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ENVIRONMENT

Richborough Estates Ltd
Heyford Park
Upper Heyford, Oxfordshire
Air Quality Assessment

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December 2021

DOCUMENT ISSUE RECORD

Document Number:	**UHO-BWB-ZZ-ZZ-RP-LA-0001_AQA_S0_P02**
BWB Reference:	BMW3171

Revision	Date of Issue	Status	Author:	Checked:	Approved:
V2.0	17/12/2021	Issue	J. Hague BSc (Hons), AIAQM, AMIEnvSc	F. Hoyle MSc, BSc, MIAQM, MIEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEnvSc

Notice

EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough Estates Ltd and Lone Star Land to undertake an air quality assessment for a proposed residential-led development located at land off Camp Road in Upper Heyford.

The proposed development Site is located within the administrative area of Cherwell District Council. The Site is not located within, or in the vicinity of, an Air Quality Management Area.

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

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

Concentrations of nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) were also predicted across the proposed development Site and the suitability of the Site for the proposed residential use considered with regard to air quality. Pollutant concentrations were predicted to be below the relevant air quality objectives and the Site was therefore considered suitable for the proposed use.

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APPENDICES

1. INTRODUCTION

1.1 BWB Consulting Limited (BWB) was instructed by Richborough Estates Ltd and Lone Star Land (the Client) to undertake an air quality assessment for a proposed residential-led development located at land off Camp Road in Upper Heyford ('the Site').

1.2 The assessment considers construction phase dust impacts and operational phase road traffic emissions. A qualitative construction phase dust assessment was undertaken in accordance with relevant guidance. A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified receptor locations. In addition, pollutant concentrations were predicted across the proposed development Site to consider the suitability of the Site for the proposed residential use with regard to the current air quality objectives.

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

Site Setting

1.4 The Site is located north of Camp Road and lies within the administrative area of Cherwell District Council (CDC).

1.5 **Figure 1.1** details the location of the proposed development. The Site currently comprises open grassed land.

1.6 To the north of the Site lies a mixture of residential dwellings and a car storage facility, with a disused airfield located beyond. To the east and south of the Site lies agricultural land. West of the Site lies open grassed land which has planning consent for a residential-led development with a mixture of residential dwellings, schools and commercial uses located beyond.

1.7 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions. The Site is not located within, or in the vicinity of, an Air Quality Management Area (AQMA).

Proposed Development

1.8 The proposed development comprises approximately 220 residential dwellings and open space for community use. The proposed development masterplan is detailed in **Appendix B**.

Figure 1.1: Site Location

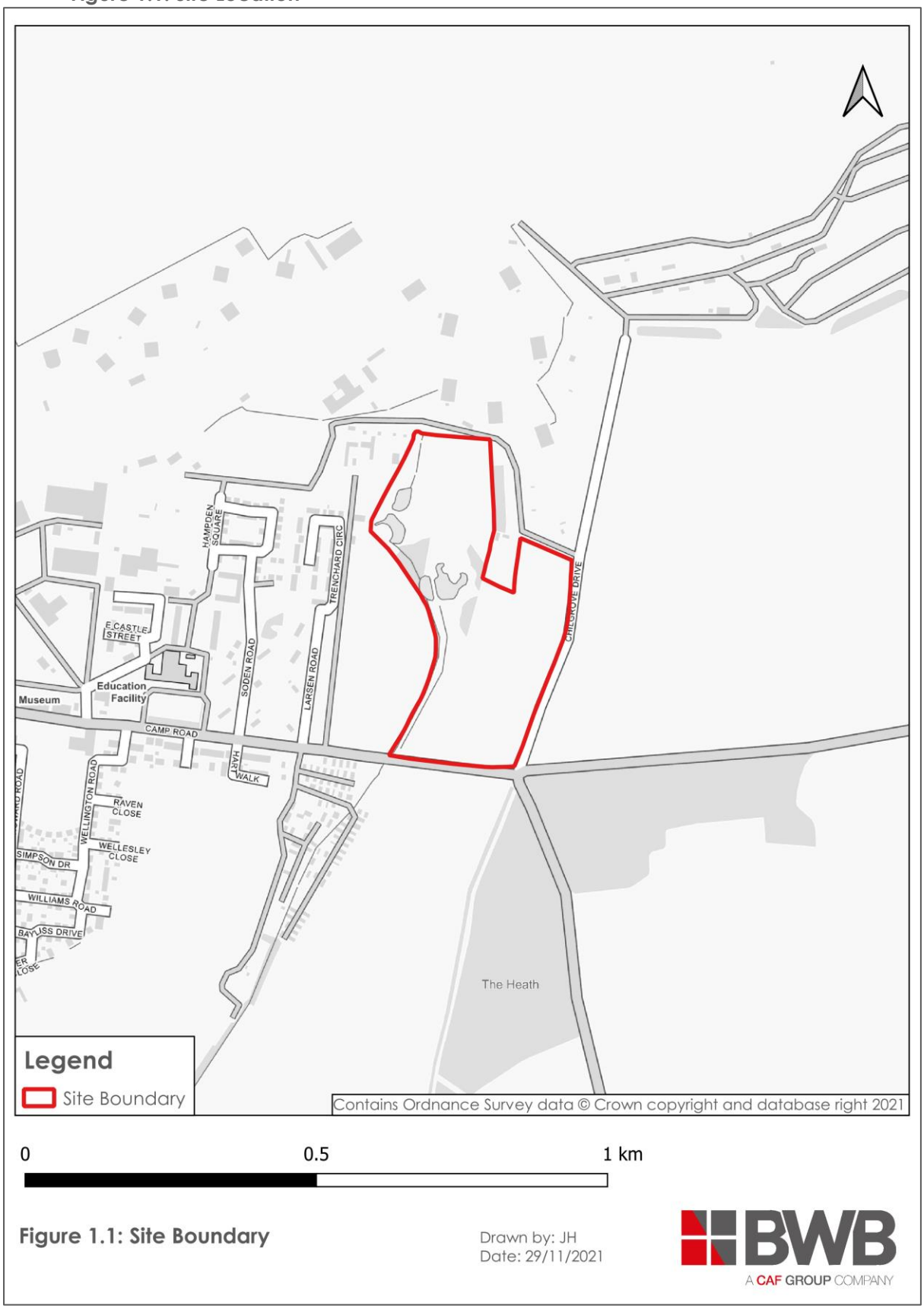

Figure 1.1: Site Boundary

Drawn by: JH
Date: 29/11/2021

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2. LEGLISLATION, PLANNING POLICY & GUIDANCE

National Legislation and Planning Policy

2.1 The following national legislation and planning policy is relevant to air quality and was considered in the undertaking of the assessment. A summary of the relevant national legislation and planning policy is provided in **Appendix C**:

- European Parliament, EU 2008 ambient Air Quality Directive (2008)[1];
- HMSO, Air Quality (England) Regulations (2000)[2];
- HMSO, Environment Act (1995)[3];
- HMSO, Environment Act (2021)[4];
- Department for Environment, Air Quality Strategy (1997)[5];
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)[6];
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework (NPPF) (2021)[7]; and
- Ministry for Housing, Communities and Local Government, Planning Practice Guidance (PPG) for air quality (2019)[8].

Local Planning Policy

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

- Cherwell District Council, The Cherwell Local Plan 2011 - 2031 (2015)[9].

Air Quality Assessment Guidance

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

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

[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] HMSO (2021) The Environment Act 2021, London: TSO
[5] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[6] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[7] Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, HMSO London
[8] Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality
[9] Cherwell District Council (2015) The Cherwell Local Plan 2011 - 2031
[10] Defra (2021) Local Air Quality Management Technical Guidance LAQM.TG(16)
[11] Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London
[12] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality

3. METHODOLOGY

Consultation with Cherwell District Council

3.1 Consultation was undertaken with the Regulatory Services and Compliance Department at CDC in which the proposed assessment methodology was provided via email on the 20th August 2021[13]. At the time of assessment no response was received.

- Construction Phase - A construction phase dust assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)[11].
- Operational Phase – A detailed operational phase road traffic emissions assessment was undertaken to consider the impact of development-generated traffic on local air quality and predict pollutant concentrations at the proposed development Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) at identified existing receptor locations for both without and with development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG16)[10] and Institute of Air Quality Management and Environmental Protection UK (EPUK)[12]. Pollutant concentrations were predicted across the Site to consider the suitability of the Site for residential use.

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

Construction Phase Dust Assessment

3.3 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM Guidance[11]. The full assessment methodology is not reproduced within this report but a summary of the assessment steps are provided below:

- Step 1 – screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works.
- Step 2 – assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout).
    - Step 2A – determine the potential dust emission magnitude for each of the four activities;
    - Step 2B – determine the sensitivity of the area;
    - Step 2C – determine the risk of dust impacts by combining the findings of steps 2A and 2B.
- Step 3 – determine the site-specific mitigation for each of the four activities; and
- Step 4 – examine the residual effects and determine significance.

