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ENVIRONMENT

Hargreaves Land Limited
Planning Application 1 at Lincolnshire Lakes (North)
Scunthorpe
Air Quality Assessment

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Air Quality Assessment

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Notice

EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Hargreaves Land Limited to undertake an air quality assessment for a residential-led mixed use development at Lincolnshire Lakes, Scunthorpe.

The Site is located within the administrative area of North Lincolnshire Council. The Site is not located within an existing Air Quality Management Area.

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

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

Based on the assessment results, the impact of the Proposed Development with regards to the current relevant air quality objectives was considered to be not significant. Measures included as part of the Proposed Development which may be beneficial to air quality include a Travel Plan and Electric Vehicle Charging.

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1. INTRODUCTION

1.1 BWB Consulting Limited (BWB) was instructed by Hargreaves Land Limited (the Client) to undertake an air quality assessment for a proposed residential-led mixed use development ('the Proposed Development') at Lincolnshire Lake, Scunthorpe ('the PA#1 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 PA#1 Site to determine the suitability of the PA#1 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**.

PA#1 Site Setting

1.4 The PA#1 Site is located east of the M181/A1077(M) and lies within the administrative area of North Lincolnshire Council (NLC). **Figure 1.1** details the location of the Proposed Development. The PA#1 Site is not located within an existing Air Quality Management Area (AQMA), however the Scunthorpe AQMA is located approximately 2.8km east of the PA#1 Site which was declared by NLC for potential exceedances of the 24 hour PM_{10} air quality objective in 2005 and the AQMA was reduced in 2018. The location of the AQMA in relation to the PA#1 Site is shown in **Figure 1.1**.

1.5 The PA#1 Site currently comprises agricultural land. The northern boundary is bound by existing woodland. The eastern boundary is bounded by existing open fields with woodland further east and the town of Scunthorpe. The southern boundary is bounded by agricultural land and land south of the existing Brumby Common Lane which horizontally dissects the Lincolnshire Lakes Site from Scotter Road to the east and a bridge over the M181 to the west. The western boundary is bounded by the M181 / A1077 Motorway and a roundabout that has recently been constructed with vehicular access provided into the PA#1 Site.

1.6 Principal air pollution sources in the vicinity of the PA#1 Site are likely to comprise road traffic emissions from the M181/A1077(M).

Proposed Development

1.7 The Proposed Development comprises a hybrid planning application as detailed below:

- Full planning application for the construction of a new vehicular access off the M181/A1077(M) roundabout, a pedestrian and cycle link to Scotter Road, a foul pumping station, earthworks and 'off-plot' drainage, ecological and associated landscaping and infrastructure works.

- Outline planning application, with all matters reserved, for the development of up to 550 residential dwellings (Use Class C3), a local centre (Use Class E) and associated 'on-plot' landscaping, drainage and other infrastructure works

1.8 The Proposed Development masterplan is detailed in **Appendix B**.

Figure 1.1: PA#1 Site Location

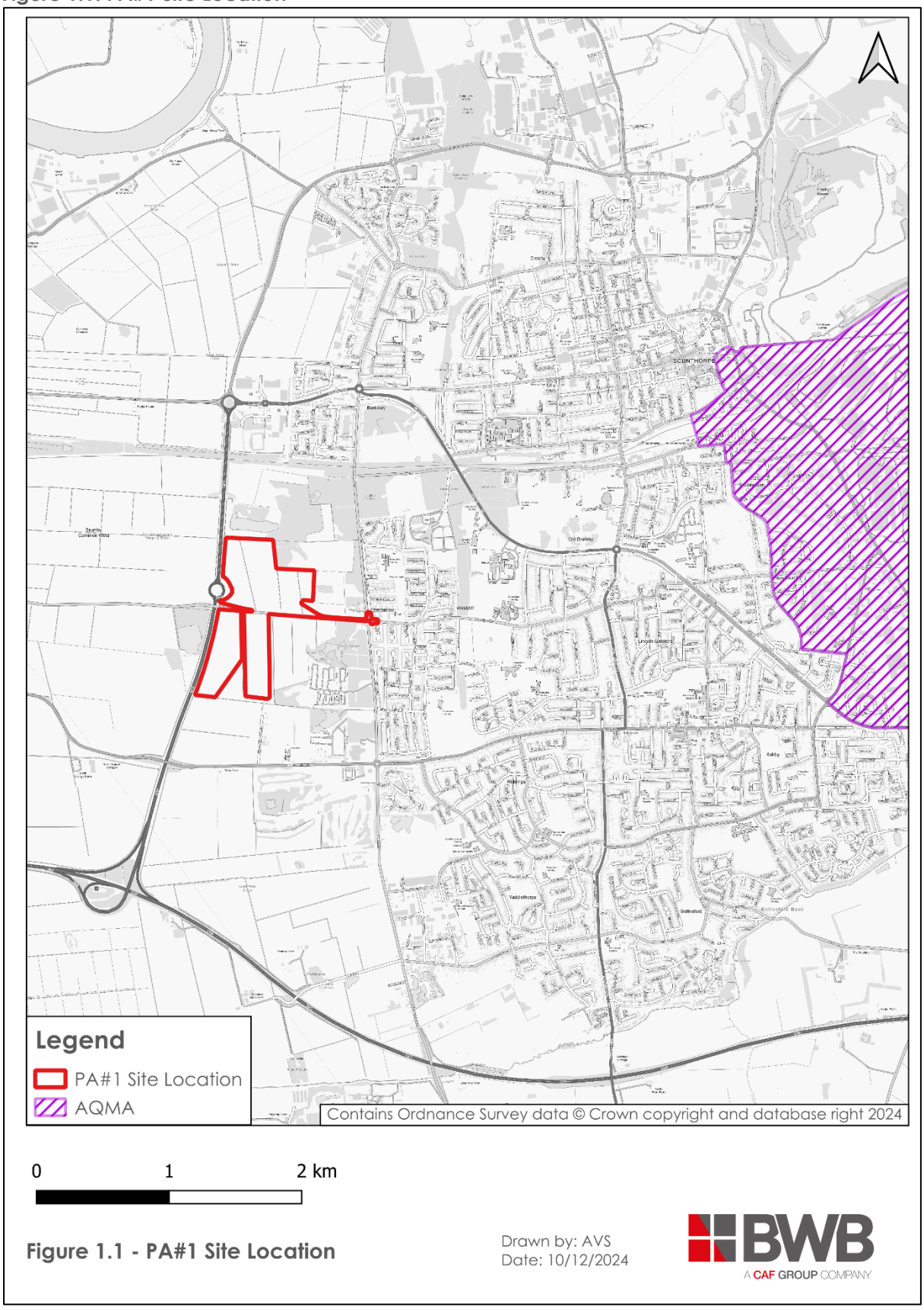

Figure 1.1 - PA#1 Site Location

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2. LEGISLATION, PLANNING POLICY & GUIDANCE

