

## **ENVIRONMENT**

Richborough  
Land East of Rugby Road  
Clifton-upon-Dunsmore  
Air Quality Assessment

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Clifton-upon-Dunsmore  
Air Quality Assessment

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## EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough to undertake an Air Quality Assessment for a proposed residential development at land east of Rugby Road, Clifton-upon-Dunsmore.

The Site is located within the administrative area of Rugby Borough Council. The Site is located within the existing 'Rugby Air Quality Management Area NO<sub>2</sub>', which was declared by Rugby Borough Council for potential exceedances of the annual mean nitrogen dioxide air quality objective.

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<sub>10</sub> and PM<sub>2.5</sub>) were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance, Institute of Air Quality Management & Environmental Policy Implementation Community (previously Environmental Protection UK) guidance and the Rugby Borough Council Air Quality Supplementary Planning Document. 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.

A damage cost calculation was undertaken in accordance with Air Quality Supplementary Planning Document and the health cost of the development was determined.

Type 1 and Type 2 mitigation in the form of electric vehicle charging, a CEMP, and the provision of a Travel Plan are proposed as part of the development.

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 and no further mitigation is required.

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## 1. INTRODUCTION

- 1.1 BWB Consulting Limited (BWB) was instructed by Richborough (the Client) to undertake an air quality assessment for a proposed residential development at land east of Rugby Road, Clifton-upon-Dunsmore ('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 determine the suitability of the Site for the proposed end use with regard to the current relevant air quality objectives.
- 1.3 This report is necessarily technical in nature so to assist the reader a glossary of air quality terminology can be found in **Appendix A**.

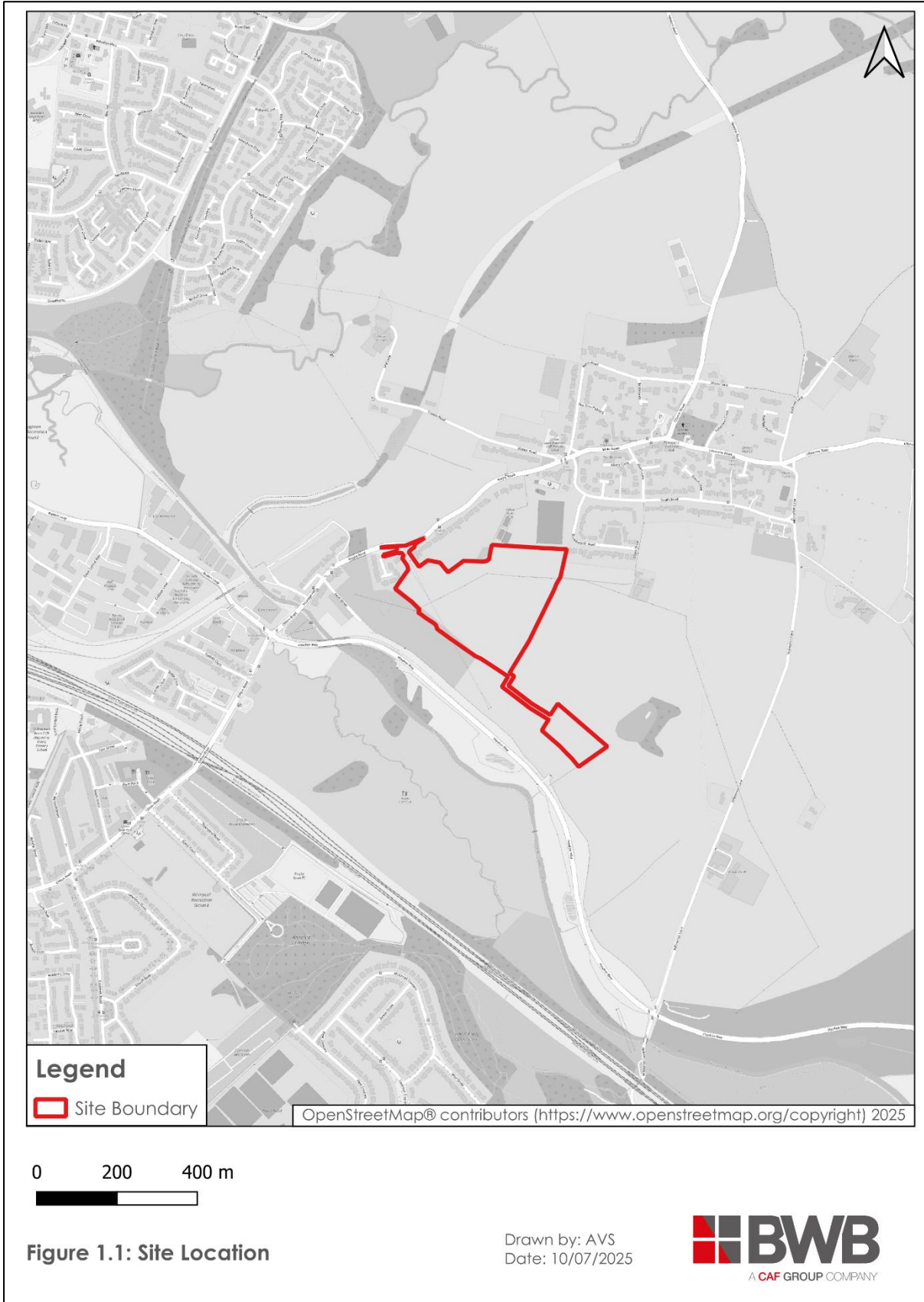
### Site Setting

- 1.4 The Site is located on a parcel of land east of Rugby Road and north of Houlton Way within the administrative area of Rugby Borough Council (RBC). The Site is located within the 'Rugby Air Quality Management Area (AQMA) NO<sub>2</sub>' which was declared by RBC for potential exceedances of the annual mean nitrogen dioxide (NO<sub>2</sub>) air quality objectives and covers the whole urban area of Rugby.
- 1.5 The Site currently comprises a vacant parcel of land, with access of Rugby Road to the west. Existing residential dwellings border the Site to the northwest and Clifton Village Football Pitch borders the Site to the northeast. Vacant parcels of land border the Site to the east and south, with the parcel to the east being under the control of the applicant, and Houlton Way further south. Existing residential dwellings border the Site to the west, located off Rugby Road and Newall Close. **Figure 1.1** details the location of the proposed development.
- 1.6 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions from local roads, including Rugby Road and Houlton Way.

### Proposed Development

- 1.7 The proposed development comprises approximately 160 new homes, alongside play space, and green infrastructure, landscaped public spaces, and enhanced footpath/cycling connectivity. The proposed development masterplan is detailed in **Appendix B**.

**Figure 1.1: Site Location**



## 2. LEGISLATION, PLANNING POLICY & GUIDANCE

### Legislation and Planning Policy

#### National Legislation and Planning Policy

2.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive<sup>1</sup> sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000<sup>2</sup>, as amended, for the purpose of the Local Air Quality Management Framework. The Air Quality (England) Regulations were amended in 2002<sup>3</sup> and again in 2010<sup>4</sup>, with miscellaneous amendments added in 2020<sup>5</sup> following the UK exit from the EU. Additionally, an updated PM<sub>2.5</sub> objective was published in 2023<sup>6</sup> with an interim target to be achieved by 2028<sup>7</sup>.

2.2 **Table 2.1** presents the air quality objectives for pollutants considered within this assessment.

**Table 2.1: Air Quality Standards and Objectives (England)**

Pollutant	Averaging Period	Air Quality Objective (µg.m <sup>-3</sup> )	Date to Achieve by
NO <sub>2</sub>	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM <sub>10</sub>	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
PM <sub>2.5</sub>	Annual Mean	20	1 January 2020
	Annual mean interim target as detailed within the Environmental Improvement Plan <sup>7</sup>	12	31 January 2028
	Annual mean	10	31 December 2040

*Italics notes future objective*

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

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

<sup>3</sup> HMSO (2002) Statutory Instruments 2002 No. 3043, The Air Quality (England) (Amendment) Regulations 2002, London: HMSO

<sup>4</sup> HMSO (2010) Statutory Instruments 2010 No. 1001 Air Quality Standards Regulations 2010, London: HMSO

<sup>5</sup> Department of the Environment, Food and Rural Affairs (Defra) (2020) The Environment (Miscellaneous Amendments) (EU Exit) Regulations, London: HMSO

<sup>6</sup> Department for the Environment, Food and Rural Affairs (Defra) (2023) Air Quality Strategy: Framework for Local Authority

<sup>7</sup> Defra (2023) Environmental Improvement Plan 2023, First revision of the 25 Year Environment Plan

2.3 **Table 2.2** summarises where the air quality objectives for pollutants considered within this report apply.

**Table 2.2: Examples of Where the Air Quality Objectives Apply**

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools (including all of playgrounds), hospitals (and their grounds), care homes (and their grounds) etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

### Local Planning Policy

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

- Rugby Borough Council, Local Plan 2011-2031<sup>8</sup>.

2.5 A summary of the relevant national legislation and planning policy is provided in **Appendix C**.

### **Defra PM<sub>2.5</sub> targets: Interim Planning Guidance**

2.6 Defra is developing guidance in relation to the new targets for PM<sub>2.5</sub> to be considered in planning. The new guidance will require planning applications to consider how the development will reduce population exposure to PM<sub>2.5</sub> from design stage. At the time of writing, the planning guidance has not been published. An interim guidance<sup>9</sup> has been published by Defra, which advises planning applications to consider the following:

- *How has exposure to PM<sub>2.5</sub> been considered when selecting the development site?*
- *What actions and/or mitigations have been considered to reduce PM<sub>2.5</sub> exposure for development users and nearby receptors (houses,*

<sup>8</sup> Rugby Borough Council (2019) Local Plan 2011-2031  
<sup>9</sup> Defra (2024) PM<sub>2.5</sub> Targets: Interim Planning Guidance

*hospitals, schools etc.) and to reduce emissions of PM<sub>2.5</sub> and its precursors?*

2.7 Consideration to the interim guidance<sup>9</sup> has therefore been included within the assessment.

### **Air Quality Assessment Guidance**

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

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(22)) (2022)<sup>10</sup>;
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (2024)<sup>11</sup>;
- Institute of Air Quality Management and Environmental Policy Implementation Community (previously Environmental Protection UK), Land-Use Planning and Development Control: Planning for Air Quality (2017)<sup>12</sup>; and
- Rugby Borough Council Air Quality Supplementary Planning Document<sup>13</sup>.

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<sup>10</sup> Defra (2022) Local Air Quality Management Technical Guidance LAQM.TG(22)

<sup>11</sup> Institute of Air Quality Management (2024) Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London

<sup>12</sup> Institute of Air Quality Management and Environmental Policy Implementation Community (previously Environmental Protection UK) (2017) Land-Use Planning and Development Control: Planning for Air Quality

<sup>13</sup> Rugby Borough Council (2021) Air Quality Supplementary Planning Document

### **3. METHODOLOGY**

#### **Consultation with Rugby Borough Council**

- 3.1 Full details of the methodology used in the assessment, as agreed with RBC, are detailed in **Appendix D**.

#### **Construction Phase Dust Assessment**

- 3.2 The full assessment methodology is not reproduced within this report but a summary of the assessment steps as detailed within the IAQM guidance<sup>11</sup> 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.