[13] Consultation request email issued to CDC on 20/08/2021

Operational Phase Road Traffic Emissions – Detailed Assessment

Air Dispersion Modelling

3.4 The air dispersion model ADMS-Roads, version 5.0.0.1 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ at existing receptor locations and across the Site.

3.5 The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[10] and Institute of Air Quality Management and Environmental Protection UK guidance[12].

Assessment Scenarios and Traffic Data

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

- Scenario 1: 2019 Verification Year;
- Scenario 2: 2021 Base Year;
- Scenario 3: 2023 Opening Year without development; and
- Scenario 4: 2023 Opening Year with development.

3.7 Traffic data were obtained from Hub Transport Planning, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:

- B430 Ardley Road;
- B430 Station Road;
- Camp Road;
- Somerton Road; and
- Chilgrove Drive.

3.8 In addition, traffic data for the M40 motorway was obtained from the Department for Transport[14] for use in the assessment.

3.9 Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free-flowing traffic conditions were modelled at the relevant speed limit. Queuing sections were modelled in accordance with the principles set out in Defra guidance[10].

3.10 Traffic data used in the air dispersion modelling are provided in **Appendix D** and the road network modelled is illustrated in **Figure D1**.

[14] Department for Transport, traffic counts website https://roadtraffic.dft.gov.uk/ [accessed November 2021]

ADMS-Roads Model Inputs

3.11 The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit[15] (EFT), version 11.0, for the years of assessment (2019, 2021 and 2023).
- Conversion of oxides of nitrogen – concentrations of NOx were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO_2) using the Defra NOx to NO_2 calculator[16], version 8.1.
- Meteorological Data – hourly sequential meteorological data for the verification year of assessment (2019) were obtained for the Weston-on-the-Green recording station. station as this is the closest, most representative recording station in the vicinity of the Site, due to the location of the Site and recording station relative to rural areas. The wind rose for 2019 is provided in **Appendix E**.
- Surface roughness and Monin-Obukhov length (MO) – Site – a surface roughness of 0.3m and an MO length of 10 were utilised in the air dispersion model to represent the open suburban conditions at the Site and within the Study area.
- Surface roughness and Monin-Obukhov length (MO) – Meteorological Station – a surface roughness of 0.03m and an MO length of 10 were utilised in the air dispersion model to represent the rural conditions at the recording station. These were the relevant parameters detailed in the meteorological data file.
- Background pollutant concentrations – background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentration maps[17] provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019, 2021 and 2023).
- Model verification – model verification was undertaken using CDC monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix F**.
- Calculation of short term PM_{10} concentrations – the following calculation, as detailed in Defra guidance[10], was utilised to calculate the number of exceedances of the 24-hour mean PM_{10} air quality objective:

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

- The IAQM released a position statement[18] regarding dealing with the uncertainty in vehicle NOx emissions within air quality assessments. This recommends that sensitivity analyses be undertaken and professional judgement be applied to consider the scenario where NOx emissions do not reduce as rapidly as shown by the EFT. The IAQM position statement[18] has now been withdrawn as there is now a growing body of evidence to suggest that the latest vehicle emission factors reflect the real-world NOx emissions more accurately. Therefore, a sensitivity analysis assessment was not undertaken.

[15] Defra (2021) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]
[16] Defra (2020) NOx to NO_2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]
[17] Defra (2020) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018]
[18] Institute of Air Quality Management (2018) Position Statement: Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments, Version 1.1

Receptor Locations

Existing Sensitive Receptors

3.12 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.7 and considered in the operational phase road traffic emissions assessment. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the identified existing receptor locations for the assessment scenarios detailed in paragraph 3.6. Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the proposed development.

3.13 Receptor heights were modelled at 1.5m to represent the average breathing height at ground floor, with the exception of receptor R3 which was modelled at 0.8m to represent the lower than average child breathing height at the school.

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

Local Air Quality Monitoring Locations

3.15 Pollutant concentrations were also predicted at local air quality monitoring locations to assess the impact of the proposed development on local air quality. Monitoring locations were modelled at the heights detailed in the latest CDC Air Quality Annual Status Report[19] as detailed in **Table 3.1**.

Table 3.1: Existing Sensitive Receptor Locations

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
Monitoring Locations				
Camp Rd 2014	451448	225779	Camp Road (2014) Upper Heyford	2.0
Ardley	454301	227498	Ardley (B430)	2.0
Long Term Receptors				
R1	451949	225724	Residential development on Trenchard Circle	1.5
R2	451900	225698	Residential development off Camp Road	1.5
R3	451626	225767	School off Camp Road	0.8
R4	453882	226045	Residential dwelling off the B430	1.5

[19] Cherwell District Council (2020) 2020 Air Quality Annual Status Report

Receptor	Grid Reference		Details	Height Modelled
	X	Y		(m)
R5	453997	226375	Residential development off B430	1.5
R6	454285	227443	Residential development on Somerton Road	1.5
R7	454316	227481	Residential development on St Marys Walk	1.5

Figure 3.1: Existing Receptor Locations

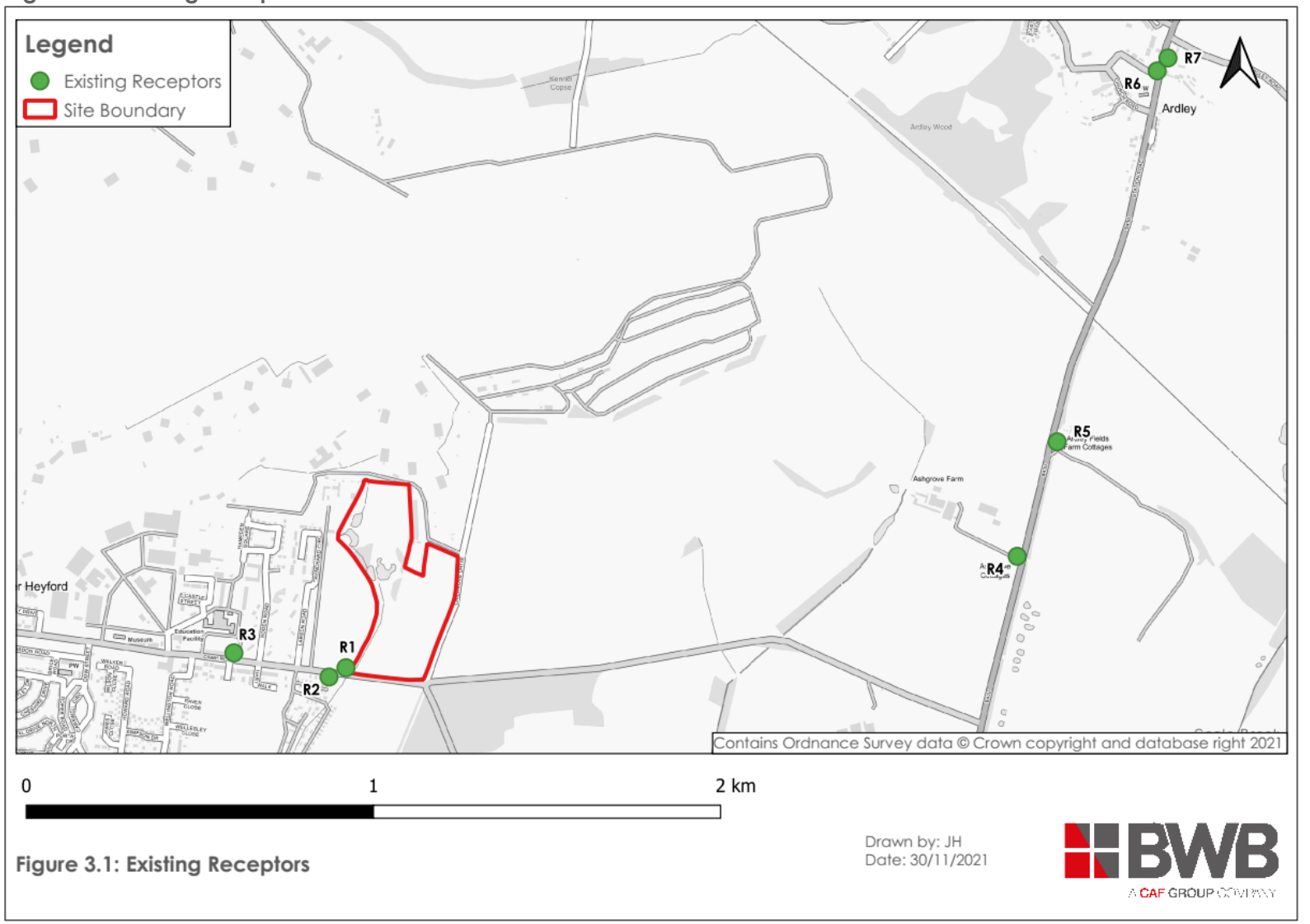


Figure 3.1: Existing Receptors

Proposed Receptor Locations

3.16 The proposed development proposes sensitive uses and therefore pollutant concentrations were predicted across the Site to consider the suitability of the proposed development with regard to the current air quality objectives. Pollutant concentrations were predicted across the Site for Scenario 4: 2023 Opening Year with development. A Cartesian grid was modelled at a height of 1.5m to represent ground floor average breathing height to cover the following grid references: minimum 451777, 225598 to maximum 452347, 226285.