National Legislation and Planning Policy

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

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

Local Planning Policy

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

- North Lincolnshire Local Development Framework Core Strategy[14];
- North Lincolnshire Council, Saved Policies of the North Lincolnshire Local Plan 2003[15]; and

[1] European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe
[2] HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO
[3] HMSO (1995) The Environment Act 1995, London: TSO
[4] HMSO (2021) The Environment Act 2021, London: TSO
[5] HMSO (2002) Statutory Instruments 2002 No. 3043, The Air Quality (England) (Amendment) Regulations 2002, London: HMSO
[6] HMSO (2010) Statutory Instruments 2010 No. 1001 Air Quality Standards Regulations 2010. London: HMSO
[7] Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO
[8] Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO
[9] Department for the Environment, Food and Rural Affairs (Defra) (2023) Air Quality Strategy: Framework for Local Authority
[10] Department of the Environment, Food and Rural Affairs (Defra) (2020) The Environment (Miscellaneous Amendments) (EU Exit) Regulations, London: HMSO
[11] HMSO (2023) Statutory Instruments 2023 No. 96 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023
[12] Ministry of Housing, Communities & Local Government (2024) National Planning Policy Framework, HMSO London
[13] Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality
[14] North Lincolnshire Council (2011) Local Development Framework Core Strategy
[15] North Lincolnshire Council (updated October 2024) Saved Policies of the North Lincolnshire Local Plan 2003

- North Lincolnshire Council, Lincolnshire Lake Area Action Plan (2016)[16]

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(22)) (2022)[17];
- Defra, $PM_{2.5}$ Targets: Interim Planning Guidance (2024)[18];
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (2024)[19]; and
- 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)[20].

[16] North Lincolnshire Council (2016) Lincolnshire Lakes Area Action Plan
[17] Defra (2022) Local Air Quality Management Technical Guidance LAQM.TG(22)
[18] Defra (2024) $PM_{2.5}$ Targets: Interim Planning Guidance
[19] Institute of Air Quality Management (2024) Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, London
[20] 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

3. METHODOLOGY

Consultation with North Lincolnshire Council

3.1 Consultation was undertaken with the Environmental Protection department at NLC via email on 14th November 2024. A response was received 9th December 2024 agreeing to the proposed methodology outlined below:

- Construction Phase – A construction phase dust assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)[19].
- 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 PA#1 Site. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM_{10} and $PM_{2.5}$) at identified existing receptor locations for both without and with development scenarios. The change in pollutant concentrations as a result of development-generated traffic was then calculated. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG22)[17] and IAQM and Environmental Policy Implementation Community (previously Environmental Protection UK) (EPIC)[20] guidance. Pollutant concentrations were predicted across the PA#1 Site to consider the suitability of the PA#1 Site for residential use.

3.2 Full details of the methodology used in the assessment, as agreed with NLC, 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[19].

3.4 The full assessment methodology is not reproduced within this report but a summary of the assessment steps as detailed within the IAQM guidance[19] are provided below:

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

Operational Phase Road Traffic Emissions – Detailed Assessment

Air Dispersion Modelling

3.5 The air dispersion model ADMS-Roads, version 5.0.1.3 was utilised in the assessment to predict concentrations of NOx, PM_{10} and $PM_{2.5}$ at existing receptors and across the PA#1 Site.

3.6 The assessment was undertaken in accordance with Defra LAQM.TG(22)[17] and IAQM and EPIC (previously EPUK) guidance[20].

Assessment Scenarios and Traffic Data

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

- Scenario 1: 2022 Verification Year;
- Scenario 2: 2024 Base Year;
- Scenario 3: 2027 Opening Year without development; and
- Scenario 4: 2027 Opening Year with development.

3.8 A sensitivity analysis was also undertaken to consider the committed 2500 dwelling development (PA/2015/0396) located to the south of the Site and forms part of the wider Lincolnshire Lakes Site, the committed development hereafter to referred to as Maltgrade. As such, the following scenarios were also considered:

- Scenario 5: 2027 Opening Year without development - Sensitivity; and
- Scenario 6: 2027 Opening Year with development - Sensitivity.

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 BWB Consulting, 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:

3.10 Traffic data used in the air dispersion modelling are provided in **Appendix C**.

ADMS-Roads Model Inputs

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

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

Parameter	Input
Emission factors	Emission factors were utilised from the Defra Emission Factor Toolkit[21] (EFT), version 12.1, for the years of assessment (2022, 2024 and 2027).
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[22], version 9.1.
Meteorological data	Hourly sequential meteorological data for the verification year of assessment (2022) were obtained for the Humberside recording station which is considered to be the closest and most representative station. The wind rose for 2022 is provided in **Appendix D.**
Surface roughness and Monin-Obukhov length (MO) – Site	A surface roughness of 0.5m and an MO length of 10m were utilised in the air dispersion model to represent conditions at the Site and within the Study area on the edge of an urban area.
Surface roughness and Monin-Obukhov length (MO) – Meteorological Station	A surface roughness of 0.3m and an MO length of 10m were utilised in the air dispersion model to represent the rural conditions at the meteorological station.
Background pollutant concentrations	Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ for the study area were obtained from the pollutant concentration maps[23] provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2022, 2024 and 2027).
Model verification	Model verification was undertaken using NLC monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix E**.
Calculation of short term PM_{10} concentrations	The following calculation, as detailed in Defra guidance[17], was utilised to calculate the number of exceedances of the 24-hour mean PM_{10} air quality objective: *Number of 24-Hour Mean Exceedance = -18.5 + 0.00145 * Annual Mean³ + (206 / Annual Mean)*

Receptor Locations

Existing Sensitive Receptors

3.12 Existing receptor locations were identified within close proximity of the road links detailed in paragraph 3.9 and considered in the operational phase road traffic emissions assessment. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the

[21] Defra (2024) Emission Factor Toolkit [https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html]
[22] Defra (2024) NOx to NO_2 Calculator [https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc]
[23] Defra (2024) background pollutant concentration maps [https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021]

identified existing receptor locations for the assessment scenarios detailed in paragraph 3.7. Where possible the closest receptors to those road links were considered, as these receptors are likely to experience the greatest change in pollutant concentrations as a result of the Proposed Development. Receptor heights were modelled at 1.5m to represent the average breathing height of adults at ground floor at residential receptors and 0.8m to represent the lower than average breathing height of children at OneSchool Global Ridgeway Campus.