#### **RBC Air Quality Supplementary Planning Document**

- 3.3 RBC has adopted the Air Quality Supplementary Planning Document (SPD)<sup>13</sup> and therefore the development classification process detailed in the SPD<sup>13</sup> was undertaken and mitigation measures recommended accordingly.
- 3.4 The Air Quality SPD<sup>13</sup> provides a three step assessment process as follows:
- Step 1 – determining the classification of the development proposal;
  - Step 2 – key assessment criteria and quantifying the impact on local air quality; and
  - Step 3 – determining the level of a mitigation required by the proposal to make the scheme acceptable and policy compliant with HS5 including an assessment of whether the development is considered to be air quality neutral.

- 3.5 This three step process was undertaken.

#### **Operational Phase Road Traffic Emissions – Detailed Assessment**

##### Air Dispersion Modelling

- 3.6 The air dispersion model ADMS-Roads, version 5.1 was utilised in the assessment to predict concentrations of NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at existing receptors and across the Site.

3.7 The assessment was undertaken in accordance with Defra LAQM.TG(22)<sup>10</sup> and IAQM and EPIC (previously EPUK) guidance<sup>12</sup>.

#### *Assessment Scenarios and Traffic Data*

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

- Scenario 1: 2023 Verification Year;
- Scenario 2: 2025 Base Year;
- Scenario 3: 2035 Opening Year without development; and
- Scenario 4: 2035 Opening Year with development.

3.9 The operational phase road traffic emissions study area is defined by the road network modelled as part of the assessment. Traffic data were obtained from 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 F**.

#### *ADMS-Roads Model Inputs*

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

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

Parameter	Input
Emission factors	Emission factors were utilised from the Defra Emission Factor Toolkit <sup>14</sup> (EFT), version 13.1, for the years of assessment (2023, 2025 and 2035).
Conversion of oxides of nitrogen	Concentrations of NO <sub>x</sub> were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO <sub>2</sub> ) using the Defra NO <sub>x</sub> to NO <sub>2</sub> calculator <sup>15</sup> , version 9.1.
Meteorological data	Hourly sequential meteorological data for the verification year of assessment (2023) were obtained for the Church Lawford recording station. This is considered to be the closest and most representative meteorological station to the Site and study area.
Surface roughness and Monin-Obukhov length (MO) – Site	A surface roughness of 0.5m and a MO length of 30m were utilised in the air dispersion model to represent the suburban conditions on the edge of Rugby at the Site and within the Study area.
Surface roughness and Monin-Obukhov length (MO) – Meteorological Station	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 meteorological station.
Background pollutant concentrations	RBC undertakes background monitoring of NO <sub>2</sub> at the diffusion tube S12. The 2023 monitored concentration from the S12 monitoring location was used to adjust the Defra NO <sub>2</sub> background concentrations <sup>16</sup> for 2025 and the proposed opening year in accordance with Defra TG22 <sup>10</sup> .  Background concentrations of PM <sub>10</sub> and PM <sub>2.5</sub> for the study area were obtained from the pollutant concentration maps <sup>16</sup>

<sup>14</sup> Defra (2025) Emission Factor Toolkit [<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>]

<sup>15</sup> Defra (2024) NO<sub>x</sub> to NO<sub>2</sub> Calculator [<https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>]

<sup>16</sup> Defra (2024) background pollutant concentration maps [<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021>]

Parameter	Input
	provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2023, 2025 and 2035).
Model verification	Model verification was undertaken using RBC monitoring data available for the study area. Further details on model verification can be found in <b>Appendix F</b> .
Calculation of short term PM <sub>10</sub> concentrations	The following calculation, as detailed in Defra guidance <sup>10</sup> , was utilised to calculate the number of exceedances of the 24-hour mean PM <sub>10</sub> air quality objective:  $\text{Number of 24-Hour Mean Exceedance} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$

## Receptor Locations

### Existing Sensitive Receptors

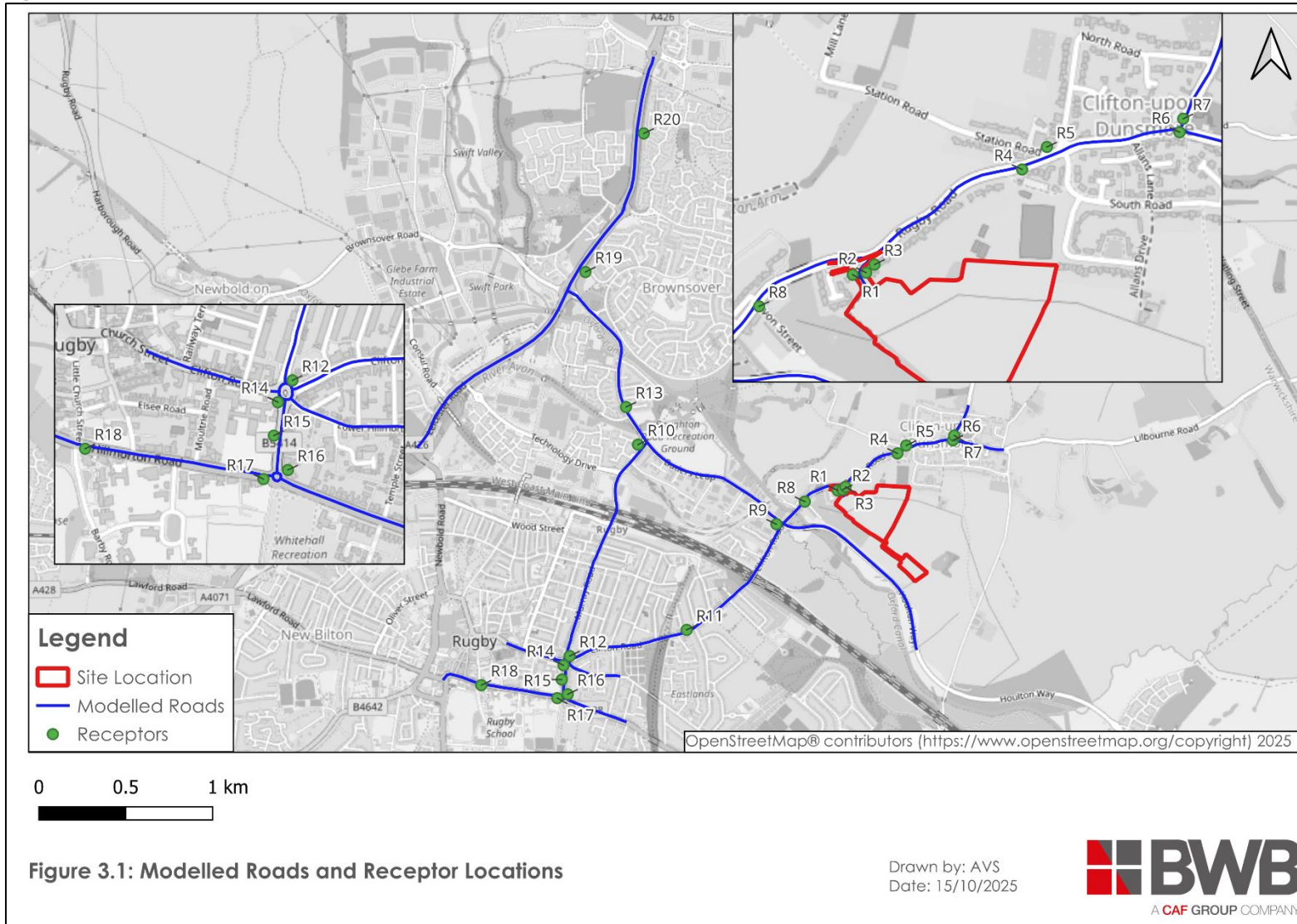
- 3.11 Existing receptor locations were identified within close proximity of the road links detailed in **Appendix F** and considered in the operational phase road traffic emissions assessment. Concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> were predicted at the identified existing receptor locations for the assessment scenarios detailed in Paragraph 3.8. Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the proposed development. Receptor heights were modelled at typically 1.5m to represent the average breathing height at ground floor level. Primary schools were modelled at 0.8m, and secondary schools were modelled at 1m to represent the average height of primary and secondary school aged children.
- 3.12 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	452428	276076	Residential receptor along Site Access	1.5
R2	452456	276080	Residential receptor along Site Access	1.5
R3	452473	276096	Residential receptor along Rugby Road	1.5
R4	452772	276289	Residential receptor along Rugby Road	1.5
R5	452822	276334	Clifton-upon-Dunsmore CofE Primary School	0.8
R6	453091	276364	Residential receptor along Main Street	1.5

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R7	453098	276392	Residential receptor along Church Street	1.5
R8	452239	276012	Residential receptor along Avon Street	1.5
R9	452075	275882	Residential receptor along Butlers Leap	1.5
R10	451279	276339	Residential receptor along Aqua Place	1.5
R11	451559	275274	Residential receptor along Clifton Road	1.5
R12	450886	275124	Residential receptor along Murray Road	1.5
R13	451210	276556	Residential receptor along Boughton Road	1.5
R14	450850	275070	Lawrence Sheriff School	1.0
R15	450840	274988	Lawrence Sheriff School	1.0
R16	450875	274904	Residential receptor along Whitehall Road	1.5
R17	450815	274882	Residential receptor along Hillmorton Road	1.5
R18	450377	274956	Rugby School	1.0
R19	450977	277332	Residential receptor along Parkend	1.5
R20	451312	278129	Residential receptor along Shearwater Drive	1.5

**Figure 3.1: Modelled Roads and Receptor Locations**



### Site Suitability

- 3.13 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 541934, Y 275382 to maximum X 453326, Y 276426, modelled at a height of 1.5m, was included to predict pollutant concentrations across the Site to consider its suitability for the proposed sensitive end use.

### Limitations and Assumptions

- 3.14 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.
- 3.15 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.
- 3.16 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<sup>14</sup> to provide the most up to date estimate of current and future emission projections.
- 3.17 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.
- 3.18 To reduce the uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in Defra guidance<sup>10</sup>. As the models were verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.
- 3.19 Consideration of committed local developments that may represent sensitive receptors to dust during the construction phase was undertaken through a review of the RBC planning portal. Any applications submitted following the review, or not present on the portal at the time of review, were not considered.

### Assessment Criteria

- 3.20 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 2.1**.
- 3.21 Guidance is provided by the IAQM and EPIC (previously EPUK)<sup>12</sup> 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 current 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.*

3.22 In accordance with IAQM and EPIC (previously EPUK) guidance<sup>12</sup>, 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 located within the Rugby AQMA NO<sub>2</sub> which was declared by RBC for potential exceedances of the annual mean NO<sub>2</sub> air quality objective, and covers the whole urban area of Rugby.

### Local Air Quality Monitoring

#### Nitrogen Dioxide

- 4.2 RBC undertake monitoring of NO<sub>2</sub> across its administrative area using a number of diffusion tubes. The closest of these diffusion tubes to the Site is the kerbside monitoring location S38 which is located 775m to the south of the Site along Clifton Road.
- 4.3 Bias adjusted NO<sub>2</sub> monitoring results, for the locations in the vicinity of the Site, are detailed in **Table 4.1** and **Figure 4.1**. Exceedances are shown in **bold**.