Limitations and Assumptions

3.17 There are uncertainties associated with both measured and predicted pollutant concentrations. The model (ADMS-Roads) used in this assessment relies on input data, which are also subject to uncertainty. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not take into account.

3.18 The assessment is based on traffic data provided by Hub Transport Planning, the transport consultants for the project. As such any assumptions made by the transport consultants may also influence the air quality assessment.

3.19 In future year scenarios, uncertainty relates to the projection of vehicle emissions and, in particular the rate at which emissions per vehicle will improve over time. This assessment utilised the most recent version of the Defra EFT[15] to provide the most up to date estimate of current and future emission projections.

3.20 To reduce the uncertainty associated with predicted concentrations, model verification was carried out following guidance set out in Defra guidance[10]. As the models were verified using local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations.

Assessment Criteria

3.21 Predicted pollutant concentrations were compared to the relevant air quality objectives[5]. The current relevant air quality standards and objectives are detailed in **Table 3.2**.

Table 3.2: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective ($\mu g.m^{-3}$)	Date to Achieve by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004

Pollutant	Averaging Period	Air Quality Objective (µg.m^{-3})	Date to Achieve by
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual mean target (15% cut in annual mean (urban background exposure)	25	2010 - 2020

3.22 Guidance is provided by the Institute of Air Quality Management and Environmental Protection UK[12] to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at receptor locations are detailed in **Table 3.3.** These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the relevant air quality objectives.

Table 3.3: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1%	2 – 5%	6 – 10%	>10%
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Note: Figures rounded up to the nearest whole number, therefore any value less than 1% after rounding (effectively less than 0.5%) will be described as negligible.

4. BASELINE CONDITIONS

Local Air Quality Management

4.1 The Site is not located within, or in the vicinity of, an existing AQMA. The closest AQMA to the Site is the AQMA No.4, which is located approximately 6.7km south east of the Site, within the centre of Bicester. The AQMA was designated by CDC for the potential exceedance of the annual mean NO_2 objective.

Local Air Quality Monitoring

Nitrogen Dioxide (NO_2)

4.2 CDC undertakes NO_2 monitoring within its administrative boundary using a network of diffusion tubes. The closest monitoring location to the proposed development is located adjacent to Camp Road, approximately 500m west of the Site.

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

4.4 Monitoring data for 2020 was not available for review. However, due to the COVID-19 pandemic and associated national lockdowns in place during the 2020 calendar year, monitoring results for 2020 were not considered to be representative of normal conditions, given the significant decrease in traffic levels.

4.5 In addition, the IAQM released a position statement in August 2021 with regards to the use of 2020 and 2021 monitoring data and the COVID-19 pandemic. Until the impact of the pandemic on air quality is fully understood, the IAQM advice is to use 2019 monitoring data as the last typical year for monitoring data.

Table 4.1: CDC NO_2 Monitoring Data in 2015 – 2019

Location and Reference	Grid Reference		Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration (µg.m^{-3})				
					2015	2016	2017	2018	2019
Camp Road 2014, (Upper Heyford)	451448	225779	Kerbside	500m west	14.1	14.9	14.6	14.4	13.6
Ardley (B430)	454301	227498	Roadside	2.5km north east	29.6	28.7	27.2	26.0	24.4

4.6 Monitored annual mean NO_2 concentrations recorded over the past five years were well below the current annual mean NO_2 objective of 40µg.m^{-3} at the two monitoring locations in the vicinity of the Site.

4.7 Monitored NO_2 concentrations at the monitoring locations detailed in **Table 4.1** fluctuated between 2015 and 2019, with an overall reducing trend.

4.8 The monitoring locations detailed in **Table 4.1** are located along the primary road network and surrounding arterial roads that are considered the primary emission sources in the study area. Therefore, they were considered to be representative of conditions of the Site and the study area. Both the monitoring locations detailed in **Table 4.1** were used within the model verification as detailed in **Appendix F**.

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

4.9 CDC does not undertake any monitoring of particulate matter (PM_{10} or $PM_{2.5}$) within its administrative area.

Background Pollutant Concentrations

4.10 No background air quality monitoring is undertaken by CDC within the study area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps[17], which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2018 monitoring and meteorological data. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the years of assessment (2019, 2021 and 2023). The background concentrations used in the assessment are detailed in **Table 4.2.**

Table 4.2: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m^{-3})		
			2019	2021	2023
Monitoring Locations Used in Verification					
NO_2	Camp Road 2014	451500, 225500	8.2	7.6	7.2
PM_{10}			Data not required for this scenario	14.3	14.0
$PM_{2.5}$				8.8	8.6
NO_2	Ardley	454500, 227500	16.2	14.5	13.0
PM_{10}			Data not required for this scenario	16.7	16.4
$PM_{2.5}$				10.1	9.9
Receptors					
NO_2	R1 – R3	451500, 22500	Data not required for this scenario	7.6	7.2
PM_{10}				14.3	14.0
$PM_{2.5}$				8.8	8.6

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m^{-3})		
			2019	2021	2023
NO_2	R4 and R5	453500, 226500	Data not required for this scenario	9.0	8.5
PM_{10}				14.0	13.6
$PM_{2.5}$				8.7	8.4
NO_2	R6 and R7	454500, 227500	Data not required for this scenario	14.5	13.0
PM_{10}				16.7	16.4
$PM_{2.5}$				10.1	9.9

4.11 2019, 2021 and 2023 background concentrations are below the relevant annual mean air quality objectives for NO_2, PM_{10} and $PM_{2.5}$. A review of Defra background concentration maps[17] identified a significant contribution of residual and secondary particulate matter towards the total background PM_{10} concentration. It is likely that this contributes towards background PM_{10} concentrations exceeding background NO_2 concentrations.

5. CONSTRUCTION PHASE DUST ASSESSMENT

5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality. These include emissions of dust generated through demolition, excavation, construction, earthworks and trackout activities, exhaust pollutant emissions from construction traffic on the local highways network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.

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

Step 1: Screen the Need for a Detailed Assessment

5.3 Step 1 of the IAQM guidance[11] involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.

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

- Human receptors are located within 350m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances; or
- Ecological receptors are located within 50m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances.

5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[20], 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 Camp Road. A construction phase assessment was therefore undertaken.

5.6 For the purpose of the assessment it was considered that the consented residential development to the west of the Site would be occupied during the construction phase of the proposed development. The consented developments were therefore considered as sensitive receptors in the construction phase dust assessment to provide a conservative and robust assessment of construction phase impacts.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

5.7 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance[11] as detailed in **Table 5.1**. Demolition is not

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

proposed as part of the development and therefore wasn't considered further in the assessment.

Table 5.1: Dust Emission Magnitude Criteria and Definition

Activity	IAQM Dust Emission Magnitude	IAQM Dust Emission Magnitude Criteria
Earthworks	Large	Total site area >10,000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.
	Medium	Total site area 2,500m^2 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4m - 8m in height, total material moved 20,000 tonnes – 100,000 tonnes.
	Small	Total site area <2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Large	Total building volume >100,000m^3, on site concrete batching, sandblasting.
	Medium	Total building volume 25,000m^3 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.
	Small	Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m.
	Medium	10 - 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m.
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

5.8 The following dust emissions magnitudes were defined for the proposed development:

- Earthworks – The total site area is greater than 10,000m^2 and therefore the dust emissions magnitude for earthworks was defined as **Large**.
- Construction – The total building volume is between 25,000m^3 and 100,000m^3 and therefore the dust emissions for construction was defined as **Medium**.
- Trackout – There is anticipated to be between 10 and 50 HDV outward movements in any one day during the construction phase and therefore the dust emissions magnitude for trackout was defined as **Medium**.

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

Table 5.2: Summary of Project Defined Dust Emissions Magnitudes

Activity	Dust Emissions Magnitude
Earthworks	Large
Construction	Medium
Trackout	Medium

Step 2B: Define the Sensitivity of the Area

5.10 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling and human health. The sensitivity of the study area takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM_{10} and site-specific factors. **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance[11] for determining receptor sensitivity.