3.13 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	486747	411114	Residential receptor along Fillingham Close	1.5
R2	486898	411108	Residential receptor along Edgemere	1.5
R3	487238	411088	Residential receptor along Scotter Road	1.5
R4	487622	411050	Residential receptor along A18 Kingsway	1.5
R5	487879	410804	Residential receptor along Cliff Closes Road	1.5
R6	488131	410277	OneSchool Global Ridgeway Campus	0.8
R7	487244	410193	Residential receptor along Purbeck Road	1.5
R8	487274	409557	Residential receptor along Scotter Road	1.5
R9	487328	409413	Residential receptor along Scotter Road	1.5
R10	487381	408746	Residential receptor along Scotter Road	1.5
R11	486003	409181	Residential receptor along M181	1.5
R12	486935	412738	Residential receptor along Ferry Road West	1.5

Figure 3.1: Existing Receptor Locations

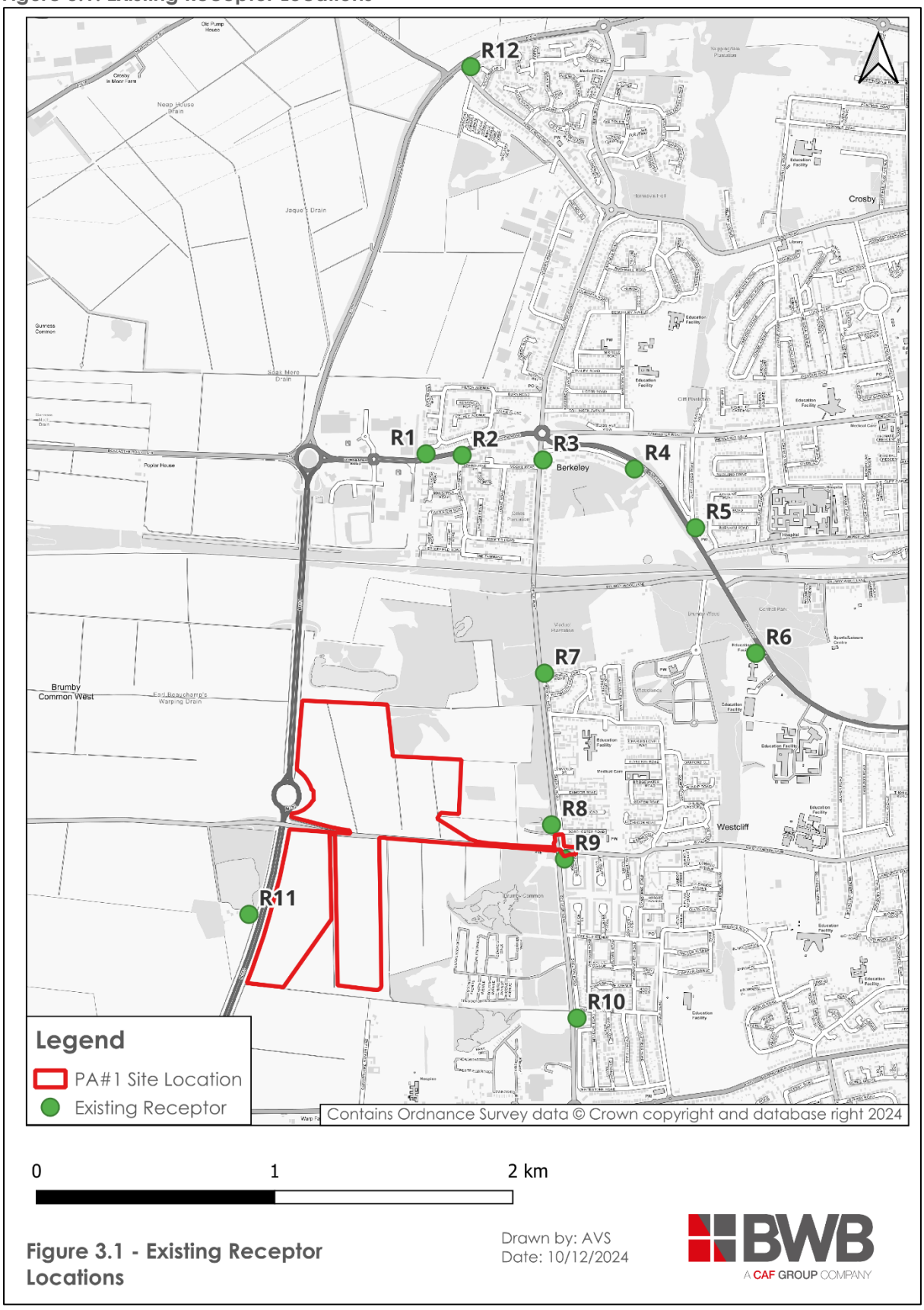

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Figure 3.1 - Existing Receptor Locations

Proposed Receptor Locations

3.14 Pollutant concentrations were predicted across the PA#1 Site to consider exposure of future residents of the Proposed Development to air quality. A Cartesian grid from minimum X 485125, Y 408521 to maximum X 487749, Y 410625, modelled at a height of 1.5m to represent average breathing height at ground floor, was included to predict pollutant concentrations across the PA#1 Site to consider its suitability for the proposed sensitive end use.

Limitations and Assumptions

3.15 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.

3.16 The assessment is based on traffic data provided by BWB Consulting, the Transport Consultants for the project. As such any assumptions made by the transport consultants will also influence the air quality assessment.

3.17 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[21] to provide the most up to date estimate of current and future emission projections.

3.18 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.

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

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

Assessment Criteria

3.21 Predicted pollutant concentrations were compared to the current relevant air quality objectives for England[7]. The current relevant air quality standards and objectives are detailed in **Table 3.3**.

Table 3.3: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective ($\mu g.m^{-3}$)	Date to Achieve by
NO_2	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM_{10}	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
$PM_{2.5}$	Annual Mean	20	1 January 2020
	Annual mean interim target as detailed within the Environmental Improvement Plan[24]	*12*	*31 January 2028*
	Annual mean	*10*	*31 December 2040*

Italics notes future objective

3.22 Guidance is provided by the IAQM and EPIC (previously EPUK)[20] to determine the significance of the impact of development-generated road traffic emissions on local air quality. The impact descriptors at receptor locations are detailed in **Table 3.4.** These impact descriptors consider the predicted magnitude of change in pollutant concentrations and the concentration in relation to the current relevant air quality objectives.

Table 3.4: Impact Descriptors for Individual Receptors

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

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

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

3.23 In accordance with IAQM and EPIC (previously EPUK) guidance[20], 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.