**Table 4.1: RBC NO<sub>2</sub> Monitoring Data in 2017 – 2023<sup>17</sup>**

ID	Grid Reference (X,Y)	Site Type	Monitored Annual Average Concentration (µg.m <sup>-3</sup> )						
			2017	2018	2019	2020	2021	2022	2023
S38	451868, 275501	Kerbside	25.7	26.5	25.1	17.1	19.5	18.9	16.5
S9	451187, 275334	Roadside	15.9	15.8	16.3	11.8	12.3	12.0	11.1
S12	451445, 277245	Urban Background	21.3	19.6	20.9	14.3	13.3	13.4	13.0
S37	450897, 275059	Roadside	24.1	23.9	25.2	20.7	22.7	21.5	19.7
S39	450852, 275116	Roadside	25.9	27.9	26.2	19.6	21.0	20.8 <sup>+</sup>	20.6
S36	450870, 275043	Roadside	29.5	28.9	29.8	24.2	26.8	23.8	23.0
S49	450864, 274896	Roadside	<b>43.7</b>	34.0	30.0	20.3	23.2	24.7	21.5

<sup>+</sup>data capture less than 75%.

- 4.4 Monitored annual mean NO<sub>2</sub> concentrations in the vicinity of the Site have been below the annual mean air quality NO<sub>2</sub> objective of 40µg.m<sup>-3</sup> at all reported locations since 2017, with the exception of S49 where an exceedance was reported in 2017. An overall

<sup>17</sup> 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.

downward trend is observed at the reported locations with some year on year fluctuations.

- 4.5 Urban background monitoring location S12 is considered representative of background conditions at the Site and within the study area and was therefore utilised within the assessment. All roadside monitoring locations, with the exception of S9, are considered representative of the study area and all roadside locations, with the exception of S9, were therefore utilised in the model verification process, where further details can be found in **Appendix F**.

#### Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

- 4.6 RBC does not undertake any monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> across its area.

### **Background Pollutant Concentrations**

- 4.7 RBC undertakes background monitoring at the urban background monitoring location S12 and this monitoring locations was utilised in the assessment to provide background NO<sub>2</sub> concentrations. Monitored NO<sub>2</sub> concentrations for 2023 were adjusted for the future year scenarios in accordance with Defra guidance<sup>10</sup>.
- 4.8 No background air quality monitoring of PM<sub>10</sub> and PM<sub>2.5</sub> is undertaken by RBC within the study area. Background pollutant concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> were therefore obtained from the latest Defra background concentration maps<sup>16</sup>, 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 PM<sub>10</sub> and PM<sub>2.5</sub> were obtained for the grid squares covering the study area for the years of assessment (2023, 2025 and 2035).
- 4.9 The background concentrations used in the assessment are detailed in **Table 4.2**.

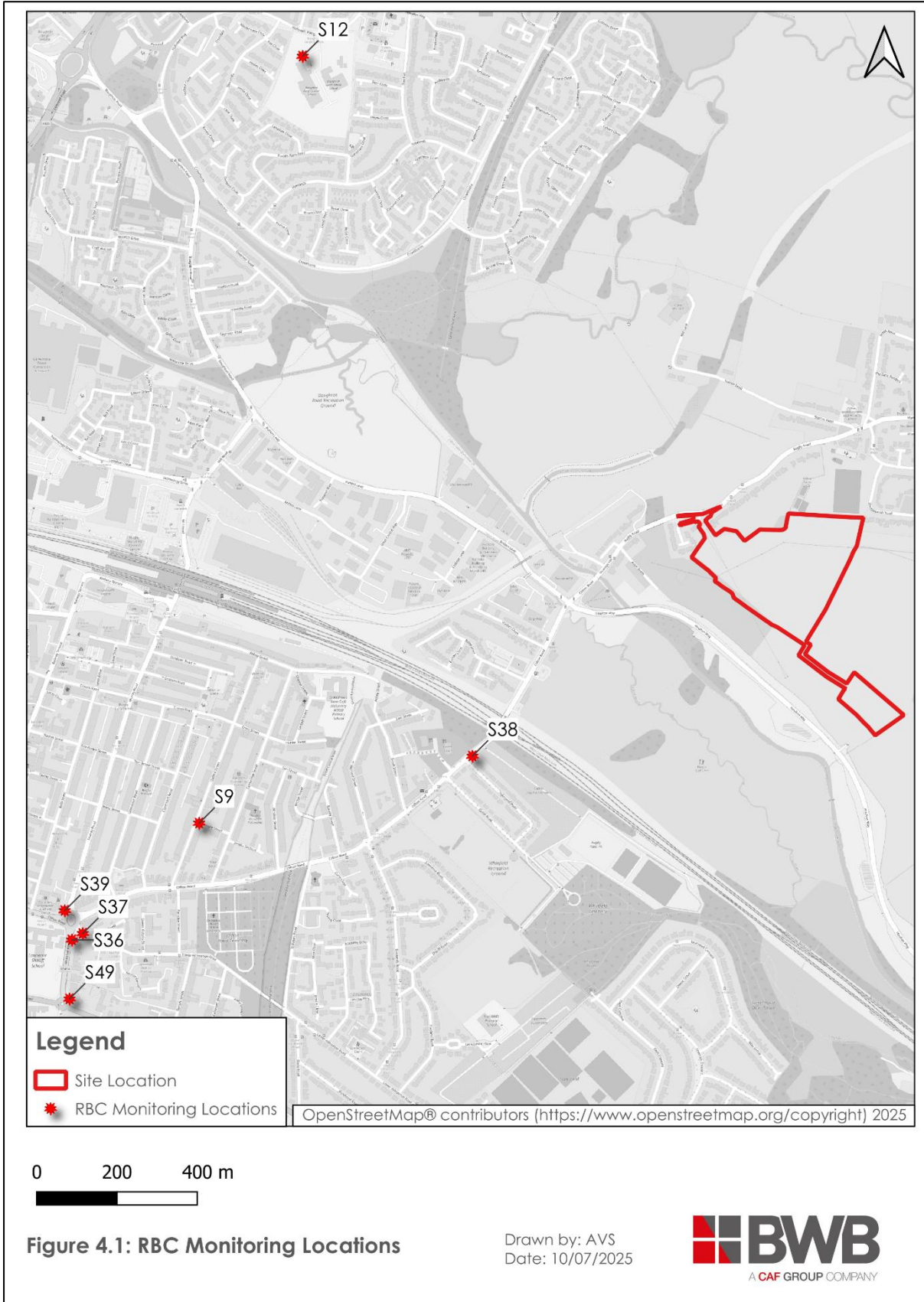
**Table 4.2: Background Pollutant Concentrations used in the Assessment (µg.m<sup>-3</sup>)**

Receptor	2023			2025			2035		
	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Site	13.0	11.1	6.5	12.2	11.0	6.4	9.2	10.3	5.8
<b>Verification Locations</b>									
S36	13.0	14.0	7.7	12.2	13.9	7.6	9.2	13.6	7.1
S37	13.0	14.0	7.7	12.2	13.9	7.6	9.2	13.6	7.1
S39	13.0	14.0	7.7	12.2	13.9	7.6	9.2	13.6	7.1
S49	13.0	11.4	6.7	12.2	11.3	6.6	9.2	10.7	6.0

Receptor	2023			2025			2035		
	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
<b>Receptors</b>									
R1 – R5, R8	13.0	11.1	6.5	12.2	11.0	6.4	9.2	10.3	5.8
R6 , R7	13.0	11.2	6.4	12.2	11.0	6.3	9.2	10.4	5.7
R9	13.0	11.2	6.5	12.2	11.1	6.3	9.2	10.5	5.8
R10, R13	13.0	11.8	6.9	12.2	11.7	6.8	9.2	11.1	6.2
R11	13.0	11.6	6.9	12.2	11.5	6.8	9.2	10.9	6.2
R12, R14	13.0	14.0	7.7	12.2	13.9	7.6	9.2	13.6	7.1
R15 – R18	13.0	11.4	6.7	12.2	11.3	6.6	9.2	10.7	6.0
R19	13.0	12.2	6.8	12.2	12.1	6.7	9.2	11.5	6.1
R20	13.0	13.8	6.9	12.2	13.6	6.8	9.2	13.0	6.2

4.10 Background concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are below the current annual mean air quality objectives in all assessment years. Furthermore, PM<sub>2.5</sub> concentrations are below the 2028 interim target of 12µg.m<sup>-3</sup> and the 2040 future objective of 10µg.m<sup>-3</sup>. PM<sub>10</sub> concentrations are higher than NO<sub>2</sub> concentrations, this is due to large contributions from secondary and residual sources.

Figure 4.1: RBC Monitoring Locations in the Vicinity of the Site



## 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<sup>11</sup> 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<sup>18</sup>, 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 Rugby Road, Newall Close and Shuttleworth Road. A construction phase assessment was therefore undertaken.

### Step 2: Assess the Risk of Dust Impacts

#### Step 2A: Define the Potential Dust Emission Magnitude

- 5.6 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance<sup>11</sup> as detailed in **Appendix E**. No demolition is required as part of the development and is therefore not considered further.

**Table 5.1: Dust Emission Magnitude**

Activity	Dust Emission Magnitude	Justification
Earthworks	Medium	The total Site area is between 18,000m <sup>2</sup> and 110,000m <sup>2</sup>

<sup>18</sup> Defra, Multi Agency Geographic Information for the Countryside (MAGIC) [<http://magic.defra.gov.uk/>]

Activity	Dust Emission Magnitude	Justification
Construction	Large	The development includes for the construction of 160 dwellings, with a total build volume of more than 75,000m <sup>3</sup>
Trackout	Medium	Due to the size and scale of the development, it is conservatively assumed that there is 20-50 outward HDV movements in any one day during the peak construction period

### Step 2B: Define the Sensitivity of the Area

- 5.7 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling and human health impacts. **Figure E.1** in **Appendix E** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance<sup>11</sup> for determining receptor sensitivity.
- 5.8 The sensitivity of the area is defined below, in accordance with IAQM criteria<sup>11</sup> as detailed in **Appendix E** and summarised in **Table 5.2**.

**Table 5.2: Determination of the Sensitivity of the Area**

Activity	Sensitivity of the Area	Justification
Dust Soiling		
Earthworks	Medium	There are one to 10 highly sensitive residential dwellings within 20m of the Site boundary
Construction		
Trackout	High	There are 10 to 100 highly sensitive residential dwellings within 20m of the trackout route
Human Health		
Earthworks	Low	There are one to 10 highly sensitive residential dwellings within 20m of the Site boundary and 10 to 100 highly sensitive residential dwellings within 20m of the trackout route. Defra <sup>16</sup> Background PM <sub>10</sub> concentrations are below 24µg.m <sup>-3</sup> .
Construction		
Trackout		

### Step 2C: Define the Risk of Impacts

- 5.9 The dust emission magnitude determined in Step 2A is then combined with the sensitivity of the area determined in Step 2B in accordance with IAQM guidance<sup>11</sup> as detailed in **Appendix E** to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in **Table 5.3**.