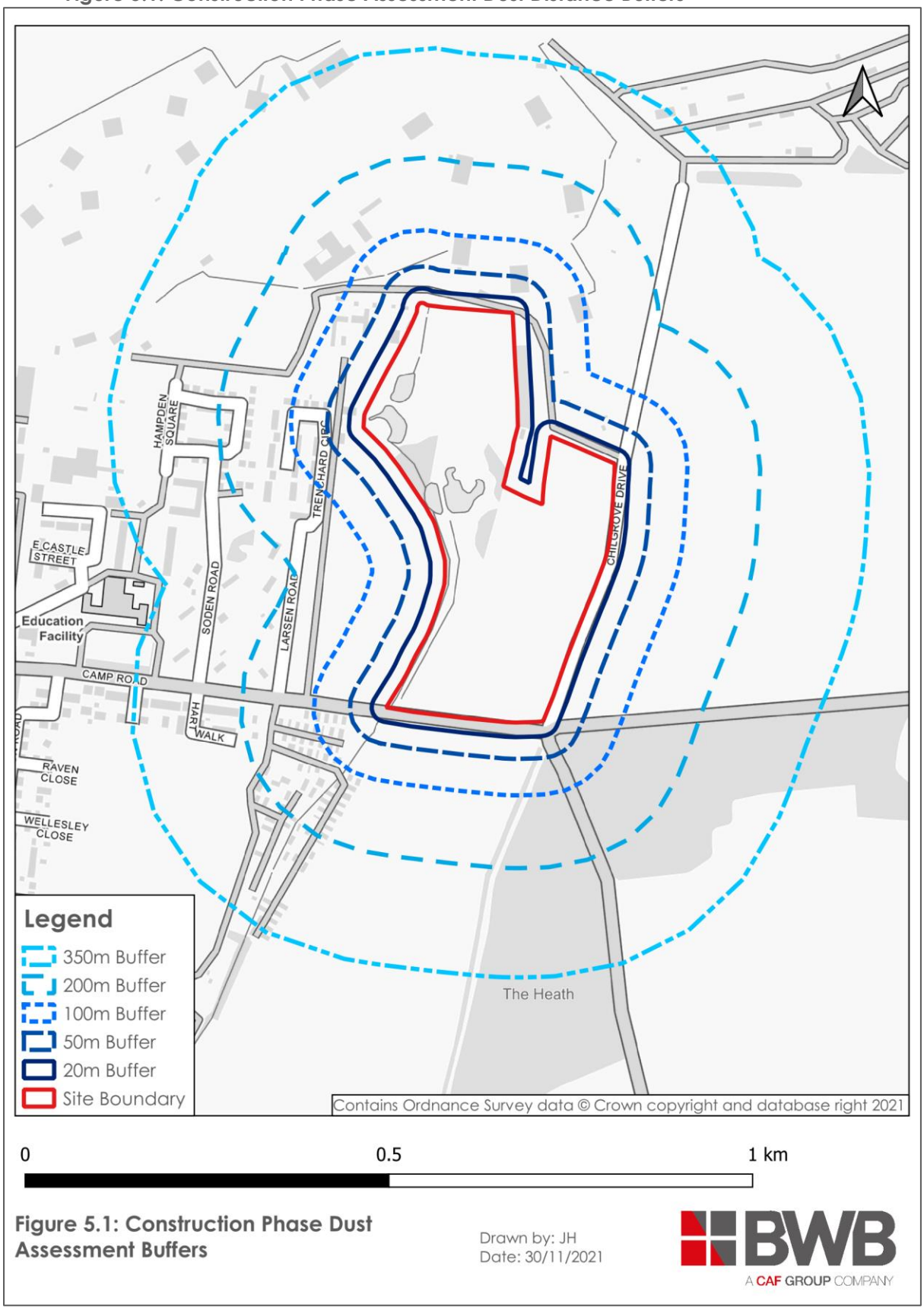
5.11 The sensitivity of the area is defined below, in accordance with IAQM criteria[11] and summarised in **Table 5.3**.

- Dust Soiling – Taking into consideration the adjacent committed residential development to the west of the Site, there is the potential for between 10 and 100 highly sensitive residential receptors to be located within 20m of construction phase activities. Therefore, the sensitivity of the area to dust soiling is defined as '**High**'.
- Human Health – There is the potential for between 10 and 100 highly sensitive residential units to be located within 20m of the proposed Site boundary and the 2021 background concentration of PM_{10} is less than 24 $\mu g.m^{-3}$. Therefore, the sensitivity of the area to human health effects is defined as '**Low'**.

Table 5.3: Determination of the Sensitivity of the Area

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

Figure 5.1: Construction Phase Assessment Dust Distance Buffers



Step 2C: Define the Risk of Impacts

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

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

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

Step 3: Site-Specific Mitigation

5.13 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[11] 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[11]. The highest risk category identified was 'High Risk' and the recommended mitigation taken from the IAQM guidance[11] is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a High Risk Site

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

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	**Desirable**
	be the environmental manager/engineer or the site manager.	
	Display the head or regional office contact information.	
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	None
	Make the complaints log available to the local authority when asked.	
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
	Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.	None
	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	**Desirable**
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	None
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.	
	Avoid site runoff of water or mud.	
	Keep site fencing, barriers and scaffolding clean using wet methods.	
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	
	Cover, seed or fence stockpiles to prevent wind whipping.	
Operating vehicle/ machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.	None
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	
	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable control measures provided, subject to the approval of the nominated undertaker with the agreement of the local authority, where appropriate).	
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such	None

Category	Mitigation Measures for a High Risk Site	
	Highly Recommended	**Desirable**
	as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	
	Used enclose chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
	Ensure equipment is readily available on site to clean and dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	
Waste Management	Avoid bonfires and burning of waste materials.	None

Table 5.6: Mitigation Measures Specific to Earthworks, Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (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 overfilling during delivery.
		For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout (Medium Risk Site)	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.	None
	Avoid dry sweeping of large areas.	

Category	Mitigation Measures	
	Highly Recommended	Desirable
	Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport.	
	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	
	Record all inspections of haul routes and any subsequent action in a site log book.	
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	
	Access gates to be located at least 10m from receptors where possible.	

Step 4: Determine Significant Effects

5.14 In accordance with IAQM guidance[11], with the implementation of the mitigation measures detailed in Step 3, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Baseline Assessment

6.1 Pollutant concentrations were predicted at the identified existing sensitive receptor and local monitoring locations using the dispersion model ADMS-Roads. Predicted pollutant concentrations for Scenario 2: 2021 Base Year and Scenario 3: 2023 Opening Year without development are detailed in **Table 6.1.**

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

Receptor	Scenario 2: 2021 Base Year (µg.m^{-3})			Scenario 3: 2023 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
Camp Rd 2014	10.5	14.9	9.2	9.9	14.7	9.0
Ardley	22.3	18.5	11.2	20.0	18.6	11.1
R1	10.5	14.9	9.1	9.9	14.7	9.0
R2	10.7	15.0	9.2	10.1	14.8	9.0
R3	10.5	14.9	9.2	9.9	14.7	9.0
R4	15.1	15.2	9.4	13.9	15.2	9.3
R5	17.3	15.7	9.7	15.9	15.8	9.6
R6	23.3	18.8	11.3	20.9	18.9	11.2
R7	23.2	18.8	11.3	20.8	18.9	11.2

6.2 The baseline assessment for Scenario 2 and Scenario 3 indicated that predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ were below the respective annual mean air quality objectives at all receptors and monitoring locations considered.

6.3 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[10] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.11 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

6.4 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor and local monitoring locations for Scenario 4: 2023 Opening Year with development, to consider the impact of development-generated vehicles on local air quality.

6.5 Predicted pollutant concentrations are detailed in **Table 6.2**, **Table 6.3** and **Table 6.4** for NO_2, PM_{10} and $PM_{2.5}$ respectively together with Scenario 3: 2024 Opening Year without development concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided.

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

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2023 Without Development ($\mu g.m^{-3}$)	Scenario 4: 2023 With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
Camp Rd 2014	9.9	10.0	+0.1	0	Negligible
Ardley	20.0	20.2	+0.2	1	Negligible
R1	9.9	10.0	+0.2	0	Negligible
R2	10.1	10.3	+0.2	0	Negligible
R3	9.9	10.1	+0.1	0	Negligible
R4	13.9	14.1	+0.2	0	Negligible
R5	15.9	16.1	+0.3	1	Negligible
R6	20.9	21.1	+0.2	1	Negligible
R7	20.8	21.0	+0.2	1	Negligible

** Discrepancies in changes due to rounding effects*

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

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2023 Without Development ($\mu g.m^{-3}$)	Scenario 4: 2023 With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
Camp Rd 2014	14.7	14.8	0.0	0	Negligible
Ardley	18.6	18.7	+0.1	0	Negligible
R1	14.7	14.8	0.0	0	Negligible
R2	14.8	14.8	0.0	0	Negligible
R3	14.7	14.8	0.0	0	Negligible
R4	15.2	15.2	0.0	0	Negligible
R5	15.8	15.8	+0.1	0	Negligible
R6	18.9	18.9	+0.1	0	Negligible
R7	18.9	18.9	+0.1	0	Negligible

** Discrepancies in changes due to rounding effects*

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

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2023 Without Development ($\mu g.m^{-3}$)	Scenario 4: 2023 With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
Camp Rd 2014	9.0	9.0	0.0	0	Negligible
Ardley	11.1	11.1	0.0	0	Negligible
R1	9.0	9.0	0.0	0	Negligible
R2	9.0	9.0	0.0	0	Negligible

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2023 Without Development ($\mu g.m^{-3}$)	Scenario 4: 2023 With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R3	9.0	9.0	0.0	0	Negligible
R4	9.3	9.3	0.0	0	Negligible
R5	9.6	9.7	0.0	0	Negligible
R6	11.2	11.3	0.0	0	Negligible
R7	11.2	11.3	0.0	0	Negligible

** Discrepancies in changes due to rounding effects*

6.6 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 3: 2023 Opening Year without development and Scenario 4: 2023 Opening Year with development are below the relevant annual mean air quality objectives for all the receptor and monitoring locations considered.