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

3.24 Defra is developing guidance in relation to the new targets for $PM_{2.5}$ to be considered in planning. The new guidance will require planning applications to consider how the development will reduce population exposure to $PM_{2.5}$ from design stage. At the time of writing, the planning guidance has not been published (expected to be published in 2025). An interim guidance[18] has been published by Defra, which advises planning applications to consider the following:

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

3.25 Consideration to the interim guidance[18] has therefore been included within the assessment.

4. BASELINE CONDITIONS

Local Air Quality Management

4.1 The PA#1 Site is not located within an existing AQMA. The Scunthorpe AQMA is located approximately 3km east of the PA#1 Site, which was declared by NLC for potential exceedances of the 24-hour PM_{10} air quality objective in 2005 and the AQMA was reduced in 2018. This is likely due to the nearby steelworks in this location.

Local Air Quality Monitoring

Nitrogen Dioxide

4.2 NLC undertakes monitoring of NO_2 across its authority using automatic monitors and diffusion tubes. The closest of these to the PA#1 Site is the diffusion tube DT24 which is located approximately 1km to the south of the PA#1 Site along Burringham Road.

4.3 Bias adjusted NO_2 monitoring results, for the locations in the vicinity of the PA#1 Site, are detailed in **Table 4.1** and **Figure 4.1.** The IAQM released a position statement[25] 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. At the time of writing, 2022 data was latest year available and were included for review.

Table 4.1: NLC NO_2 Monitoring Data in 2016 – 2022

ID	Grid Reference (X,Y)	Site Type	Monitored Annual Average Concentration ($\mu g.m^{-3}$)						
			2016	2017	2018	2019	2020	2021	2022
DT2	487239, 411259	Roadside	28	24	24	24	21.5	24.6	24.3
DT3	486699, 411110	Roadside	20	22	19.0	18.0	17.5	17.2	19.8
DT4	486928, 411156	Roadside	24	22	20.0	20.0	19.0	21.0	20.7
DT24	487203, 408372	Roadside	-	-	-	-	-	17.3	15.9

- data not available. Data presented to reported precision.

4.4 Monitored annual mean NO_2 concentrations were below the current relevant air quality objectives since 2016 at all reported monitoring locations. An overall downward trend is evident, with some year on year fluctuation. All four diffusion tubes are considered representative of the PA#1 Site and study area. Diffusion tubes, DT2, DT3 and DT4 were utilised in the model verification process as shown in **Appendix E**. Whilst DT24 is reported as a roadside location in the NLC Annual Status Report[26], on review, this tube is located

[25] Institute of Air Quality Management (2021) Position Statement: Use of 2020 and 2021 Monitoring Datasets
[26] North Lincolnshire Council (2023) 2022 Annual Status Report

less than 1m from the kerb and is therefore more representative of kerbside conditions and is therefore not considered suitable in the model verification process in accordance with Defra guidance[17]. DT24 was therefore excluded from the model verification process.

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

4.5 NLC undertake monitoring of PM_{10} and $PM_{2.5}$ using automatic monitors, as shown in **Figure 4.2**. Monitored results are shown in **Table 4.2** and **Table 4.3** below. At the time of writing, 2022 data was latest year available and were included for review.

Table 4.2: NLC PM_{10} Monitoring Data in 2016 – 2022

ID	Grid Reference X,Y	Site Type	Monitored Annual Average Concentration (µg.m^{-3})						
			2016	2017	2018	2019	2020	2021	2022
CM1 (BAM)	490320, 410831	Industrial	17	16	18	20	17	17	19
CM1 (TEOM)	490320, 410831	Industrial	17	17	20	22	17	17	19
CM2	490663, 409789	Urban Background	20	18	21	22	19	22	22
CM4	491343, 408782	Industrial	17	16	20	21	22	21	20
CM5	490224, 411301	Industrial	21	19	22	21	18	19	22

Data reported to available precision

Table 4.3: NLC $PM_{2.5}$ Monitoring Data in 2016 – 2022

ID	Grid Reference X,Y	Site Type	Monitored Annual Average Concentration (µg.m^{-3})						
			2016	2017	2018	2019	2015	2021	2022
CM2	490663, 409789	Urban Background	7	6	10	7	7	6	8

Data reported to available precision

4.6 Monitored annual mean PM_{10} and $PM_{2.5}$ concentrations were below the current relevant air quality objectives are all reported locations between 2016 and 2022, with no discernible trend. Annual mean $PM_{2.5}$ concentrations at CM2 were also below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

4.7 As shown in **Figure 4.2** all these monitors are located within the AQMA and concentrations are considered to be impacted by the steelworks. It is therefore considered that these monitoring locations are not representative of the PA#1 Site and study area, and PM_{10} and $PM_{2.5}$ concentrations are anticipated to be lower than those reported in **Table 4.2** and **Table 4.3.**