**Table 5.3: 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
<b>Dust Soiling Effects on People and Property</b>			
Earthworks	Medium	Medium	Medium Risk
Construction	Large	Medium	Medium Risk
Trackout	Medium	High	Medium Risk
<b>Human Health Impacts</b>			
Earthworks	Medium	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Medium	Low	Low Risk

### Step 3: Site-Specific Mitigation

- 5.10 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<sup>11</sup> 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<sup>11</sup>. The highest risk category identified was '**Medium Risk**' and the recommended mitigation taken from the IAQM guidance<sup>11</sup> is detailed in **Appendix E**.

### Step 4: Determine Significant Effects

- 5.11 In accordance with IAQM guidance<sup>11</sup>, 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 IMPACT 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: 2035 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 ( $\mu\text{g.m}^{-3}$ )**

Receptor	Scenario 2: 2025 Base Year			Scenario 3: 2035 Opening Year Without Development		
	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
R1	12.8	11.2	6.5	9.4	10.5	5.9
R2	12.8	11.2	6.5	9.4	10.5	5.9
R3	13.0	11.2	6.5	9.4	10.6	5.9
R4	13.7	11.5	6.7	9.5	10.7	6.0
R5	13.3	11.3	6.6	9.4	10.6	6.0
R6	13.6	11.5	6.5	9.5	10.7	5.9
R7	14.9	11.9	6.7	9.8	11.0	6.0
R8	14.1	11.6	6.7	9.7	10.9	6.1
R9	14.0	11.7	6.7	9.7	11.1	6.1
R10	14.4	12.3	7.1	9.8	11.7	6.5
R11	14.7	12.4	7.3	9.8	11.8	6.7
R12	18.7	15.9	8.7	10.9	15.4	8.1
R13	16.9	13.5	7.7	10.5	13.0	7.3
R14	16.7	15.2	8.3	10.4	14.8	7.8
R15	15.9	12.4	7.2	10.1	11.7	6.5
R16	17.7	13.0	7.5	10.6	12.2	6.9

Receptor	Scenario 2: 2025 Base Year			Scenario 3: 2035 Opening Year Without Development		
	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
R17	16.7	12.8	7.4	10.3	12.1	6.8
R18	16.6	12.7	7.4	10.3	12.0	6.7
R19	15.5	12.9	7.1	10.6	12.4	6.6
R20	16.0	14.9	7.5	10.7	14.3	7.0

6.2 Annual mean concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are predicted to be below the current relevant air quality objectives at all modelled receptor locations in both Scenario 2 and 3. Furthermore, PM<sub>2.5</sub> concentrations are also below the 2028 interim target of 12µg.m<sup>-3</sup> and the 2040 future objective of 10µg.m<sup>-3</sup>.

6.3 With regard to short term air quality objectives for NO<sub>2</sub> and PM<sub>10</sub>, the predicted annual mean NO<sub>2</sub> concentrations are less than 60µg.m<sup>-3</sup> and therefore in accordance with Defra guidance<sup>10</sup> 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<sub>10</sub> short term objective; no exceedances were predicted.

## Impact Assessment

### RBC Air Quality Supplementary Planning Document

6.4 RBC has adopted the Air Quality SPD<sup>13</sup>. The three stage process detailed in the guidance<sup>13</sup> was undertaken and the classifications for each stage were agreed with RBC during the consultation process.

#### *Stage 1: Development Type Classification*

6.5 The development is for greater than 10 residential dwellings, therefore Policy HS5 applies.

#### *Stage 2: Air Quality Impact Assessment*

6.6 For developments greater than 10 dwellings, it is necessary to demonstrate whether the development is air quality neutral or not. Therefore, an air quality assessment was undertaken, as well as a damage cost calculation.

### Detailed Operational Phase Road Traffic Emissions Assessment

6.7 Concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> were predicted at identified existing receptor locations for Scenario 4: 2035 Opening Year with development, to consider the impact of development-generated vehicles on with regard to the current relevant air quality objectives.

6.8 Predicted pollutant concentrations are detailed in **Table 6.2**, **Table 6.3** and **Table 6.4** or NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> respectively together with Scenario 3: 2035 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<sub>2</sub> Concentrations and Development Impact at Existing Receptor Locations**

Receptor	Predicted NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )		Concentration Change* (µg.m <sup>-3</sup> )	Change in Concentration Relative to Air Quality Assessment Level (%)	Long Term Average Concentration as % of Air Quality Assessment Level	Impact
	Scenario 3: 2035 Opening Year Without Dev	Scenario 4: 2035 Opening Year With Dev				
R1	9.4	9.4	<0.1	0	11	Negligible
R2	9.4	9.4	+0.1	0	24	Negligible
R3	9.4	9.4	<0.1	0	24	Negligible
R4	9.5	9.5	<0.1	0	24	Negligible
R5	9.4	9.4	<0.1	0	24	Negligible
R6	9.5	9.5	<0.1	0	24	Negligible
R7	9.8	9.9	<0.1	0	25	Negligible
R8	9.7	9.7	<0.1	0	24	Negligible
R9	9.7	9.7	<0.1	0	24	Negligible
R10	9.8	9.8	<0.1	0	24	Negligible
R11	9.8	9.8	<0.1	0	25	Negligible
R12	10.9	10.9	<0.1	0	27	Negligible
R13	10.5	10.5	<0.1	0	26	Negligible
R14	10.4	10.4	<0.1	0	26	Negligible
R15	10.1	10.1	<0.1	0	25	Negligible
R16	10.6	10.6	<0.1	0	26	Negligible

Receptor	Predicted NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )		Concentration on Change* (µg.m <sup>-3</sup> )	Change in Concentration on Relative to Air Quality Assessment Level (%)	Long Term Average Concentration on as % of Air Quality Assessment Level	Impact
	Scenario 3: 2035 Opening Year Without Dev	Scenario 4: 2035 Opening Year With Dev				
R17	10.3	10.3	<0.1	0	26	Negligible
R18	10.3	10.3	<0.1	0	26	Negligible
R19	10.6	10.6	<0.1	0	26	Negligible
R20	10.7	10.7	<0.1	0	27	Negligible

\* Discrepancies in changes due to rounding effects

**Table 6.3: Predicted Annual Mean PM<sub>10</sub> Concentrations and Development Impact at Existing Receptor Locations**

Receptor	Predicted PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> )		Concentration on Change* (µg.m <sup>-3</sup> )	Change in Concentration on Relative to Air Quality Assessment Level (%)	Long Term Average Concentration on as % of Air Quality Assessment Level	Impact
	Scenario 3: 2035 Opening Year Without Dev	Scenario 4: 2035 Opening Year With Dev				
R1	10.5	10.6	<0.1	0	26	Negligible
R2	10.5	10.6	+0.1	0	27	Negligible
R3	10.6	10.6	<0.1	0	27	Negligible
R4	10.7	10.7	<0.1	0	27	Negligible
R5	10.6	10.6	<0.1	0	27	Negligible
R6	10.7	10.7	<0.1	0	27	Negligible
R7	11.0	11.1	<0.1	0	28	Negligible
R8	10.9	10.9	+0.1	0	27	Negligible
R9	11.1	11.1	<0.1	0	28	Negligible
R10	11.7	11.7	<0.1	0	29	Negligible
R11	11.8	11.8	<0.1	0	29	Negligible

Receptor	Predicted PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> )		Concentration on Change* (µg.m <sup>-3</sup> )	Change in Concentration on Relative to Air Quality Assessment Level (%)	Long Term Average Concentration on as % of Air Quality Assessment Level	Impact
	Scenario 3: 2035 Opening Year Without Dev	Scenario 4: 2035 Opening Year With Dev				
R12	15.4	15.4	<0.1	0	38	Negligible
R13	13.0	13.1	<0.1	0	33	Negligible
R14	14.8	14.8	<0.1	0	37	Negligible
R15	11.7	11.7	<0.1	0	29	Negligible
R16	12.2	12.3	<0.1	0	31	Negligible
R17	12.1	12.1	<0.1	0	30	Negligible
R18	12.0	12.0	<0.1	0	30	Negligible
R19	12.4	12.4	<0.1	0	31	Negligible
R20	14.3	14.3	<0.1	0	36	Negligible

\* Discrepancies in changes due to rounding effects

**Table 6.4: Predicted Annual Mean PM<sub>2.5</sub> Concentrations and Development Impact at Existing Receptor Locations**

Receptor	Predicted PM <sub>2.5</sub> Concentration (µg.m <sup>-3</sup> )		Concentration on Change* (µg.m <sup>-3</sup> )	Change in Concentration on Relative to Air Quality Assessment Level (%)	Long Term Average Concentration on as % of Air Quality Assessment Level	Impact
	Scenario 3: 2035 Opening Year Without Dev	Scenario 4: 2035 Opening Year With Dev				
R1	5.9	5.9	<0.1	0	30	Negligible
R2	5.9	5.9	<0.1	0	30	Negligible
R3	5.9	6.0	<0.1	0	30	Negligible
R4	6.0	6.0	<0.1	0	30	Negligible
R5	6.0	6.0	<0.1	0	30	Negligible
R6	5.9	5.9	<0.1	0	29	Negligible

Receptor	Predicted PM <sub>2.5</sub> Concentration (µg.m <sup>-3</sup> )		Concentration on Change* (µg.m <sup>-3</sup> )	Change in Concentration on Relative to Air Quality Assessment Level (%)	Long Term Average Concentration on as % of Air Quality Assessment Level	Impact
	Scenario 3: 2035 Opening Year Without Dev	Scenario 4: 2035 Opening Year With Dev				
R7	6.0	6.0	<0.1	0	30	Negligible
R8	6.1	6.1	<0.1	0	31	Negligible
R9	6.1	6.1	<0.1	0	30	Negligible
R10	6.5	6.5	<0.1	0	33	Negligible
R11	6.7	6.7	<0.1	0	33	Negligible
R12	8.1	8.1	<0.1	0	40	Negligible
R13	7.3	7.3	<0.1	0	36	Negligible
R14	7.8	7.8	<0.1	0	39	Negligible
R15	6.5	6.5	<0.1	0	33	Negligible
R16	6.9	6.9	<0.1	0	34	Negligible
R17	6.8	6.8	<0.1	0	34	Negligible
R18	6.7	6.7	<0.1	0	34	Negligible
R19	6.6	6.6	<0.1	0	33	Negligible
R20	7.0	7.0	<0.1	0	35	Negligible

\* Discrepancies in changes due to rounding effects

- 6.9 Annual mean concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> are predicted to be below the current relevant air quality objectives at all modelled receptor locations in both Scenario 3 and 4. Furthermore, PM<sub>2.5</sub> concentrations are also below the 2028 interim target of 12µg.m<sup>-3</sup> and the 2040 future objective of 10µg.m<sup>-3</sup>.
- 6.10 The impact of the proposed development with regards to NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> is predicted to be 'negligible' at all receptor locations, and the impact of the proposed development is considered to be not significant, in accordance with IAQM and EPIC (previously EPUK) guidance<sup>12</sup>.

- 6.11 With regard to short term air quality objectives for NO<sub>2</sub> and PM<sub>10</sub>, the predicted annual mean NO<sub>2</sub> concentrations are less than 60µg.m<sup>-3</sup> and therefore in accordance with Defra guidance<sup>10</sup> 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<sub>10</sub> short term objective; no exceedances were predicted.