6.7 The proposed development does not lead to any additional exceedances of the annual mean air quality objectives.

6.8 Predicted changes in NO_2, PM_{10} and $PM_{2.5}$ concentrations were compared to the assessment criteria detailed in **Table 3.3** and are considered to be negligible in accordance with IAQM and EPUK guidance[12].

6.9 With regard to short term air quality objectives for NO_2 and PM_{10}, the predicted annual mean NO_2 concentrations are less than $60\mu g.m^{-3}$ and therefore in accordance with Defra guidance[10] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in paragraph 3.11 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Impact Significance Summary

6.10 Relevant guidance, legislation and professional judgement was utilised to determine the significance of the findings of the air quality assessment. The air quality assessment was supervised by a full member of the Institute of Air Quality Management. A summary of the impact significance and justification of this are provided below.

6.11 The impact of the proposed development on air quality is considered to be 'negligible':

- Consideration was given to local planning policy[9] and the development proposals are considered to be in accordance with this policy with regard to air quality.

- Existing concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the study area are predicted to be below the relevant air quality objectives.
- The air quality assessment undertaken utilised robust model inputs including slowing traffic sections at junctions, appropriate meteorological data and surface roughness.
- The impact of development-generated road traffic on local air quality is defined as negligible in accordance with IAQM and EPUK guidance[12].

Site Suitability Assessment

6.12 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted across the proposed development Site to determine the suitability for the proposed residential use with regard to the current air quality objectives.

6.13 A Cartesian grid was modelled covering the area between the following grid references: minimum 451777, 225598 to maximum 452347, 226285. The Cartesian grid was modelled over the Site and the surrounding area to capture Camp Road as the primary emission source in the vicinity of the Site. The grid was run at a height of 1.5m to represent the average breathing height at ground floor level across the proposed development Site for Scenario 4: 2023 Opening Year with development. **Figures 6.1 – 6.3** illustrate annual mean pollutant concentration contours for NO_2, PM_{10} and $PM_{2.5}$ respectively across the Site.

