

D.3 The Environment Act 2021[4] was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995[3] with regard to the Local Air Quality Management regime. Under the Environment Act 2021[4], 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 2021[4] 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.

D.4 Part IV of the Environment Act[3] requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate Air Quality Management Areas (AQMAs). Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

D.5 The National Planning Policy Framework (NPPF)[12] was amended in December 2024 and sets out the Government's planning policies for England and how these are expected to be applied.

D.6 The NPPF[12] 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:*

[26] Defra (2023) Environmental Improvement Plan 2023, First revision of the 25 Year Environment Plan

[…]

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."

D.7 With regard to assessing cumulative effects the NPPF[12] 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

D.8 The Planning Practice Guidance (PPG) for air quality[13] 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.

D.9 The PPG[13] 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".*

D.10 The PPG[13] sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.

D.11 The PPG[13] 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".*

D.12 The PPG[13] 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".*

D.13 The PPG[13] provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Hinckley & Bosworth Local Development Framework Core Strategy

D.14 Hinckley & Bosworth Borough Council adopted the Local Development Framework Core Strategy in December 2009 which sets out the long-term vision for Hinckley & Bosworth. A review of the Local Development Framework Core Strategy did not indicate any policies relating to air quality in the area of the Site.

APPENDIX E: MODEL INPUTS AND VERIFICATION

Table E.1: Traffic Data used in the Assessment

Road Link	Speed	Scenario 1: 2023 Verification Year		Scenario 2: 2025 Base Year		Scenario 3: 2028 Opening Year Without Development		Scenario 4: 2028 Opening Year With Development	
	Km.hr^{-1}	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
Brascote Lane South of Main Street	62	1,727	0	2,679	0	4,254	0	5,015	0
Main Street West of Brascote Lane	48	949	0	1,672	0	2,635	0	3,140	0
Main Street East of Brascote Lane	48	778	0	1,008	0	1,620	0	1,876	0
B582 Northwest of Dragon Lane	64	5,729	33	6,784	31	9,260	25	9,752	24
B582 Southeast of Main Street	64	4,027	41	4,462	41	6,007	34	6,237	33
Bosworth Lane	64	6,162	55	6,550	50	8,408	44	8,277	41
B582 Northwest of Bosworth Lane	64	8,872	26	10,051	22	13,020	20	13,291	17
A47 Hinckley Road	64	18,878	647	19,155	641	20,316	680	20,316	680
M1	112/96	139,216	22,733	140,049	22,989	148,538	24,382	148,538	24,382

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

Figure E.1: Road Links Included in the ADMS-Roads Model

Figure E.1: Road Links Included in the ADMS-Roads Model

Drawn by: AVS
Date: 15/07/2025

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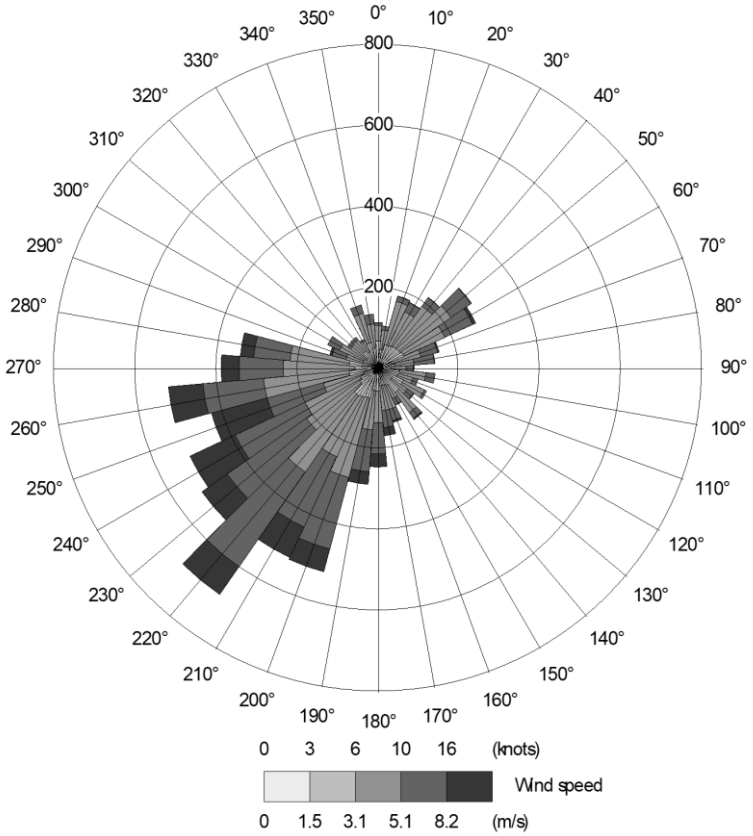
Meteorological Data