Figure 4.1: NLC Diffusion Tube Locations

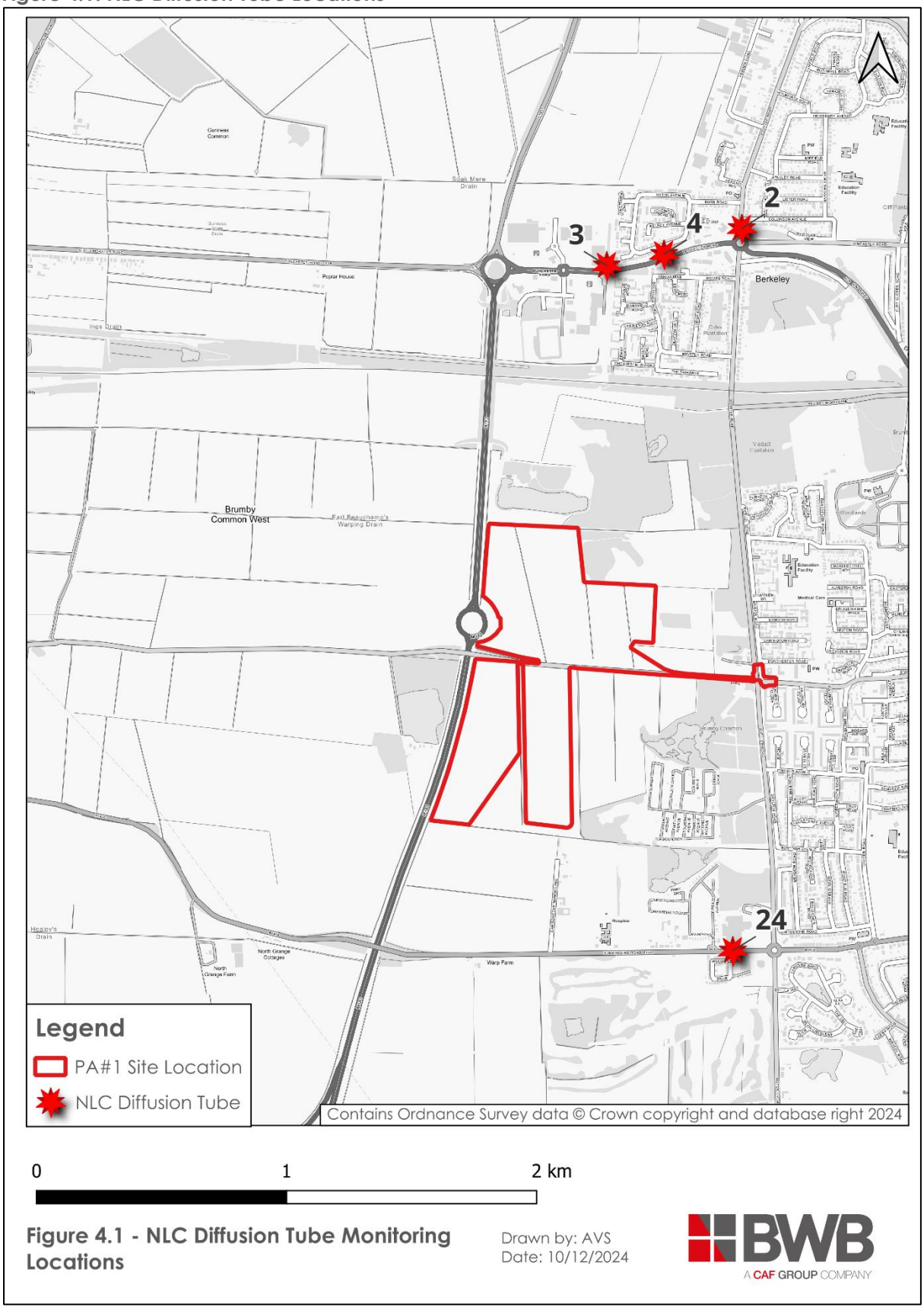

Figure 4.1 - NLC Diffusion Tube Monitoring Locations

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Date: 10/12/2024

Figure 4.2: NLC Automatic Monitor Locations

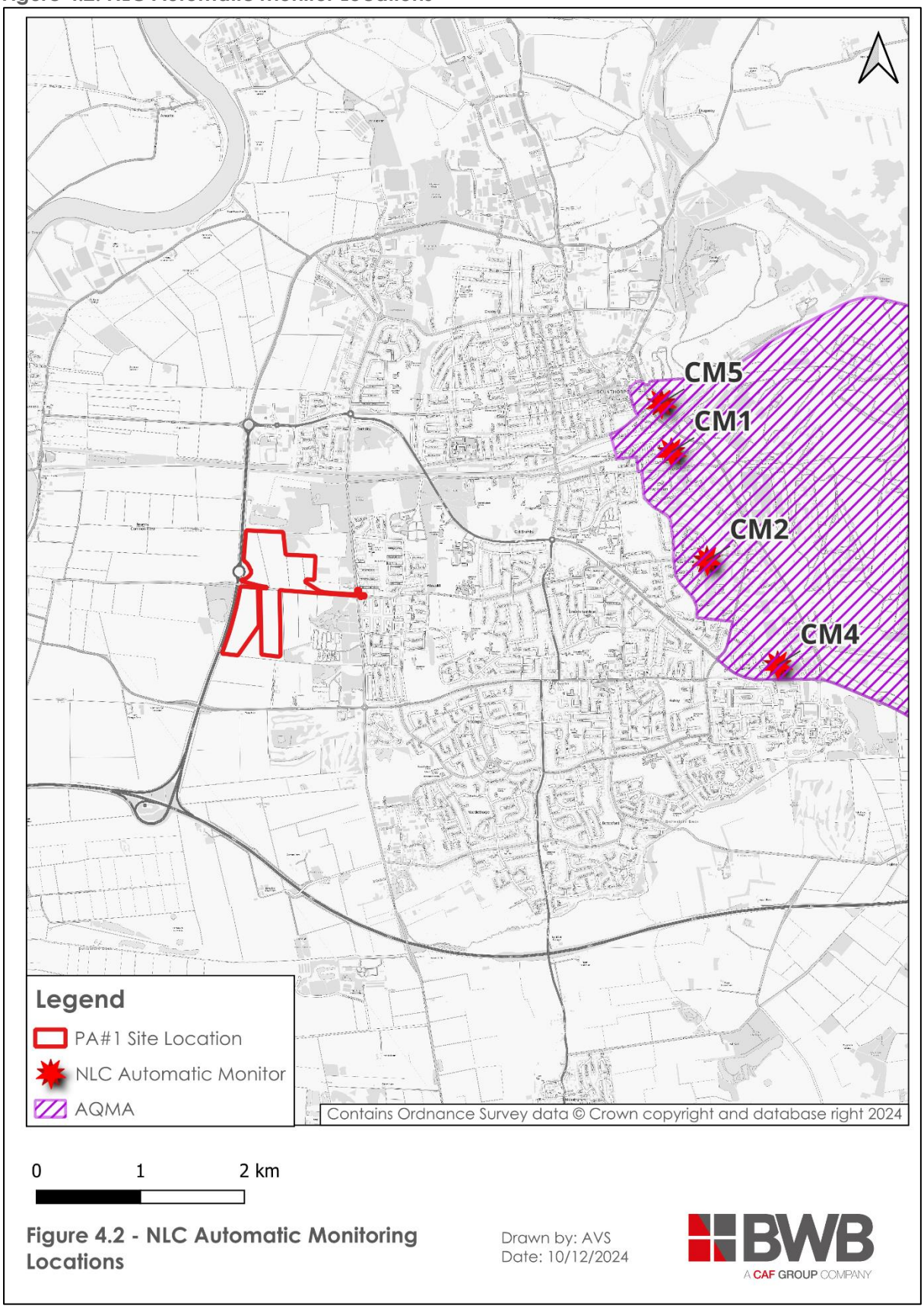

Figure 4.2 - NLC Automatic Monitoring Locations

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Background Pollutant Concentrations

4.8 No representative background air quality monitoring is undertaken by NLC within the study area. Background pollutant concentrations were therefore obtained from the latest Defra background concentration maps[23], which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2021 monitoring and meteorological data. Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ were obtained for the grid squares covering the study area for the years of assessment (2022, 2024 and 2027). The background concentrations used in the assessment are detailed in **Table 4.4.**