### **Site Suitability Assessment**

- 6.12 Concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> were predicted at the proposed residential dwellings within the Site for Scenario 4: 2035 Opening Year with development. Predicted pollutant concentrations are detailed in **Figure 6.1** to **Figure 6.3**.
- 6.13 The predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations for Scenario 4: 2035 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the current relevant air quality objectives in 2035 with the development in place. Furthermore, PM<sub>2.5</sub> concentrations are also below the 2028 interim target of 12µg.m<sup>-3</sup> and the 2040 future objective of 10µg.m<sup>-3</sup> across the Site.
- 6.14 With regard to short term air quality objectives for NO<sub>2</sub> and PM<sub>10</sub> at the residential development, the predicted annual mean NO<sub>2</sub> concentrations are less than 60µg.m<sup>-3</sup> and therefore in accordance with Defra guidance<sup>10</sup> it may be assumed that exceedance of the 1-hour mean NO<sub>2</sub> objective are unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM<sub>10</sub> short term objective; no exceedances were predicted.

Figure 6.1: Predicted Annual Mean NO<sub>2</sub> Concentrations Across the Site

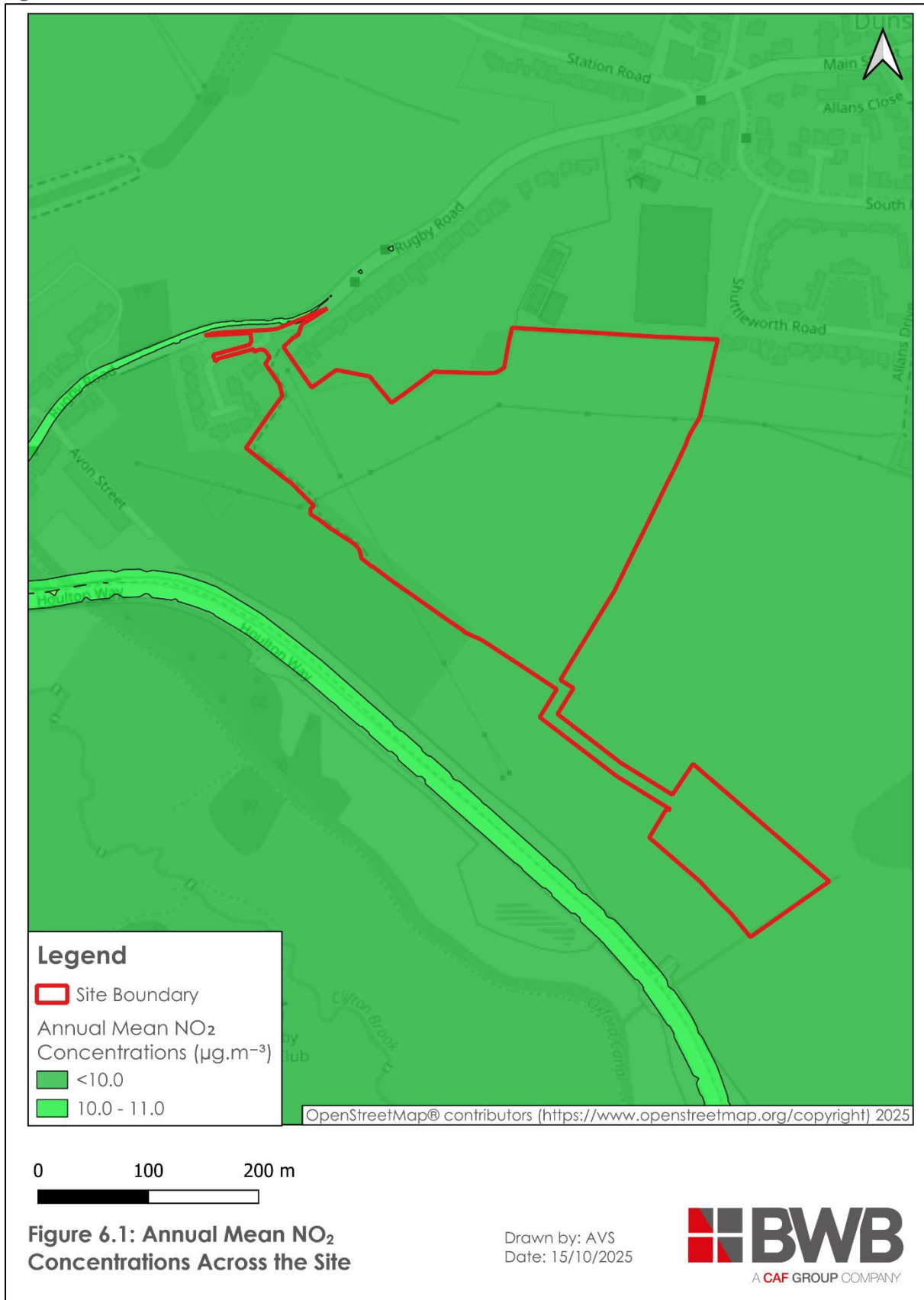


Figure 6.2: Predicted Annual Mean PM<sub>10</sub> Concentrations Across the Site

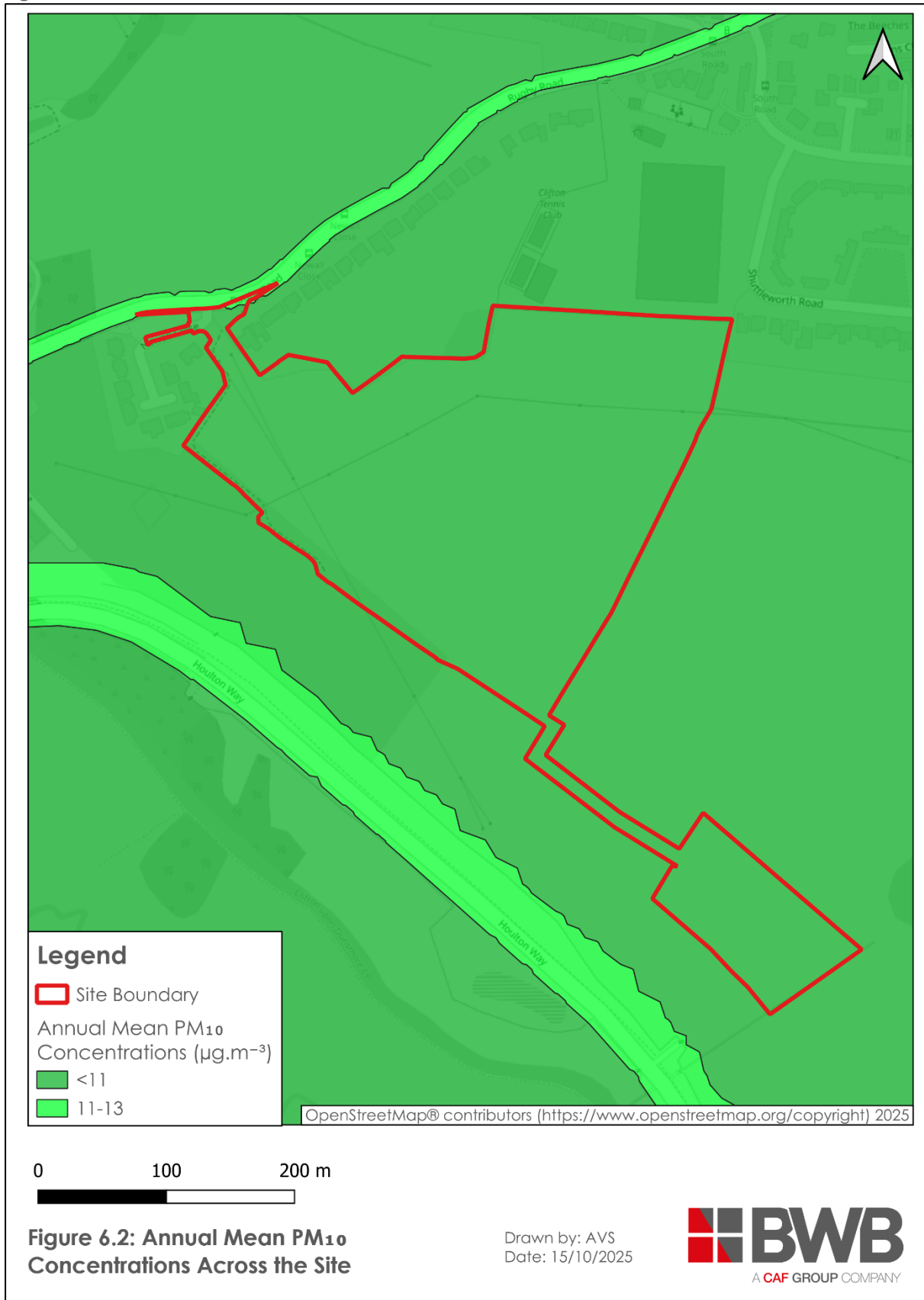
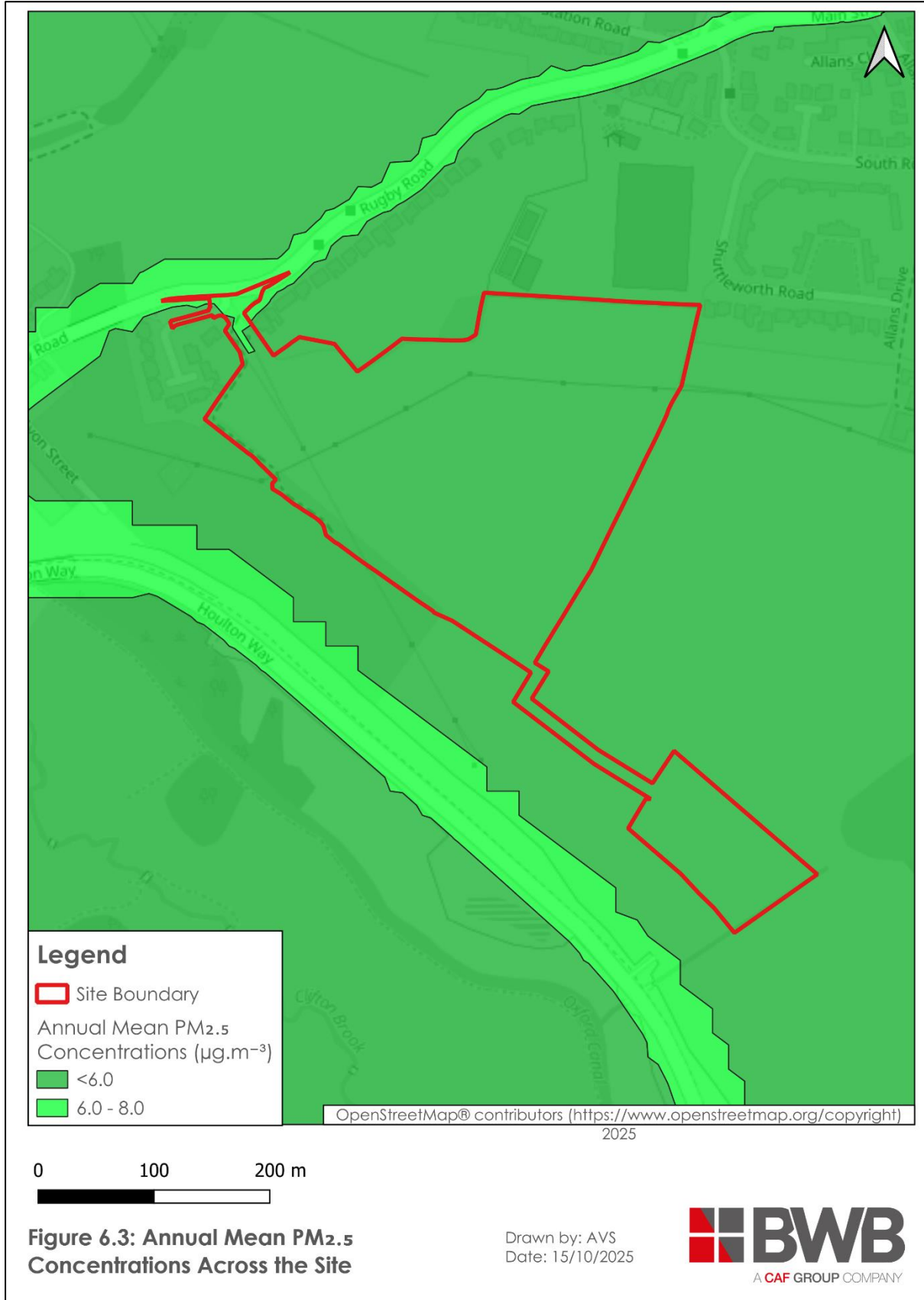