Figure 6.1: Predicted Annual Mean NO_2 Concentrations across the Site

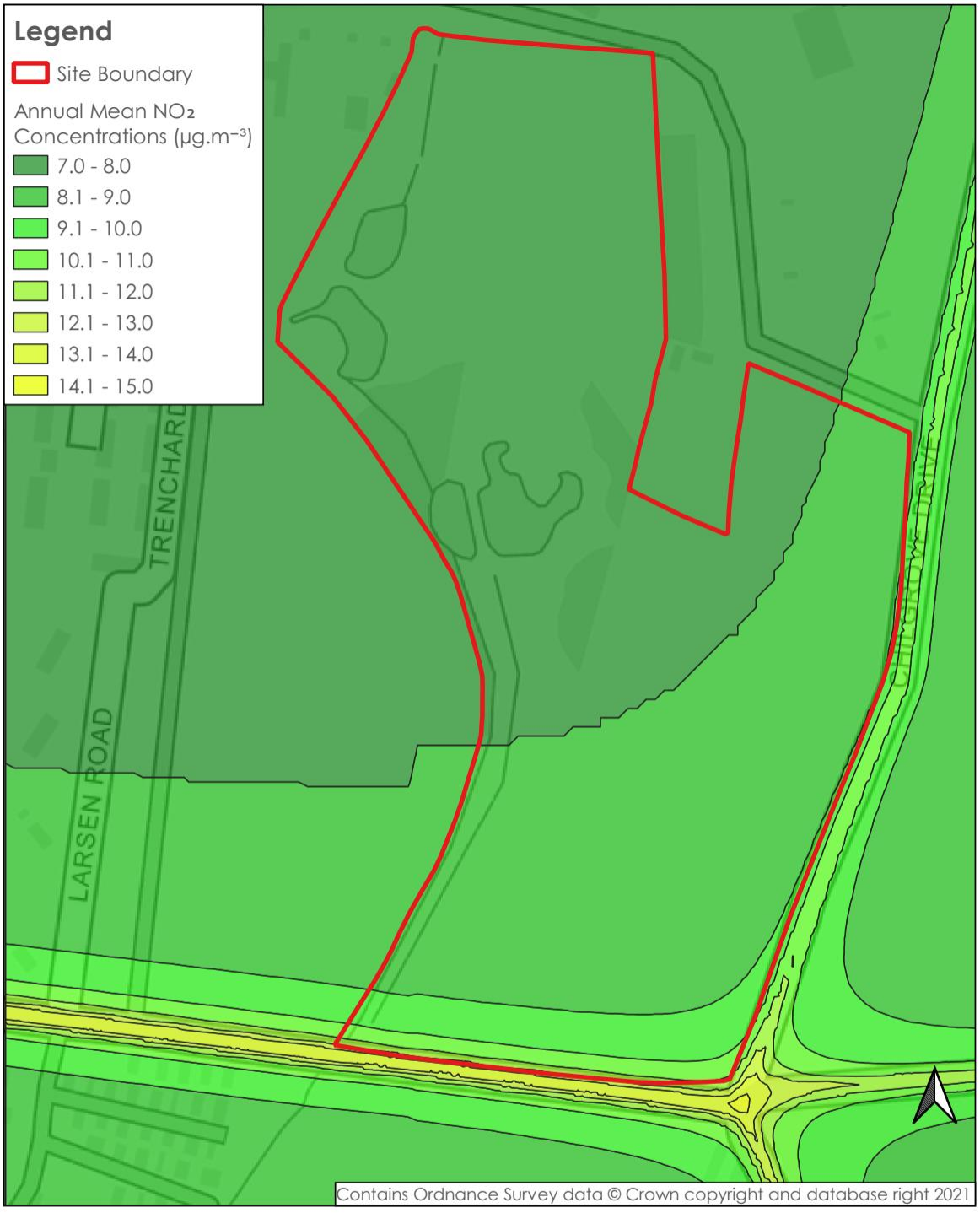


Figure 6.1: Annual Mean NO_2 Concentrations at the Site

Drawn by: JH
Date: 30/11/2021

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

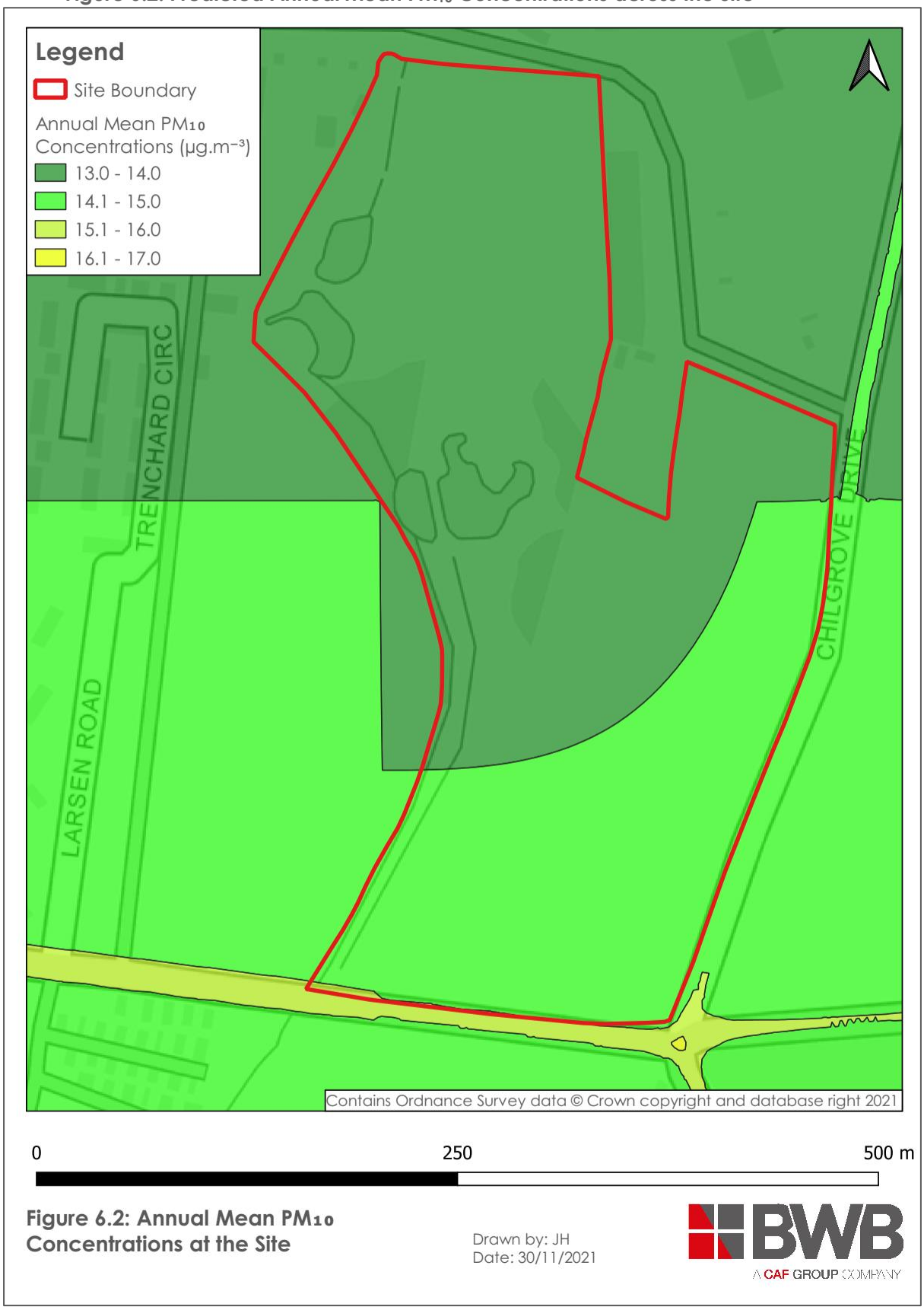

Figure 6.2: Annual Mean PM_{10} Concentrations at the Site

Drawn by: JH
Date: 30/11/2021

BWB
A CAF GROUP COMPANY

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

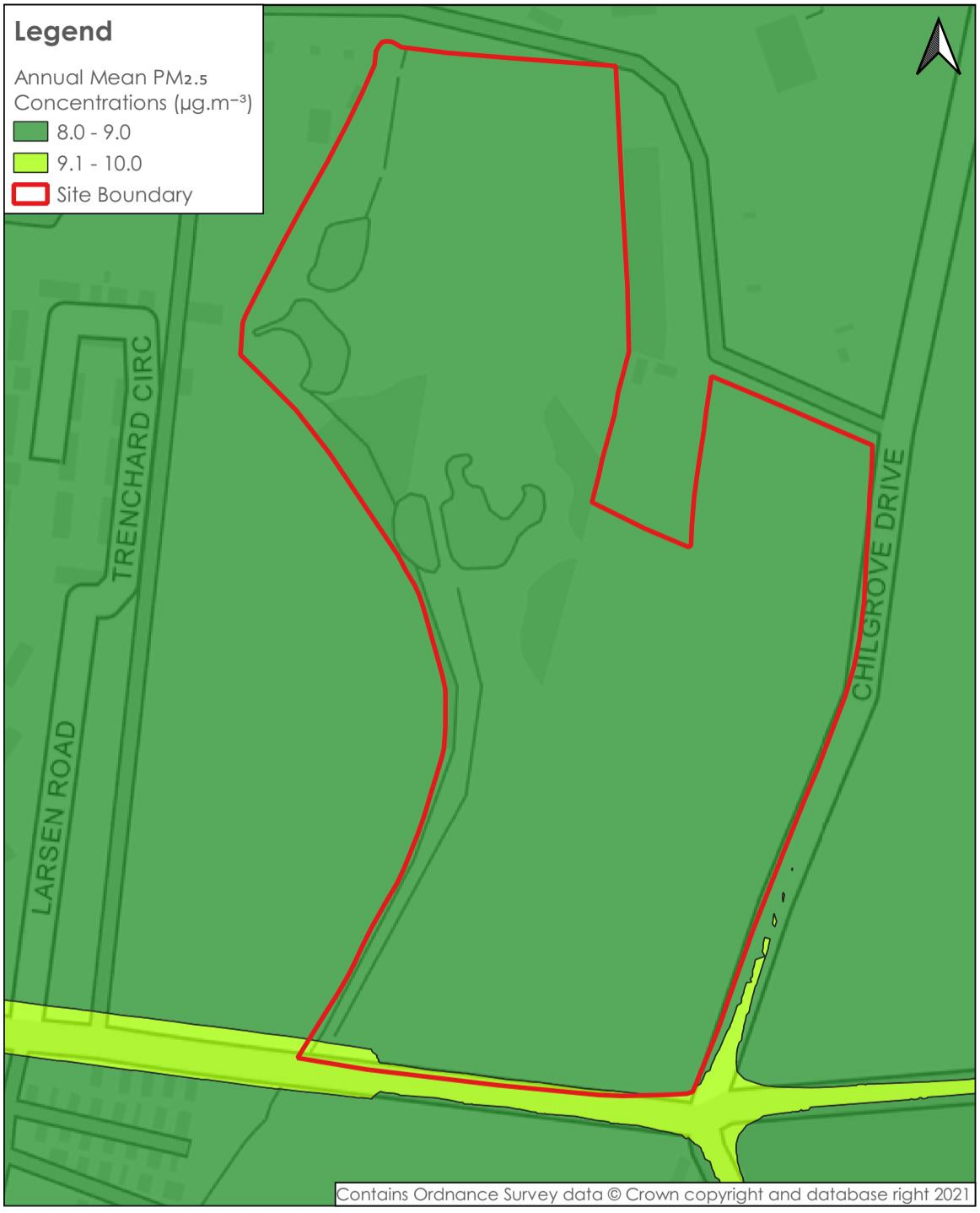

Figure 6.3: Annual Mean $PM_{2.5}$ Concentrations at the Site

Drawn by: JH
Date: 30/11/2021

A CAF GROUP COMPANY

6.14 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 4: 2023 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2023 with the development in place.

6.15 With regard to short term air quality objectives for NO_2 and PM_{10} at the residential development, the predicted annual mean NO_2 concentrations are less than 60µg.m^{-3} and therefore in accordance with Defra guidance[10] it may be assumed that exceedance of the 1-hour mean NO_2 objective are unlikely. The calculation detailed in paragraph 3.11 was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

Mitigation

6.16 The proposed development will result in minimal increases in pollutant concentrations and no new exceedances of the relevant air quality objectives are predicted.

6.17 Whilst the proposed development is not considered to significantly influence local air quality, a Travel Plan will be submitted with the planning application which includes the following measures that will further reduce road traffic emissions associated with the Site:

- A Travel Plan Co-ordinator (TPC) will be appointed for the proposed development and will be responsible for the overall management and implementation of the Travel Plan.
- Each household will be provided with a Travel Pack detailing information regarding sustainable travel information.
- Cycling will be encouraged by the provision of on-plot cycle storage and maps of local cycle routes.
- Walking will be promoted by the provision of a map of local walking routes.
- Public transport use will be promoted through the provision of detailed public transport information including timetables and fares in Travel Packs and each dwelling will be provided with public transport vouchers.
- Car sharing will be encouraged.

6.18 In addition, each dwelling will be provided with an Electric Vehicle charging point, further reducing the road traffic emissions associated with the operation of the proposed development.

7. CONCLUSION

7.1 An air quality impact assessment was undertaken for the proposed residential-led development located at land off Camp Road in Upper Heyford.

7.2 A qualitative construction phase assessment was undertaken and measures were recommended for inclusion in a DMP to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance[11].

7.3 A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on local air quality at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[10]. The development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the development on local air quality was predicted to be 'negligible' in accordance with IAQM and EPUK guidance[12].

7.4 Pollutant concentrations were also predicted across the proposed development Site. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were all predicted to be below the relevant air quality objectives and therefore the Site was considered to be suitable for the proposed residential use with regard to air quality.

7.5 Mitigation measures will be incorporated into the Site to minimise emissions associated with the operation of the proposed development.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Term	Definition
AADT	Annual Average Daily Traffic flow.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
EPUK	Environmental Protection UK.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles (HGVs + buses and coaches)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX B: PROPOSED DEVELOPMENT MASTERPLAN

PLANNING

Site boundary *(11.68ha)*

Hybrid/mixed application for upto 1,235 dwellings; retail; medical centre; employment; schools; community use buildings; indoor sports provision; energy facilities; 30m high observation tower with zip-wire; changes of use and demolition to existing buildings; open space; sports facilities; green infrastructure; and upgrades to Chilgrove Drive and the junction with Camp Road
(18/00825/HYBRID)
Status: Outline Approval

1. Full application for 89 dwellings
(15/01357/F)
Status: Undetermined

2. Outline application application for up to 31 dwellings
(21/03523/OUT)
Status: Undtermined

1. Proposed vehicular and pedestrian access via Camp Road
2. Proposed pedestrian/cycle connection to Camp Road
3. Proposed pedstrian/cycle connection to Chilgrove Drive
4. Primary tree lined street with foot/cycleway
5. Secondary street
6. Shared surface
7. Linked private drive
8. Private drive/lane
9. Proposed footpaths/recreational routes
10. Central green space to act as focal point with playspace (LAP)
11. Playspace (LEAP)
12. 'Wet corridor' public open space to provide ecological enhancement and recreation benefits
13. Attenuation basins
14. Existing ponds
15. Existing vegetation retained and enhanced as necessary with locally characteristic and native species
16. Proposed hedgerow strengthening the field pattern by planting up gappy existing hedges
17. Proposed native wet woodland
18. Proposed native tree belts around airfield to enhance urban fringe and reduce the the visual impact using locally characteristic and native species
19. Proposed scattered clusters of native tree planting to give impression of linear tree belt to enhance urban fringe and softening of built form

Rev.	Date	Description

Land north of Camp Road
HEYFORD PARK

Illustrative Masterplan

Job ref:	Drawing number:	Revision:
374	P06	-

Scale:	Date:
1:2,000 @ A3	December 2021

0 50 100 150 200 m

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APPENDIX C: PLANNING POLICY AND LEGISLATION

National Legislation and Planning Policy

The UK Air Quality Strategy

European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework.