Table 4.4: Background Pollutant Concentrations used in the Assessment

Receptor	Grid Square	2022 Verification			2024 Baseline			2027 Opening Year Without Development		
		NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
DT2	487500, 411500	8.4	12.2	6.2	7.9	12.0	6.0	7.2	11.8	5.8
DT3	486500, 411500	7.9	14.5	6.3	7.4	14.4	6.1	6.7	14.2	5.9
DT4	486500, 411500	7.9	14.5	6.3	7.4	14.4	6.1	6.7	14.2	5.9
DT24	487500, 408500	7.6	12.2	6.1	7.2	12.1	6.0	6.5	11.9	5.8
R1	486500, 411500	7.9	14.5	6.3	7.4	14.4	6.1	6.7	14.2	5.9
R2	486500, 411500	7.9	14.5	6.3	7.4	14.4	6.1	6.7	14.2	5.9
R3	487500, 411500	8.4	12.2	6.2	7.9	12.0	6.0	7.2	11.8	5.8
R4	487500, 411500	8.4	12.2	6.2	7.9	12.0	6.0	7.2	11.8	5.8
R5	487500, 410500	7.9	12.4	6.1	7.5	12.3	6.0	6.8	12.1	5.8
R6	488500, 410500	9.3	12.1	6.2	8.7	11.9	6.1	8.0	11.7	5.9
R7	487500, 410500	7.9	12.4	6.1	7.5	12.3	6.0	6.8	12.1	5.8
R8	487500, 409500	8.0	14.5	6.4	7.5	14.5	6.3	6.9	14.3	6.1
R9	487500, 409500	8.0	14.5	6.4	7.5	14.5	6.3	6.9	14.3	6.1
R10	487500, 408500	7.6	12.2	6.1	7.2	12.1	6.0	6.5	11.9	5.8
R11	486500,409500	7.2	15.0	6.2	6.8	14.9	6.1	6.1	14.7	5.9
R12	486500, 412500	7.4	14.2	6.1	6.9	14.1	6.0	6.3	13.9	5.8

4.9 Annual mean NO_2, PM_{10} and $PM_{2.5}$ background concentrations are below the current relevant air quality objectives for 2022, 2024 and 2027. $PM_{2.5}$ concentrations are also below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

4.10 PM_{10} concentrations are higher than NO_2 at all receptor locations. This is due to a high contribution of PM_{10} from residual and secondary sources.

5. CONSTRUCTION PHASE DUST ASSESSMENT

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

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

Step 1: Screen the Need for a Detailed Assessment

5.3 Step 1 of the IAQM guidance[19] 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 PA#1 Site or 50m of routes used by construction vehicles on the public highways, up to 250m from the PA#1 Site entrances; or
- Ecological receptors are located within 50m of the boundary of the PA#1 Site or 50m of routes used by construction vehicles on the public highways, up to 250m from the PA#1 Site entrances.

5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[27], 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 Scotter 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[19] as detailed in **Table 5.1**. Demolition is not proposed as part of the development and therefore was not considered further in the assessment.

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

Table 5.1: Dust Emission Magnitude Criteria and Definition

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

5.7 The following dust emission magnitudes were defined for the Proposed Development:

- Earthworks – the total PA#1 Site area is greater than 110,000m^2, therefore the dust emission magnitude for earthworks was defined as **Large**.
- Construction – the total building volume to be constructed is greater than 75,000m^3, therefore the dust emission magnitude from construction was defined as **Large.**
- Trackout – Due to the size of the PA#1 Site it is considered that there will be between 20 and 50 outward HDV movements in any one day. The unpaved road length is less than 50m. the dust emission magnitude for trackout was therefore defined as **Large**. The trackout distance utilised in the assessment was set to 250m from the PA#1 Site access in accordance with the guidance.

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

Table 5.2: Summary of Project Defined Dust Emission Magnitudes

Activity	Dust Emission Magnitude
Earthworks	Large
Construction	Large
Trackout	Large

Step 2B: Define the Sensitivity of the Area

5.9 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling and human health impacts. The sensitivity of the study area takes into account the specific receptors in the vicinity of the PA#1 Site, the proximity and number of those receptors, the local background concentration of PM_{10} and site-specific factors.

5.10 **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance[19] for determining receptor sensitivity.

5.11 The sensitivity of the area is defined below, in accordance with IAQM criteria[19] and summarised in **Table 5.3**.

- Dust Soiling – There are 10 to 100 highly sensitive receptors, including residential receptors and car parking spaces within 20m of the PA#1 Site boundary. The sensitivity of the area to dust soiling from earthworks and construction was defined as **High**. There are no receptors sensitive to dust soiling within 50m of roads used by construction vehicles up to 250m from the PA#1 Site.
- Human Health – Residential receptors are also considered sensitive to human health impacts. There are 10 to 100 highly sensitive residential receptors within 20m of the PA#1 Site boundary. As detailed in **Table 4.4**, the background PM_{10} concentration is below 24µg.m^{-3}. The sensitivity of the area to dust soiling from earthworks and construction was defined as **Low**. There are no receptors sensitive to human health impacts from dust within 50m of roads used by construction vehicles up to 250m from the PA#1 Site.