Figure 6.3: Predicted Annual Mean PM<sub>2.5</sub> Concentrations Across the Site



## Defra PM<sub>2.5</sub> Targets: Interim Planning Guidance

6.15 Defra is developing new guidance which will require planning applications to reduce population exposure to PM<sub>2.5</sub> from design stage. Consideration to the interim planning guidance<sup>9</sup>, 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<sub>2.5</sub> concentrations across and in the vicinity of the Site suggest no exceedances of the 2040 future objective of 10µg.m<sup>-3</sup>. In addition, dispersion modelling was undertaken to predict pollutant concentrations across the Site and PM<sub>2.5</sub> concentrations across the Site were predicted to be below 10µg.m<sup>-3</sup>.
- When considering the design of the Site, the proposed dwellings are set back from any major roads and is not expected to experience concentrations exceeding the 2040 future objective of 10µg.m<sup>-3</sup>.
- 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<sub>2.5</sub> concentrations against the 2040 future objective of 10µg.m<sup>-3</sup>.
- A construction phase dust assessment was conducted to consider the impact of dust. On review of background mapping<sup>16</sup>, annual mean PM<sub>2.5</sub> concentrations across and in the vicinity of the Site are below 10µg.m<sup>-3</sup>. 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'.

6.16 Based on the above, the Site was considered suitable for the proposed residential use, when considering the 2040 future objective of 10µg.m<sup>-3</sup>. 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.

## Mitigation

### RBC Air Quality Supplementary Planning Document

6.17 Policy HS5 applies to the proposed development, therefore, in accordance with the RBC SPD<sup>13</sup>, Type 1 and Type 2 mitigation is required. The SPD<sup>13</sup> provides example mitigation measures. The proposed development includes the following measure which are considered to be appropriate Type 1 and Type 2 mitigation:

- Provision of electric vehicle charging;
- Provision of a CEMP. Recommended mitigation has been provided in **Appendix E**; and
- Provision of a Travel Plan.

6.18 In addition, as policy HS5 applies, a damage cost calculation is required, as detailed below.

## Damage Cost Calculation

6.19 The inputs used in the emissions cost calculation are detailed in **Table 6.5**.

**Table 6.5: Emissions Cost Calculation Inputs**

Input Factor	Value
Trip Rate (LDVs)	907
Trip Rate (HDVs)	0
Average Speed (km.hr <sup>-1</sup> ) (estimated speed on nearby routes)	30
Link Length (km)	10
Road Type	Urban (not London)
Emissions Year (EFT v13.1)	2035
Cost per Tonne per Pollutant <sup>19</sup> ( <sup>1</sup> NO <sub>x</sub> and PM <sub>2.5</sub> Road Transport Urban Medium)	NO <sub>x</sub> = £9,054
	PM <sub>2.5</sub> = £63,766
Rebasing Factor from 2022 to 2035 <sup>20</sup>	1.417542
Rebased Cost per Tonne per Pollutant	NO <sub>x</sub> = £12,834
	PM <sub>2.5</sub> = £90,391
Development transport emissions (Tonnes)	NO <sub>x</sub> = 0.15
	PM <sub>2.5</sub> = 0.06

6.20 The emissions cost calculation for the proposed development is detailed in **Table 6.6**.

**Table 6.6: Emissions Cost Calculation**

Year	NO <sub>x</sub> Emissions Cost*	PM <sub>2.5</sub> Emissions Cost*
1	£12,834 x 0.15 T = £1,903	£90,391 x 0.06 T = £5,190
2	x 1.02% = £1,941	x 1.02% = £5,294
3	x 1.02% = £1,980	x 1.02% = £5,399
4	x 1.02% = £2,020	x 1.02% = £5,507
5	x 1.02% = £2,060	x 1.02% = £5,618
Pollutant Total	£9,904	£27,008
Combined Total	£36,911	

<sup>19</sup> <https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance>.

<sup>20</sup> <https://www.gov.uk/government/publications/tag-data-book>

*\*discrepancies in values due to rounding effects*

- 6.21 The calculated value from **Table 6.6** of £36,911 is the calculated 'health cost' associated with development-generated traffic emissions. This 'health cost' should be used as an indication regarding the cost of mitigation measures to be implemented which will benefit local air quality and therefore offset the 'health cost', in accordance with Air Quality SPD<sup>13</sup> and Defra guidance<sup>19</sup>.
- 6.22 As the proposed development is for outline application mitigation measures incorporated into the design of the development have not been finalised. This item will therefore be completed at a later date once mitigation measures have been finalised, to inform any additional mitigation required.

## **7. CONCLUSION**

- 7.1 An air quality impact assessment was undertaken for the proposed residential development at Land East of Rugby Road, Clifton-upon-Dunsmore.
- 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<sup>11</sup>.
- 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<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance<sup>10</sup>. 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<sup>12</sup>.
- 7.4 Pollutant concentrations were also predicted across the Site. Concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> 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 Consideration was also given to the RBC Air Quality SPD<sup>13</sup> and the development was categorised and mitigation recommended in accordance with the guidance. Type 1 and Type 2 mitigation in the form of electric vehicle charging, a CEMP and the provision of a Travel Plan are proposed as part of the development. A damage cost calculation was also undertaken.
- 7.6 Based on the assessment results, the impact of the proposed development on local air quality with regards to the current relevant air quality objectives was considered to be not significant. No further mitigation is required.

## **APPENDICES**

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## APPENDIX A: GLOSSARY OF TERMS

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

**APPENDIX B: PROPOSED DEVELOPMENT MASTERPLAN**

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Date: 01/04/2024  
 Project: L101  
 Drawing: 01/04/2024

- Site Boundary
- Existing Vegetation to be retained
- Indicative Proposed Planting
- Indicative Location for Play Area
- Residential Development
- Streets
- Private Drives
- Proposed Paths
- Proposed SUDs
- Public Open Space
- Potential All Modes Access
- Potential Pedestrian Access
- Potential Sports Pitches
- Drainage Outfall



## **APPENDIX C: PLANNING POLICY AND LEGISLATION**

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## National Legislation and Planning Policy

### The UK Air Quality Strategy

- C.1 European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive<sup>1</sup> sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000<sup>2</sup>, as amended, for the purpose of the Local Air Quality Management Framework. The Air Quality (England) Regulations were amended in 2002<sup>3</sup> and again in 2010<sup>4</sup>, with miscellaneous amendments added in 2020<sup>5</sup> following the UK exit from the EU. Additionally, an updated PM<sub>2.5</sub> objective was published in 2023<sup>6</sup> with an interim target to be achieved by 2028<sup>7</sup>.
- C.2 The UK Government are required under the Environment Act 1995<sup>21</sup> to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997<sup>22</sup>, updated in 2007<sup>23</sup> and most recently reviewed and updated in 2023<sup>6</sup>. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.
- C.3 The Environment Act 2021<sup>24</sup> was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995<sup>21</sup> with regard to the Local Air Quality Management regime. Under the Environment Act 2021<sup>24</sup>, 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<sup>24</sup> also places responsibility on local authorities to co-operate with air quality partners in the preparation of Air Quality Action Plans and identification of measures which should be monitored within the Plan and dates by which they should be implemented.
- C.4 Part IV of the Environment Act<sup>24</sup> 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

- C.5 The National Planning Policy Framework (NPPF)<sup>25</sup> was amended in December 2024 and sets out the Government's planning policies for England and how these are expected to be applied.

<sup>21</sup> HMSO (1995) The Environment Act 1995, London: TSO

<sup>22</sup> Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO

<sup>23</sup> Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO

<sup>24</sup> HMSO (2021) The Environment Act 2021, London: TSO

<sup>25</sup> Ministry of Housing, Communities & Local Government (2024) National Planning Policy Framework, HMSO London

C.6 The NPPF<sup>25</sup> recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

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

*[...]*

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;*

*[...]*

*Ground conditions and pollution*

*[...]*

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

*[...]*

*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”*

C.7 With regard to assessing cumulative effects the NPPF<sup>25</sup> states:

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

*[...]”*

## Planning Practice Guidance

- C.8 The Planning Practice Guidance (PPG) for air quality<sup>26</sup> was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.
- C.9 The PPG<sup>26</sup> sets out the following with regard to air quality and planning:
- *“What air quality considerations does planning need to address;*
  - *What is the role of plan-making with regard to air quality;*
  - *Air quality concerns relevant to neighbourhood planning;*
  - *What information is available about air quality;*
  - *When could air quality considerations be relevant to the development management process;*
  - *What specific issues may need to be considered when assessing air quality impacts;*
  - *How detailed does an air quality assessment need to be; and*
  - *How can an impact on air quality be mitigated”.*
- C.10 The PPG<sup>26</sup> sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.
- C.11 The PPG<sup>26</sup> 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”.*

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<sup>26</sup> Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality

C.12 The PPG<sup>26</sup> also states what may be considered relevant to determining a planning application and these include whether a development would:

- *“Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value”.*

C.13 The PPG<sup>26</sup> 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

*Rugby Borough Council Local Plan 2011 – 2031*

C.14 The RBC Local Plan was adopted in 2019 and summarises the long-term spatial vision for how the Borough will develop. The Local Plan contains the following policies with regard to air quality:

*“Policy ED2: Employment Development within Rugby Urban Area*

*[...]*

*Applicants will be required to demonstrate that any potential impacts on neighbouring land uses, particularly those especially sensitive to noise, visual amenity or air quality impacts arising from industrial uses are avoided, or where this is not possible, mitigated to an acceptable level.”*

"Policy HS5: Traffic Generation and Air Quality, Noise and Vibration

Development proposals should promote a shift to the use of sustainable transport modes and low emission vehicles (including electric/hybrid cars) to minimise the impact on air quality, noise and vibration caused by traffic generation. Proposals should be located where the use of public transport, walking and cycling can be optimised. Proposals should take full account of the cumulative impact of all development including that proposed in this Local Plan on traffic generation, air quality, noise and vibration. Development proposals should complement the Air Quality Action Plan.