The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[5] and was most recently reviewed and updated in 2007[6]. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

The Environment Act 2021[4] was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995[3] with regard to the Local Air Quality Management regime. Under the Environment Act 2021[4], the Secretary of State must lay a statement before Parliament setting out progress made in meeting air quality objectives and standard in England and steps taken towards achieving the standards. The Environment Act 2021[4] also places responsibility on local authorities to co-operate with air quality partners in the preparation of Air Quality Action Plans and identification of measures which should be monitored within the Plan and dates by which they should be implemented.

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

National Planning Policy Framework

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

The NPPF[7] recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *[…]*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

[…]

Ground conditions and pollution

[…]

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.
[…]
Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

With regard to assessing cumulative effects the NPPF[7] states:

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

[...]"

Planning Practice Guidance

The Planning Practice Guidance (PPG) for air quality[8] was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

The PPG[7] sets out the following with regard to air quality and planning:

- *"What air quality considerations does planning need to address;*
- *What is the role of plan-making with regard to air quality;*
- *Air quality concerns relevant to neighbourhood planning;*
- *What information is available about air quality;*

- *When could air quality considerations be relevant to the development management process;*
- *What specific issues may need to be considered when assessing air quality impacts;*
- *How detailed does an air quality assessment need to be; and*
- *How can an impact on air quality be mitigated".*

The PPG[8] sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.

The PPG[8] states that development plans may need to consider:

- *"what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*
- *the impact of point sources of air pollution (pollution that originates from one place);*
- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
- *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
- *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement".*

The PPG[8] also states what may be considered relevant to determining a planning application and these include whether a development would:

- *"Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or*

extraction systems (including chimneys) which require approval or permits under pollution control legislation;

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value".*

The PPG[8] 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

Cherwell District Council, The Cherwell Local Plan 2011 - 2031 (2015)

The Cherwell Local Plan was adopted in July 2015 and sets out the policies for development in Cherwell up until 2031. The following policy relates to air quality:

"Policy ESD 10 Protection and Enhancement of Biodiversity and the Natural Environment

Protection and enhancement of biodiversity and the natural environment will:
be achieved by the following:
[…]

- *Air quality assessments will also be required for development proposals likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution*

[...]"

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

APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

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

Road Link	Speed	Scenario 1: 2019 Verification Year		Scenario 2: 2021 Base Year		Scenario 3: 2023 Opening Year Without Development		Scenario 4: 2023 Opening Year With Development	
	Km.hr^{-1}	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
Camp Road , West of Site Access	40	6,156	388	6,404	404	7,612	516	8,074	523
Camp Road , East of Site Access	40	4,996	281	5,197	292	6,401	416	7,438	430
Unnamed Road, East of Chilgrove Drive	48 / 96*	2,202	189	2,289	196	3,591	458	4,262	467
B430, Ardley Road,	48 / 64 / 96*	8,961	497	9,312	517	9,566	531	9,566	531
B430 Station Road	64 / 96*	13,607	683	14,140	710	16,203	932	16,874	942
Somerton Road	48	1,462	44	1,519	46	1,560	47	1,560	47
Unnamed Road, South of Camp Road	48 / 96*	3,878	143	4,030	149	4,908	235	5,275	240
Chilgrove Drive	48	0	0	0	0	2,133	520	2,133	520
M40 Motorway,	112	120,806	17,229	125,665	17,922	129,093	18,411	129,093	18,411