Table 5.3: Determination of the Sensitivity of the Area

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

Figure 5.1: Construction Phase Assessment Dust Distance Buffers

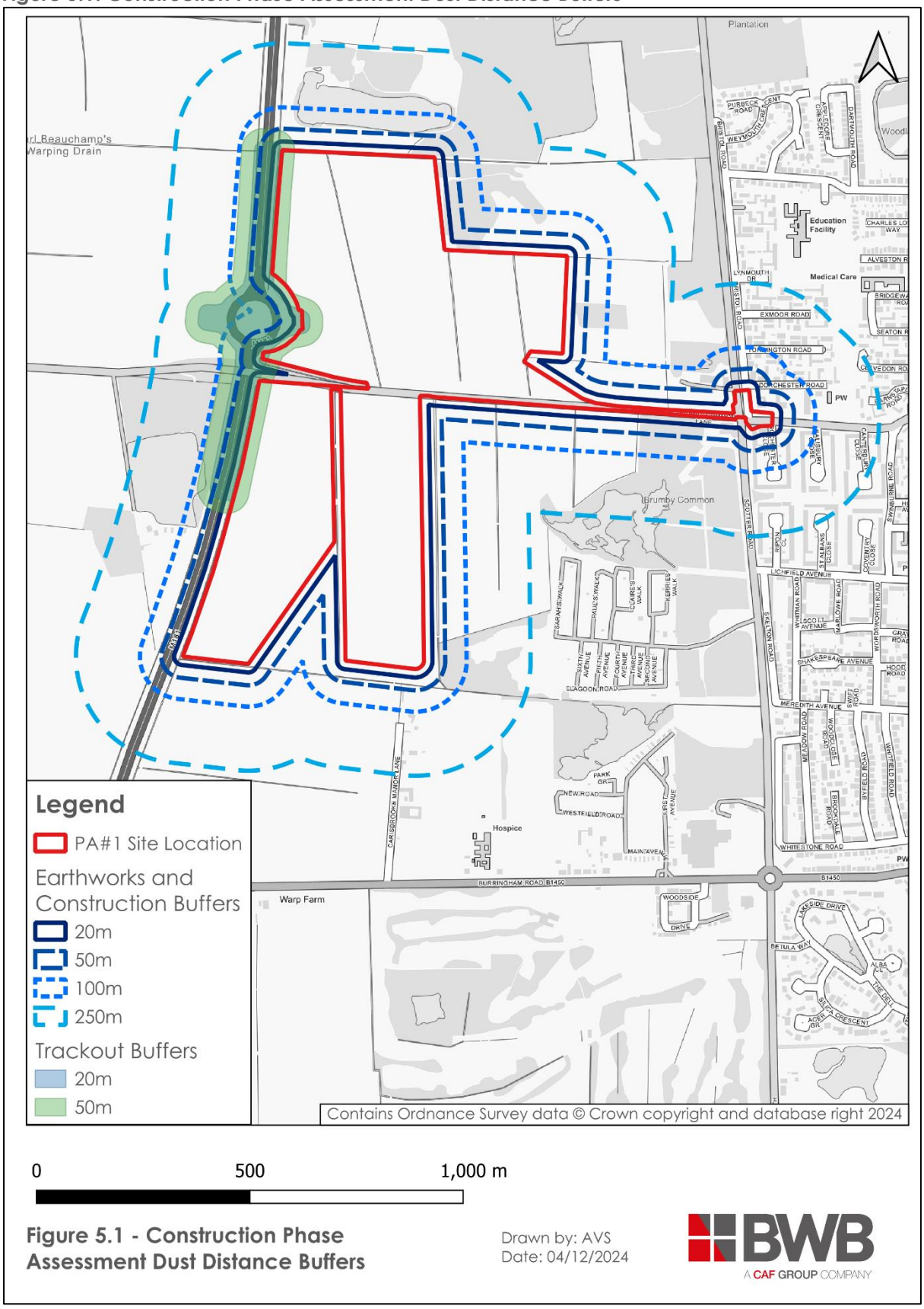

Figure 5.1 - Construction Phase Assessment Dust Distance Buffers

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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	Large	High	High Risk
Trackout	Large	N/A	N/A
Human Health Impacts			
Earthworks	Large	Low	Low Risk
Construction	Large	Low	Low Risk
Trackout	Large	N/A	N/A

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[19] 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[19]. The highest risk category identified was '**High Risk'** and the recommended mitigation taken from the IAQM guidance[19] is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a High Risk Site

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

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

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

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

Table 5.6: Mitigation Measures Specific to Earthworks and Construction

Category	Mitigation Measures	
	Highly Recommended	**Desirable**
Earthworks (High Risk Site)	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	None
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	
	Only remove the cover in small areas during work and not all at once.	
Construction (High Risk Site)	Avoid scabbling (roughening of concrete surfaces) if possible.	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	
	Ensure 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[19], with the implementation of the mitigation measures detailed in Step 3, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Baseline Assessment

6.1 Pollutant concentrations were predicted at the identified existing sensitive receptor locations using the dispersion model ADMS-Roads. Predicted pollutant concentrations for Scenario 2: 2024 Base Year and Scenario 3: 2027 Opening Year without development are detailed in **Table 6.1.**

Table 6.1: Predicted Annual Mean Pollutant Concentrations for Scenario 2: 2024 Base Year and Scenario 3: 2027 Opening Year Without Development at Existing Receptor Locations

Receptor	Scenario 2: 2024 Base Year (µg.m^{-3})			Scenario 3: 2027 Opening Year Without Development (µg.m^{-3})		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	18.8	18.3	8.3	21.7	18.4	8.3
R2	18.3	18.1	8.2	21.0	18.2	8.2
R3	20.7	17.0	8.7	24.0	17.2	8.8
R4	10.8	13.1	6.6	11.0	12.9	6.4
R5	11.8	13.9	6.8	12.4	13.8	6.7
R6	11.2	12.8	6.6	11.2	12.6	6.4
R7	16.8	15.8	7.8	19.5	16.0	7.9
R8	16.2	17.7	8.0	18.6	17.9	8.0
R9	14.5	17.0	7.6	16.3	17.1	7.6
R10	15.9	15.3	7.8	18.2	15.5	7.8
R11	9.1	15.5	6.5	9.2	15.3	6.3
R12	11.1	15.3	6.7	12.0	15.2	6.6

6.2 Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in Scenario 2: 2024 Base Year and Scenario 3: 2027 Opening Year without development are predicted to be below the current annual mean air quality objectives at all modelled receptor locations. $PM_{2.5}$ concentrations are also predicted to be below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3} in both scenarios.

6.3 It is noted that pollutant concentrations increase between Scenario 2: 2024 Base Year and Scenario 3: 2027 Opening Year without development. This is due to the introduction of committed developments between 2024 and 2027, resulting in increased baseline traffic flows within the study area and thus increased pollutant concentrations.

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

Impact Assessment

Detailed Operational Phase Road Traffic Emissions Assessment

6.5 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for Scenario 4: 2027 Opening Year with development, to consider the impact of development-generated vehicles on with regard to the current relevant air quality objectives.

6.6 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: 2027 Opening Year without development concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided.

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

Receptor	Predicted NO_2 Concentration (µg.m^{-3})				
	Scenario 3: 2027 Opening Year Without Development (µg.m^{-3})	Scenario 4: 2027 Opening Year With Development (µg.m^{-3})	Concentration Change* (µg.m^{-3})	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	21.7	23.1	+1.5	4	Negligible
R2	21.0	22.4	+1.4	4	Negligible
R3	24.0	24.6	+0.6	1	Negligible
R4	11.0	11.7	+0.7	2	Negligible
R5	12.4	13.6	+1.2	3	Negligible
R6	11.2	11.8	+0.6	2	Negligible

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2027 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4: 2027 Opening Year With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R7	19.5	19.7	+0.3	1	Negligible
R8	18.6	18.8	+0.3	1	Negligible
R9	16.3	16.5	+0.2	1	Negligible
R10	18.2	18.5	+0.2	1	Negligible
R11	9.2	9.8	+0.6	2	Negligible
R12	12.0	12.6	+0.6	1	Negligible

** Discrepancies in changes due to rounding effects*

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

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2027 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4: 2027 Opening Year With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	18.4	18.9	+0.5	1	Negligible
R2	18.2	18.6	+0.4	1	Negligible
R3	17.2	17.4	+0.2	0	Negligible
R4	12.9	13.1	+0.2	1	Negligible
R5	13.8	14.1	+0.4	1	Negligible
R6	12.6	12.8	+0.2	0	Negligible
R7	16.0	16.1	+0.1	0	Negligible
R8	17.9	17.9	+0.1	0	Negligible
R9	17.1	17.2	+0.1	0	Negligible