Development throughout the Borough of more than 1,000 sqm of floorspace or 10 or more dwellings or development within the Air Quality Management Area (see Appendix 8) that would generate any new floorspace must:

1. Achieve or exceed air quality neutral standards; or
2. Address the impacts of poor air quality due to traffic on building occupiers, and public realm or amenity space users by reducing exposure to and mitigating their effects, proportionate to the scale of the development. This can be achieved using design solutions that include:

Orientation and layout of buildings, taking into account building occupiers, public realm and amenity space users;

- Appropriate abatement technologies; and
- Urban greening appropriate for providing air quality benefits,

Where air quality neutral standards are not met, measures to offset any shortfall will be required, according to the following hierarchy:

- On-site measures; then
- Off-site measures; then
- Financial contributions."

"Policy SDC1: Sustainable Design

[...]

Proposals for new development will ensure that the living conditions of existing and future neighbouring occupiers are safeguarded."

- C.15 The above policies were taken into consideration throughout the undertaking of the assessment.

**APPENDIX D: CONSULTATION WITH RBC**

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- D.1 Consultation was undertaken with the Environmental Health Officer at RBC via email on 14<sup>th</sup> February 2025. RBC confirmed agreement with the proposed methodology via email on 21<sup>st</sup> February 2025.
-

**Amy Van De Sande**

**From:** Michael Warren [REDACTED]  
**Sent:** 21 February 2025 17:53  
**To:** Amy Van De Sande  
**Subject:** RE: Land East of Rugby Road - Air Quality Consultation (my ref 10510)

**This email originated from outside of our organisation. Please exercise caution with content, links and attachments.**

Good afternoon Amy

I am sorry it has taken me this long to reply to you, other cases and covering colleagues have been taking up my time.

I concur with the proposed methodology. I cannot locate other details about proposals for this development area so am not able to provide other comments that may help.

Please note that traffic speeds along the Rugby Road in that area can be quite low due to the traffic calming measures.

Regards,

Michael Warren



Environmental Health Officer  
Commercial Regulation Team  
Regulation and Safety  
Rugby Borough Council



**From:** Amy Van De Sande <[REDACTED]>  
**Sent:** 14 February 2025 16:53  
**To:** Michael Warren <[REDACTED]>  
**Subject:** Land East of Rugby Road - Air Quality Consultation

Good Afternoon,

BWB are preparing an air quality assessment for a residential development of 150 dwellings on land east of Rugby Road as shown in the figure below. We have provided our proposed methodology below for your agreement.



Construction Dust

A construction phase dust assessment will be undertaken with the latest version (January 2024) of the IAQM construction dust guidance to inform mitigation requirements during the construction phase of the development.

Operational Phase

The development trip generation is likely to exceed the IAQM and EPUK screening criteria for 500 LDVs or when a detailed road traffic impact assessment is required. We therefore propose to undertake a detailed impact assessment using the dispersion model ADMS-Roads. We propose the following model inputs:

Parameter	Input
Emission factors	Emission factors will be utilised from the Defra Emission Factor Toolkit (EFT), version 12.1, for the years of assessment (2023 verification year, 2025 base year and development Opening Year).
Conversion of oxides of nitrogen	Concentrations of NOx will be predicted using the ADMS-Roads dispersion model. These concentrations will be converted to nitrogen dioxide (NO <sub>2</sub> ) using the Defra NOx to NO <sub>2</sub> calculator <sup>[1]</sup> , version 9.1.
Meteorological data	Hourly sequential meteorological data for the verification year of assessment, 2023, will be obtained for the Church Lawford recording station. This is considered the closest and most representative meteorological station for the site and study area
Surface roughness and Monin-Obukhov length (MO) – Site	A surface roughness of 0.5m and a MO length of 30m will be utilised in the air dispersion model to represent the suburban conditions on the edge of Rugby at the Site and within the Study area.
Surface roughness and Monin-Obukhov length (MO) – Meteorological Station	A surface roughness of 0.3m and a MO length of 10m will be utilised in the air dispersion model to represent conditions at the meteorological station.
Background pollutant concentrations	RBC undertakes background monitoring of NO <sub>2</sub> at the diffusion tube S12. The 2023 monitored concentration from the S12 monitoring location will be used to adjust the Defra background concentrations for 2025 and the development opening year in accordance with Defra TG22 Background concentrations of PM <sub>10</sub> and PM <sub>2.5</sub> for the study area will be obtained from the pollutant concentration maps <sup>[2]</sup> provided by Defra as a 1km x 1km grid of the UK, for the years of assessment
Model verification	Model verification will be undertaken using RBC monitoring data available for the study area. We propose to use the following roadside diffusion tubes: <ul style="list-style-type: none"> <li>• S9</li> <li>• S37</li> <li>• S39</li> <li>• S36</li> <li>• S49</li> </ul>
Receptors	Sensitive receptor will be chosen along the roads which exceed the IAQM and EPUK screening criteria, including residential dwellings, schools, care homes and hospitals where required.

Pollutant concentrations will also be predicted across the Site and will be compared to the current relevant air quality objectives.

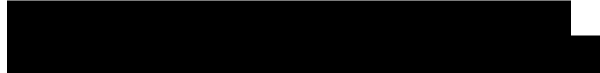
Consideration will also be given to the Rugby Council Air Quality SPD and a damage cost calculation will be undertaken to demonstrate that mitigation proposed as part of the development offsets the calculated health cost.

Finally, consideration will also be given to the DEFRA Interim Planning Guidance on PM2.5

I would be grateful if you could confirm our proposed methodology outlined above is acceptable.

Kind regards,

**Amy Van de Sande** MSc BSc (Hons) MIAQM MIEEnvSc



**Registered in England and Wales**

**Registered Office:** 5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ  
**Company No.** 5265863  
**VAT Reg No.** 648 1142 45

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<sup>[1]</sup> Defra (2024) NOx to NO<sub>2</sub> Calculator [<https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>]  
<sup>[2]</sup> Defra (2024) background pollutant concentration maps [<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021>]

## **APPENDIX E: CONSTRUCTION DUST ASSESSMENT METHODOLOGY**

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- E.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 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.
- E.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

- E.3 Step 1 of the IAQM guidance<sup>11</sup> involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.
- E.4 In accordance with the guidance<sup>11</sup>, 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.
- E.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website<sup>27</sup>, 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 Rugby Road, Newall Close and Shuttleworth Road. A construction phase assessment was therefore undertaken.

### Step 2: Assess the Risk of the Dust Impacts

#### Step 2A: Define the Potential Dust Emission Magnitude

- E.6 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance<sup>11</sup> as detailed in **Table E.1**. Demolition is not proposed as part of the development and therefore was not considered further in the assessment.

**Table E.1: Dust Emission Magnitude**

Activity	IAQM Dust Emission Magnitude	Dust Emission Magnitude
Earthworks	Large	Total site area >110,000m <sup>2</sup> , 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.

<sup>27</sup> <https://magic.defra.gov.uk/>

	Medium	Total site area 18,000m <sup>2</sup> – 110,000m <sup>2</sup> , 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 <sup>2</sup> , 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 <sup>3</sup> , on site concrete batching, sandblasting.
	Medium	Total building volume 12,000m <sup>3</sup> – 75,000m <sup>3</sup> , potentially dusty construction material (e.g. concrete), on site concrete batching.
	Small	Total building volume <12,000m <sup>3</sup> , 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.

E.7 The following dust emissions magnitudes were defined for the Proposed Development.

- Earthworks – the total Site area is between 18,000m<sup>2</sup> and 110,000m<sup>2</sup>. The dust emission magnitude for earthworks were therefore defined as **Medium**.
- Construction – the proposed development comprises the construction of 160 dwellings, with a likely building volume of greater than 75,000m<sup>3</sup>. The dust emission magnitude was therefore defined as **Large**.
- Trackout – at the time of writing, HDV movements during the construction phase were not available. Due to the size and scale of the Site and development, it is assumed that there are likely to be 20-50 outward HDV movements in any one day during the peak construction period. Therefore, the dust emissions magnitude associated with trackout was defined as **Medium**. In accordance with IAQM guidance<sup>11</sup>, a trackout distance of 250m from Site exits was used.

E.8 A summary of the defined dust emissions magnitude for the development are provided in **Table E.2**.

**Table E.2: Summary of Dust Emission Magnitudes**

Activity	Dust Emission Magnitude
Earthworks	Medium
Construction	Large
Trackout	Medium

### Step 2B: Define the Sensitivity of the Area

E.9 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling and human health impacts. The sensitivity of the study area takes into account the specific receptors in the vicinity of the site, the proximity and number of

those receptors, the local background concentration of PM<sub>10</sub> and site-specific factors. **Figure E.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance<sup>11</sup> for determining receptor sensitivity.

E.10 The sensitivity of the area is defined below, in accordance with the IAQM criteria<sup>11</sup> and summarised in **Table E.3**.

- Dust Soiling – there are one to 10 highly sensitive residential dwellings located within 20m of the Site boundary. The sensitivity of the area to dust soiling from on site activities is therefore **Medium**. There are 10 to 100 highly sensitive residential dwellings located within 20m of the trackout routes, therefore the sensitivity of the area to dust soiling from trackout is **High**.
- Human Health – there are one to 10 highly sensitive residential dwellings located within 20m of the Site boundary. There are 10 to 100 highly sensitive residential dwellings located within 20m of the trackout routes. DEFRA<sup>16</sup> shows that annual mean background PM<sub>10</sub> concentrations are below 24µg.m<sup>-3</sup>. Therefore the sensitivity of the area to human health is **Low**.