E.2 Meteorological data for 2023 Verification Year scenario for the East Midlands recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2023 is detailed below in **Figure E.2** and illustrates a predominant wind direction from the south west.

Figure E.2: Wind Rose for 2023



Model Verification

E.3 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[17]. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

E.4 The model was run for Scenario 1: 2023 Verification Year to predict the 2023 annual mean road contributions of NOx at the monitoring locations in the study area. The model NOx outputs at these locations were compared to the 2023 monitored concentrations to provide adjustment factors. **Table E.2** presents the verification process for NOx respectively.

7.6 HBBC diffusion tube '5' is located along Peckleton Lane, south of Desford, adjacent to a small industrial estate. Conditions at this tube are not considered to representative of the Site or study area. HBBC diffusion tube '8' is located along Wood Street within Earl Shilton along a shopping high street. As such, conditions at this tube are not considered to representative of the Site or study area. HBBC diffusion tube '13' is located within the residential area of Ratby. However, in 2023, data capture at this location was less than 75% and was therefore suitable for use in the model verification process in accordance with Defra guidance[17]. BDC monitoring locations '93', '99', '54', '68' and CM4 are all located ajdatent to the A47 with surrounding residential and are therefore considered the most suitable monitoring for use in the model verification process. The locations of the verification locations used in the assessment are shown in Error! Reference source n ot found..

E.5 No monitoring of PM_{10} or $PM_{2.5}$ is undertaken within the study area which is suitable for use in the model verification process. Therefore the adjustment factor calculated during the NOx verification process was utilised to adjust predicted concentrations of PM_{10} and $PM_{2.5}$.

Table E.2: NOx Verification Process

Model Verification Steps	CM4	54	68	93	99
2023 monitored total NO_2 (µg.m^{-3})	18.9	23.6	22.4	19.9	16.7
2023 background NO_2 concentration (µg.m^{-3})	12.6	14.8	14.8	14.8	14.8
Monitored road contribution NOx (µg.m^{-3})	13.9	20.0	17.1	11.3	4.1
Modelled road contribution NOx (µg.m^{-3})	4.6	9.9	10.8	4.2	4.8
Ratio of monitored road NOx to modelled road NOx	3.1	2.0	1.6	2.7	0.8
Adjustment factor for modelled road contribution NOx	1.8656				
Adjusted modelled road contribution NOx (µg.m^{-3})	8.5	18.4	20.1	7.9	9.0
Modelled total NO_2 concentration (µg.m^{-3})	16.5	22.9	23.6	18..4	18.9
Monitored total NO_2 concentration (µg.m^{-3})	13.9	20.0	17.1	11.3	4.1
% difference between modelled and monitored total NO_2 concentration	-14.5	-3.0	5.1	-8.1	11.7
RMSE % (should be less than 25% and ideally less than 10%)	8.3				

Road-NOx component, determined from NOx to NO_2 calculator

E.6 A road-NOx factor of **1.8656** 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-NOx concentration at each receptor, before conversion to NO_2 concentrations using the NOx to NO_2 calculator provided by Defra[17].

E.7 The RMSE calculated for the verification exceeds is within the ideal 10% as outlined in Defra guidance[17], indicating that the model if performing well.

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