* Indicates the road link was spilt to represent a change in speed limit

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

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

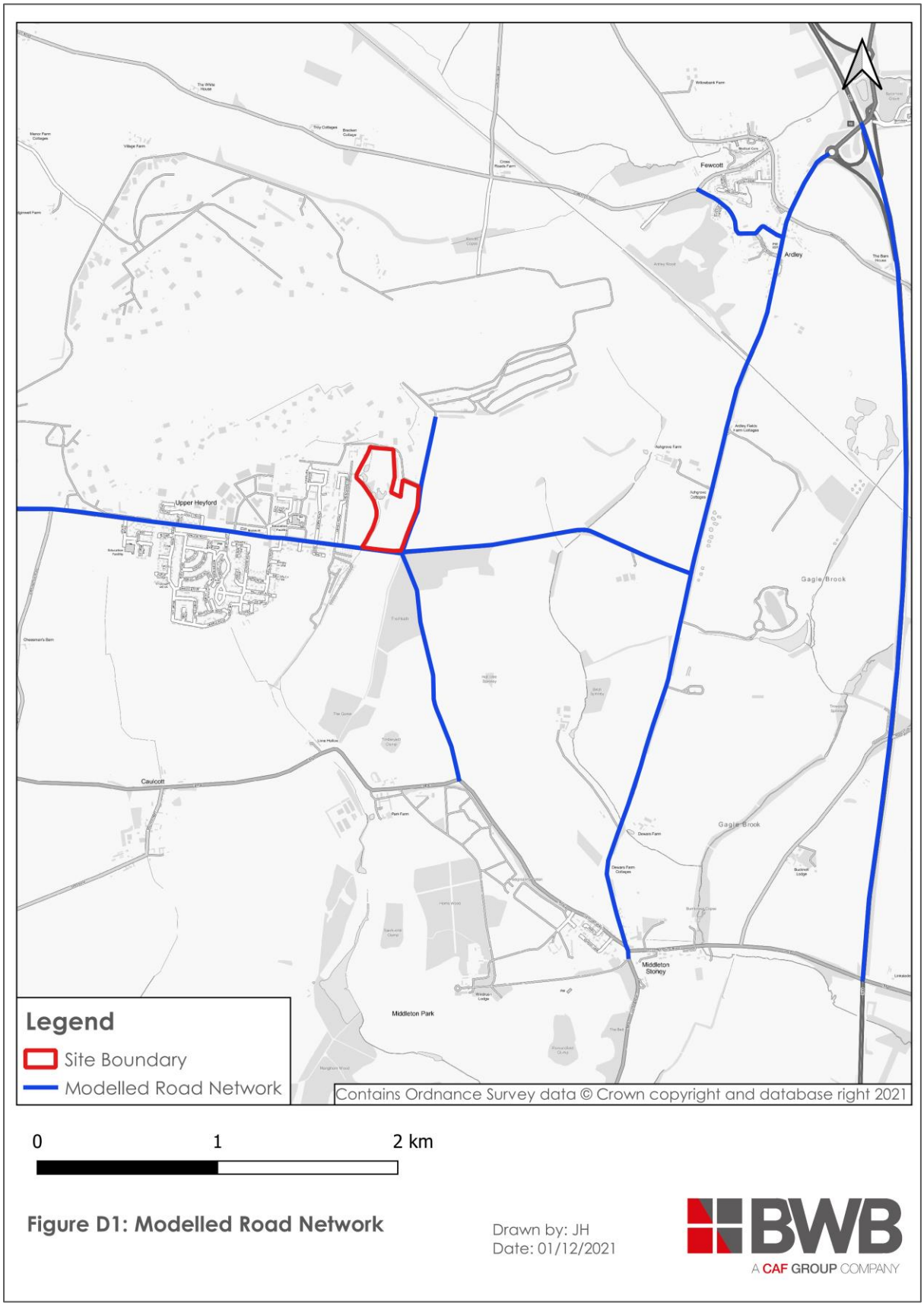

Figure D1: Modelled Road Network

Drawn by: JH
Date: 01/12/2021

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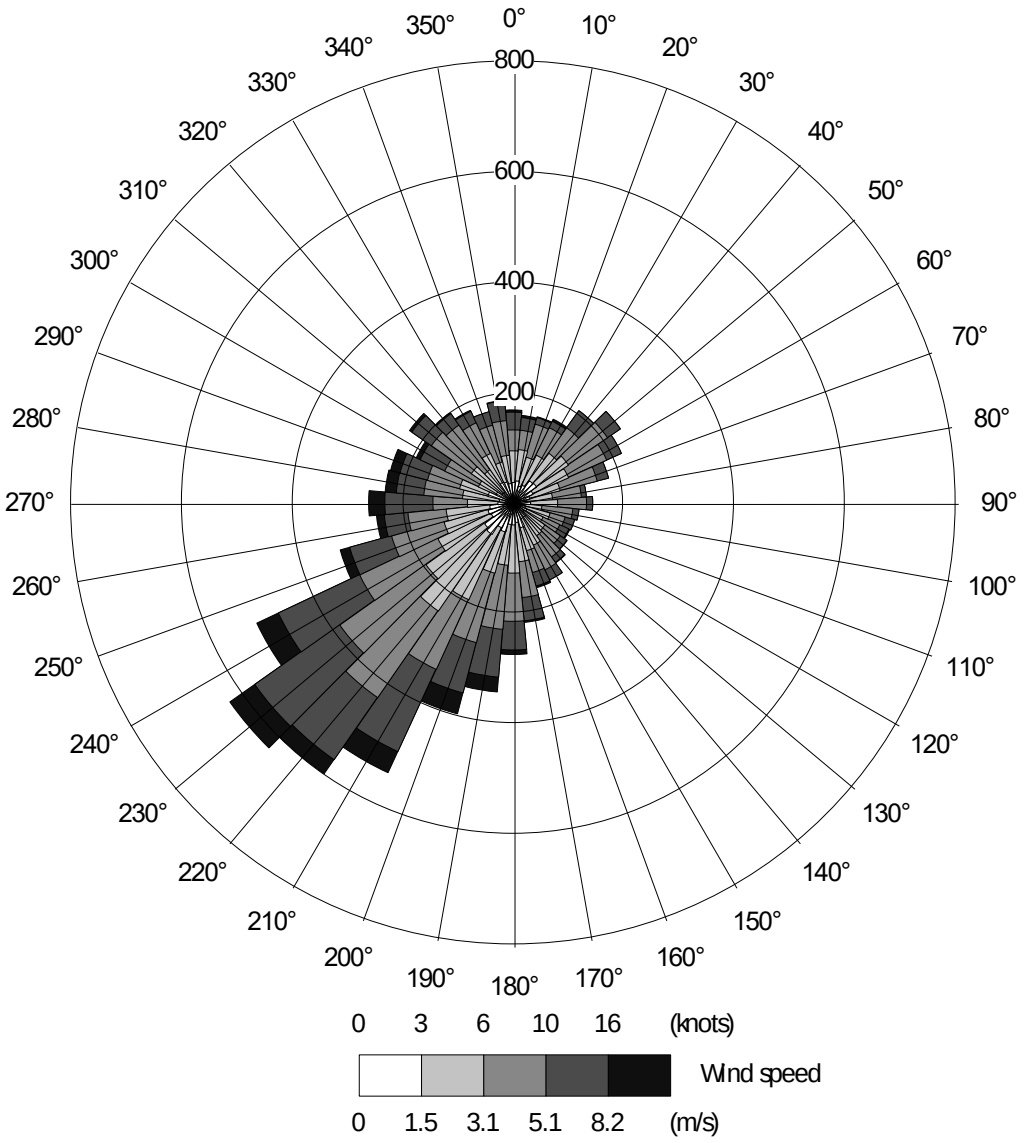
APPENDIX E: WIND ROSE FOR 2019 FOR WESTON-ON-THE-GREEN METEOROLOGICAL RECORDING STATION

Meteorological data for 2019 Verification Year scenario for the Weston-on-the-Green recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2019 is detailed below and illustrates a predominant wind direction from the south-west.



APPENDIX F: MODEL VERIFICATION

Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

The model was run for Scenario 1: 2019 Verification Year to predict the 2019 annual mean road contributions of NOx at the monitoring locations in the study area. The model NOx outputs at this location were compared to the 2019 monitored concentrations to provide adjustment factors. **Table F1** presents the verification process for NOx. **Figure F1** detailed the monitoring locations utilised in the model verification.

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

Table F1: NOx Verification Process

Model Verification Steps	Camp Rd 2014	Ardley
2019 monitored total NO_2 ($\mu g.m^{-3}$)	13.6	24.4
2019 background NO_2 concentration ($\mu g.m^{-3}$)	8.2	16.2
Monitored road contribution NOx ($\mu g.m^{-3}$)	9.8	15.6
Modelled road contribution NOx ($\mu g.m^{-3}$)	14.5	17.6
Ratio of monitored road NOx to modelled road NOx	0.7	0.9
Adjustment factor for modelled road contribution NOx	**0.80111**	
Adjusted modelled road contribution NOx ($\mu g.m^{-3}$)	11.6	14.1
Modelled total NO_2 concentration ($\mu g.m^{-3}$)	14.6	23.6
Monitored total NO_2 concentration ($\mu g.m^{-3}$)	13.6	24.4
% difference between modelled and monitored total NO_2 concentration	6.7	-3.2
RMSE % (should be less than 25% and ideally less than 10%)	2.2	

** Road-NOx component, determined from NOx to NO_2 calculator*

A road-NOx factor of **0.80111** was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. To provide a conservative assessment a factor of 1.0 was applied to the modelled road-NOx concentrations at each receptor and across the Site, before conversion to NO_2 concentrations using the NOx to NO_2 calculator provided by Defra and the adjusted NO_2 background concentration.

Statistical analysis undertaken for the results in **Table F1** demonstrate that the RMSE is within the acceptable range. Given the number of monitoring sites in the study area and the extent of the modelled road network, the RMSE value is considered to represent an acceptable level of average uncertainty within the air quality model.

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

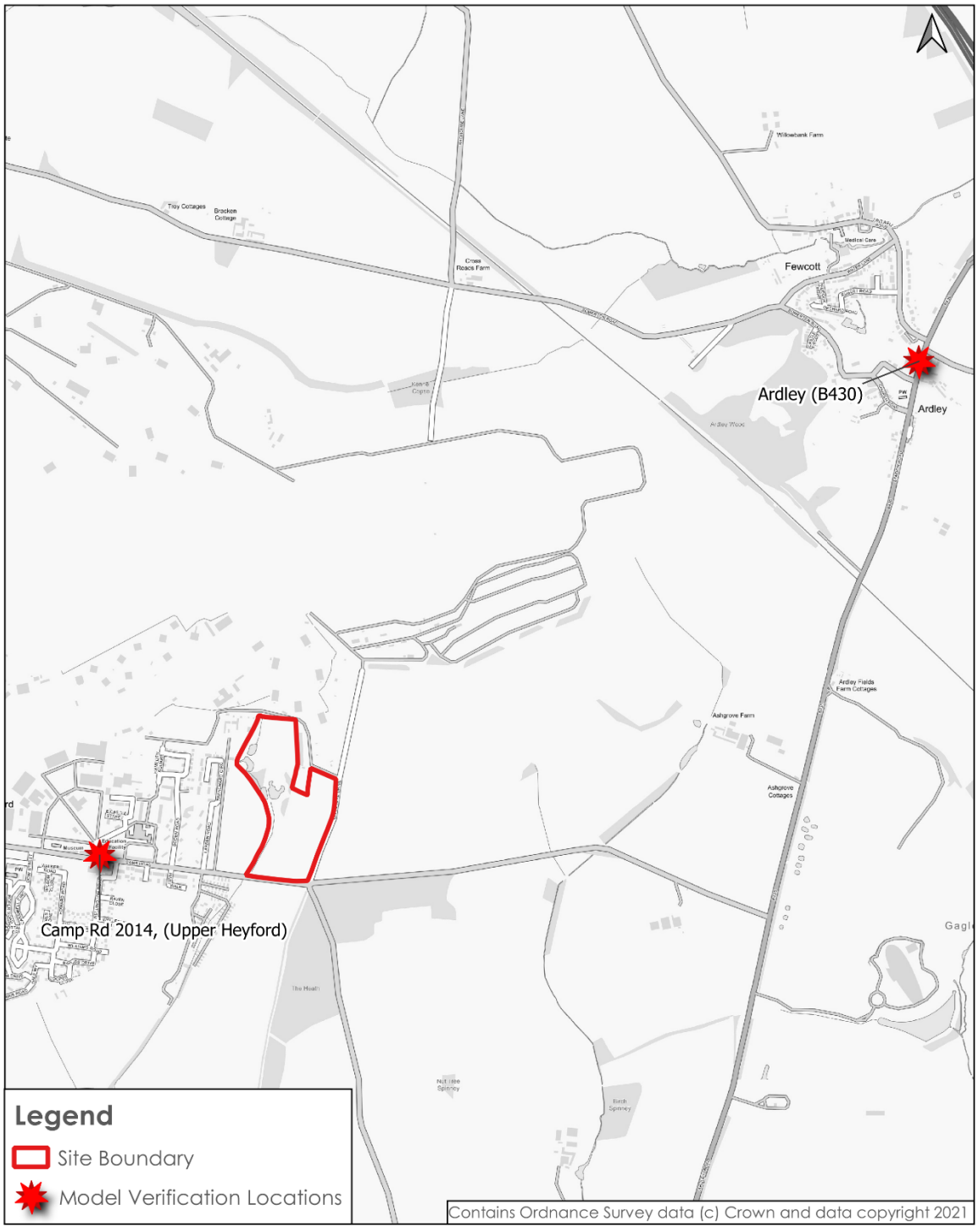


Figure F1: Model Verification Locations

Drawn by: ReS
Date: 01/12/2021

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