**Table E.3: Summary of the Area to Dust Soiling and Human Health Impacts**

Activity	Sensitivity		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	High
Human Health	Low	Low	Low

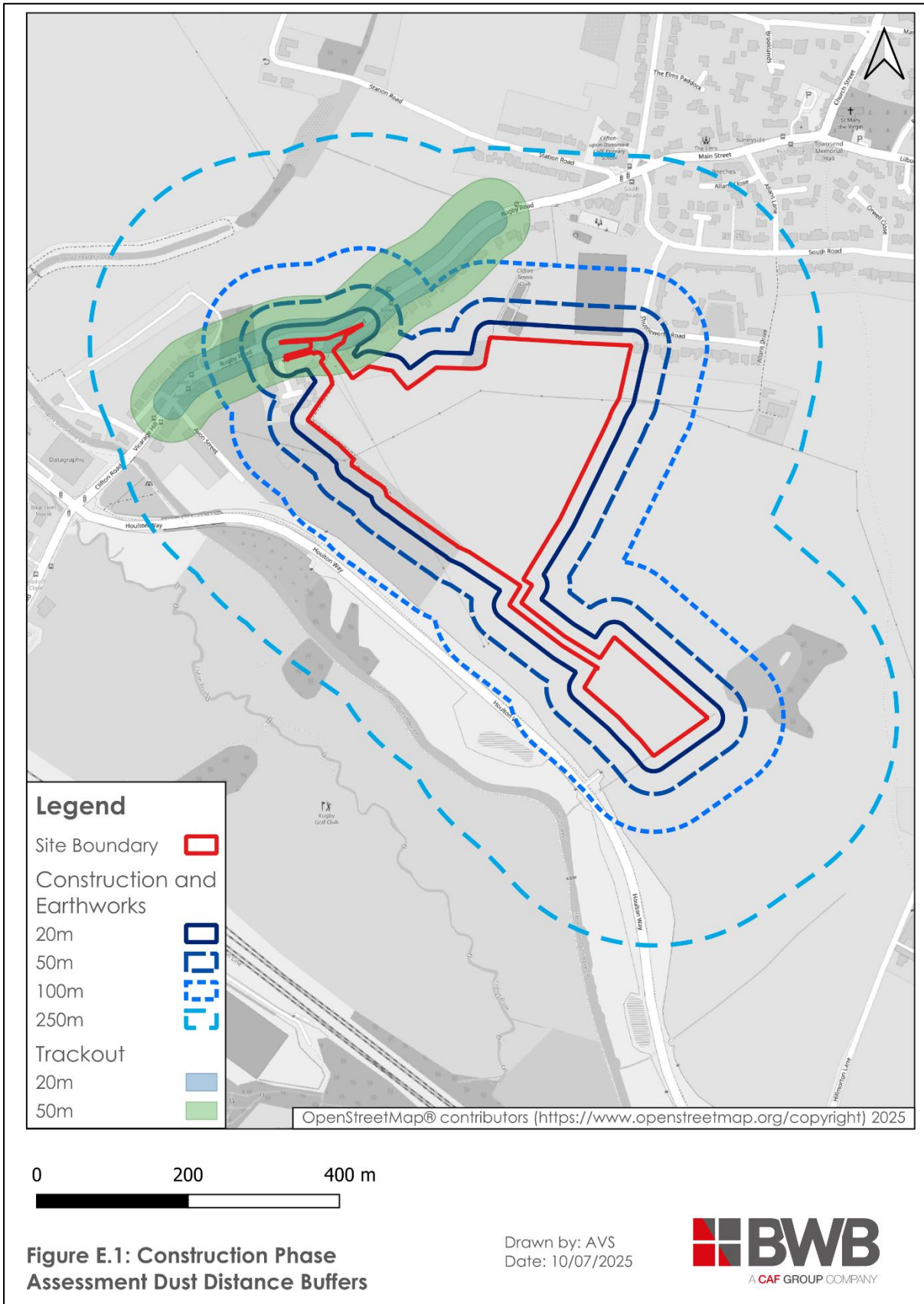
### Step 2C: Define the Risk of Impacts

E.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 E.4**.

**Table E.4 – Risk of Dust Impacts**

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

**Figure E.1: Construction Phase Assessment Dust Distance Buffers**



### Step 3: Site-Specific Mitigation

E.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<sup>11</sup> 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<sup>11</sup>. The highest risk category identified was '**Medium Risk**' and the recommended mitigation taken from the IAQM guidance<sup>11</sup> is detailed in **Table E.5** and **Table E.6**.

**Table E.5: Mitigation Measures for a Medium Risk Site**

Category	Mitigation Measures for a Medium Risk Site	
	Highly Recommended	Desirable
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	None
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	None
	Make the complaints log available to the local authority when asked.	
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.
	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

Category	Mitigation Measures for a Medium Risk Site	
	Highly Recommended	Desirable
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.	
	Avoid site runoff of water or mud.	
	Keep site fencing, barriers and scaffolding clean using wet methods.	
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	
	Cover, seed or fence stockpiles to prevent wind whipping.	
Operating vehicle/ machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	None
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	
	Use enclosed chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
	Ensure equipment is readily available on site to clean and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	

Category	Mitigation Measures for a Medium Risk Site	
	Highly Recommended	Desirable
Waste Management	Avoid bonfires and burning of waste materials.	None

**Table E.6: Mitigation Measures Specific to Earthworks, Construction and Trackout**

Category	Mitigation Measures	
	Highly Recommended	Desirable
Earthworks (Medium Risk Site)	None	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
		Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
		Only remove the cover in small areas during work and not all at once.
Construction (Medium Risk Site)	Ensure sand and other aggregates are stored in 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.	Avoid scabbling (roughening of concrete surfaces) if possible.
		Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overflowing during delivery.
		For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout (Medium Risk Site)	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.	None
	Avoid dry sweeping of large areas.	
	Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport.	
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	
	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**

- E.13 In accordance with the IAQM guidance<sup>11</sup>, with the implementation of the mitigation measures detailed in Step 3, the residual impacts from the construction phase are considered to be 'Not Significant'.
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## APPENDIX F: MODEL INPUTS AND VERIFICATION



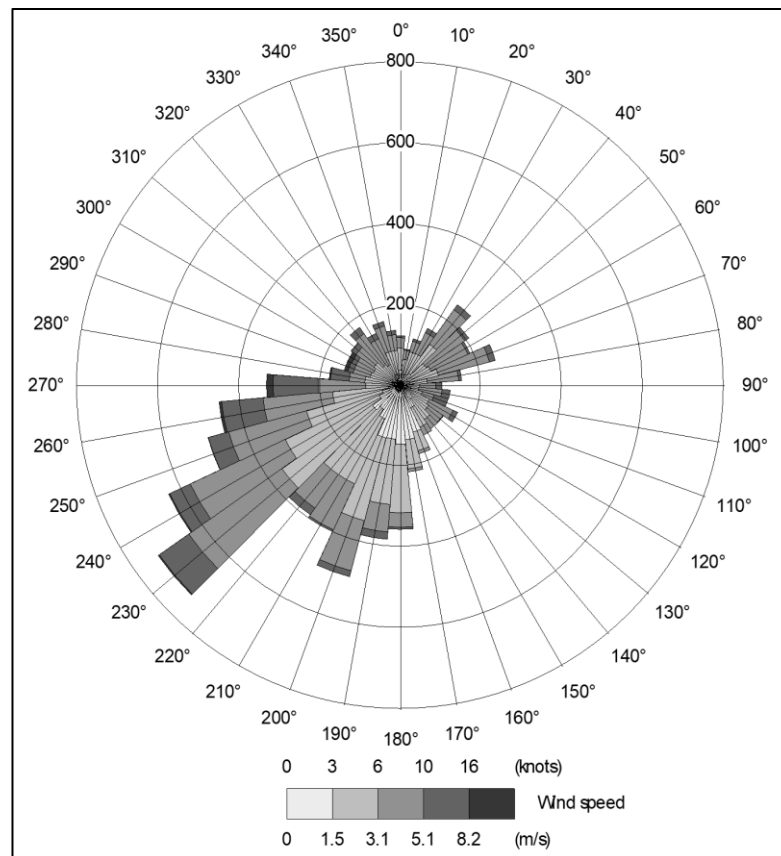
Road Link	Speed	Scenario 1: 2023 Verification Year		Scenario 2: 2025 Base Year		Scenario 3: 2035 Opening Year Without Development		Scenario 4: 2035 Opening Year With Development	
	Km.hr <sup>-1</sup>	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
Rugby Road (east of the Site)	30	4,537	147	4,587	149	3,883	104	4,175	104
Rugby Road (west of the Site)	30	4,542	153	4,592	154	3,892	110	4,507	109
Butlers Leap	28	11,401	325	11,525	329	16,253	203	16,605	199
Houlton Way	36	5,426	233	5,484	236	13,024	241	13,040	241
Clifton Road (west of Houlton Way)	39	8,399	271	8,490	274	8,754	197	8,985	197
Clifton Road (east of Murray Road)	38	8,321	269	8,411	272	9,172	142	9,385	141
B5414	28	11,835	721	11,963	729	12,631	800	12,670	803
Whitehall Road	27	15,835	554	16,007	560	16,624	408	16,767	403
Murray Road	48	6,094	238	6,160	240	5,873	220	5,873	220
A428 (west of Whitehall Road)	38	19,428	284	19,638	287	21,399	259	21,531	239
A428 (east of Whitehall Road)	38	15,383	447	15,550	452	16,986	289	16,998	289
A426 Leicester Road (South of M6)	77	35,777	4,038	36,164	4,081	40,564	5,820	40,667	5,819



## Meteorological Data

- F.1 Meteorological data for 2023 Verification Year scenario for the Church Lawford recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2023 is detailed below in **Figure F.2** and illustrates a predominant wind direction from the south west.

**Figure F.2: Wind Rose for 2023**



## Model Verification

- F.2 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<sup>10</sup>. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.
- F.3 The model was run for Scenario 1: 2023 Verification Year to predict the 2023 annual mean road contributions of NO<sub>x</sub> at the monitoring locations in the study area. The model NO<sub>x</sub> outputs at these locations were compared to the 2023 monitored concentrations to provide adjustment factors. **Table F.1** presents the verification process for NO<sub>x</sub>.

- F.4 Roadside monitoring locations within the study area (S36, S37, S39 and S49) were utilised in the model verification process. Roadside location S9 was excluded as it is not located within the study area, i.e. along a road which exceeds the IAQM and EPIC (previously EPUK) screening criteria<sup>12</sup>.
- F.5 The locations of the verification locations used in the assessment are shown in **Figure 4.1**.
- F.6 No monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> is undertaken within the study area. Therefore, the adjustment factor calculated during the NO<sub>x</sub> verification process was utilised to adjust predicted concentrations of PM<sub>10</sub> and PM<sub>2.5</sub>.

**Table F.2: NO<sub>x</sub> Verification Process**

Model Verification Steps	S36	S37	S39	S49
2023 monitored total NO <sub>2</sub> (µg.m <sup>-3</sup> )	23.0	19.7	20.6	21.5
2023 background NO <sub>2</sub> concentration (µg.m <sup>-3</sup> )	13.0	13.0	13.0	13.0
Monitored road contribution NO <sub>x</sub> (µg.m <sup>-3</sup> )	22.7	14.8	16.9	19.0
Modelled road contribution NO <sub>x</sub> (µg.m <sup>-3</sup> )	17.7	9.3	12.6	19.3
Ratio of monitored road NO <sub>x</sub> to modelled road NO <sub>x</sub>	1.3	1.6	1.3	1.0
Adjustment factor for modelled road contribution NO <sub>x</sub>	1.2042			
Adjusted modelled road contribution NO <sub>x</sub> (µg.m <sup>-3</sup> )	21.3	11.1	15.2	23.2
Modelled total NO <sub>2</sub> concentration (µg.m <sup>-3</sup> )	22.4	18.1	19.9	23.2
Monitored total NO <sub>2</sub> concentration (µg.m <sup>-3</sup> )	23.0	19.7	20.6	21.5
% difference between modelled and monitored total NO <sub>2</sub> concentration	-2.5	-8.1	-3.6	-7.9
RMSE % (should be less than 25% and ideally less than 10%)	3.1			

*Road-NO<sub>x</sub> component, determined from NO<sub>x</sub> to NO<sub>2</sub> calculator*

- F.7 A road-NO<sub>x</sub> factor of **1.2042** 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<sub>x</sub> concentration at each receptor, before conversion to NO<sub>2</sub> concentrations using the NO<sub>x</sub> to NO<sub>2</sub> calculator provided by Defra<sup>10</sup>.
- F.8 The RMSE calculated for the verification is within the ideal 10% range as detailed in Defra guidance<sup>10</sup>, indicating that the model is performing well.