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2027 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4: 2027 Opening Year With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R10	15.5	15.5	+0.1	0	Negligible
R11	15.3	15.4	+0.1	0	Negligible
R12	15.2	15.3	+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 Locations

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)				
	Scenario 3: 2027 Opening Year Without Development ($\mu g.m^{-3}$)	Scenario 4: 2027 Opening Year With Development ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	8.3	8.5	+0.3	1	Negligible
R2	8.2	8.4	+0.2	1	Negligible
R3	8.8	8.9	+0.1	0	Negligible
R4	6.4	6.6	+0.1	0	Negligible
R5	6.7	6.9	+0.2	1	Negligible
R6	6.4	6.5	+0.1	0	Negligible
R7	7.9	7.9	<0.1	0	Negligible
R8	8.0	8.1	<0.1	0	Negligible
R9	7.6	7.7	<0.1	0	Negligible
R10	7.8	7.8	<0.1	0	Negligible
R11	6.3	6.4	<0.1	0	Negligible
R12	6.6	6.7	+0.1	0	Negligible

** Discrepancies in changes due to rounding effects*

6.7 Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in Scenario 3: 2027 Opening Year without development and Scenario 4: 2027 Opening Year with development are predicted to be below the current annual mean air quality objectives at all modelled receptor locations. $PM_{2.5}$ concentrations are also predicted to be below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

6.8 Impacts at all receptor locations are predicted to be 'negligible' and 'not significant' in accordance with IAQM and EPIC (formerly EPUK) guidance[20].

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 60µg.m^{-3} and therefore in accordance with Defra guidance[17] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

6.10 A sensitivity analysis was also undertaken which considered the impact of the committed 2500 dwellings Maltgrade development. The results of the sensitivity analysis are detailed in **Appendix G**. Annual mean pollutant concentrations were also predicted to be below the current relevant air quality objectives and the impacts at all receptor locations are predicted to be 'negligible' and 'not significant' in accordance with IAQM and EPIC (formerly EPUK) guidance[20].

PA#1 Site Suitability Assessment

6.11 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the proposed residential dwellings within the PA#1 Site for Scenario 4: 2027 Opening Year with development. Predicted pollutant concentrations are detailed in **Figure 6.1** to **Figure 6.3.**

6.12 The predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for Scenario 4: 2027 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2027 with the Proposed Development in place. Annual mean $PM_{2.5}$ concentrations are also below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

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

6.14 The PA#1 Site is therefore considered suitable for the proposed end use with regard to the current relevant air quality objectives.

Figure 6.1: Predicted Annual Mean NO_2 Concentrations Across the PA#1 Site

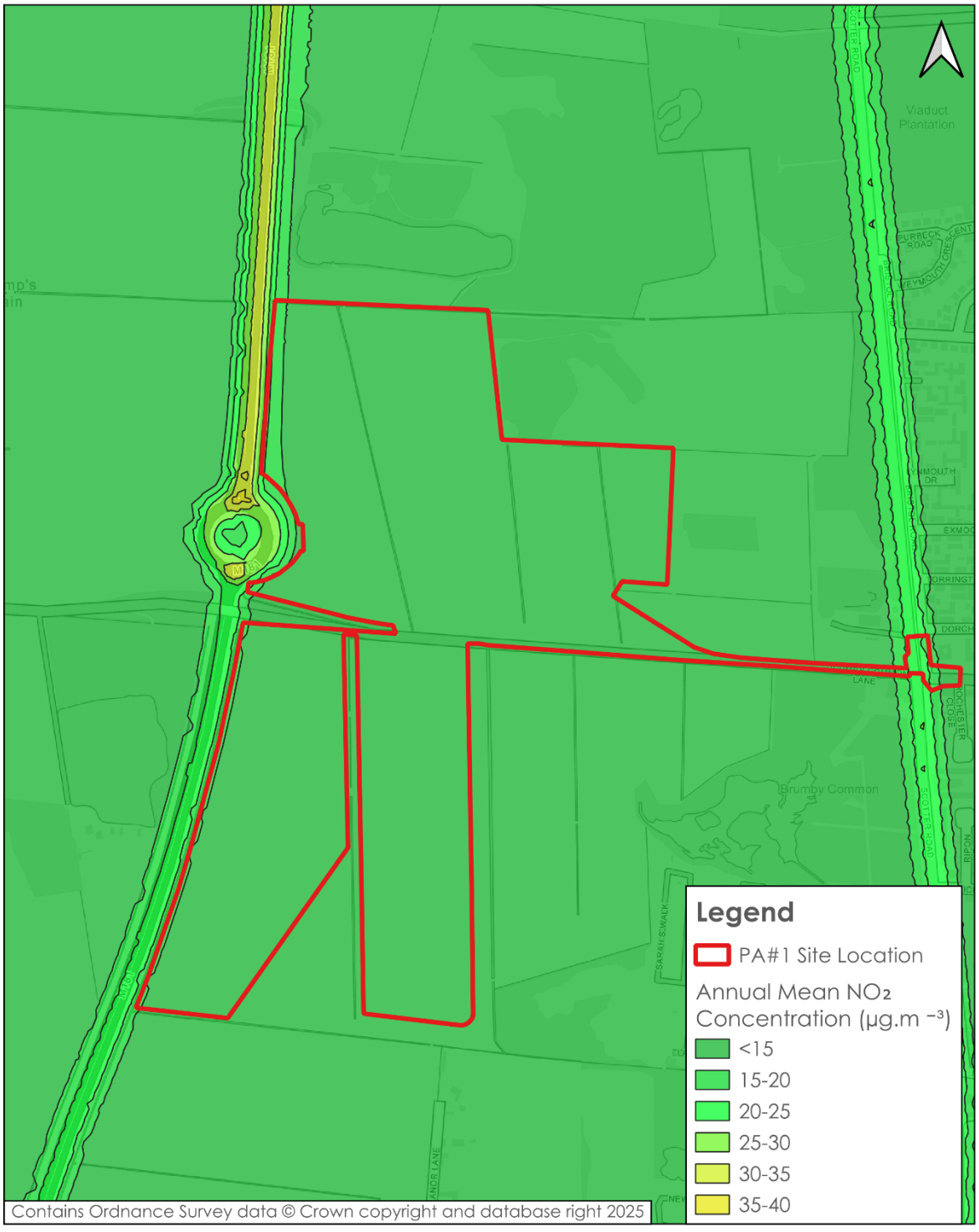

Figure 6.1: Predicted Annual Mean NO_2 Concentrations Across the PA#1 Site

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Figure 6.2: Predicted Annual Mean PM_{10} Concentrations Across the PA#1 Site

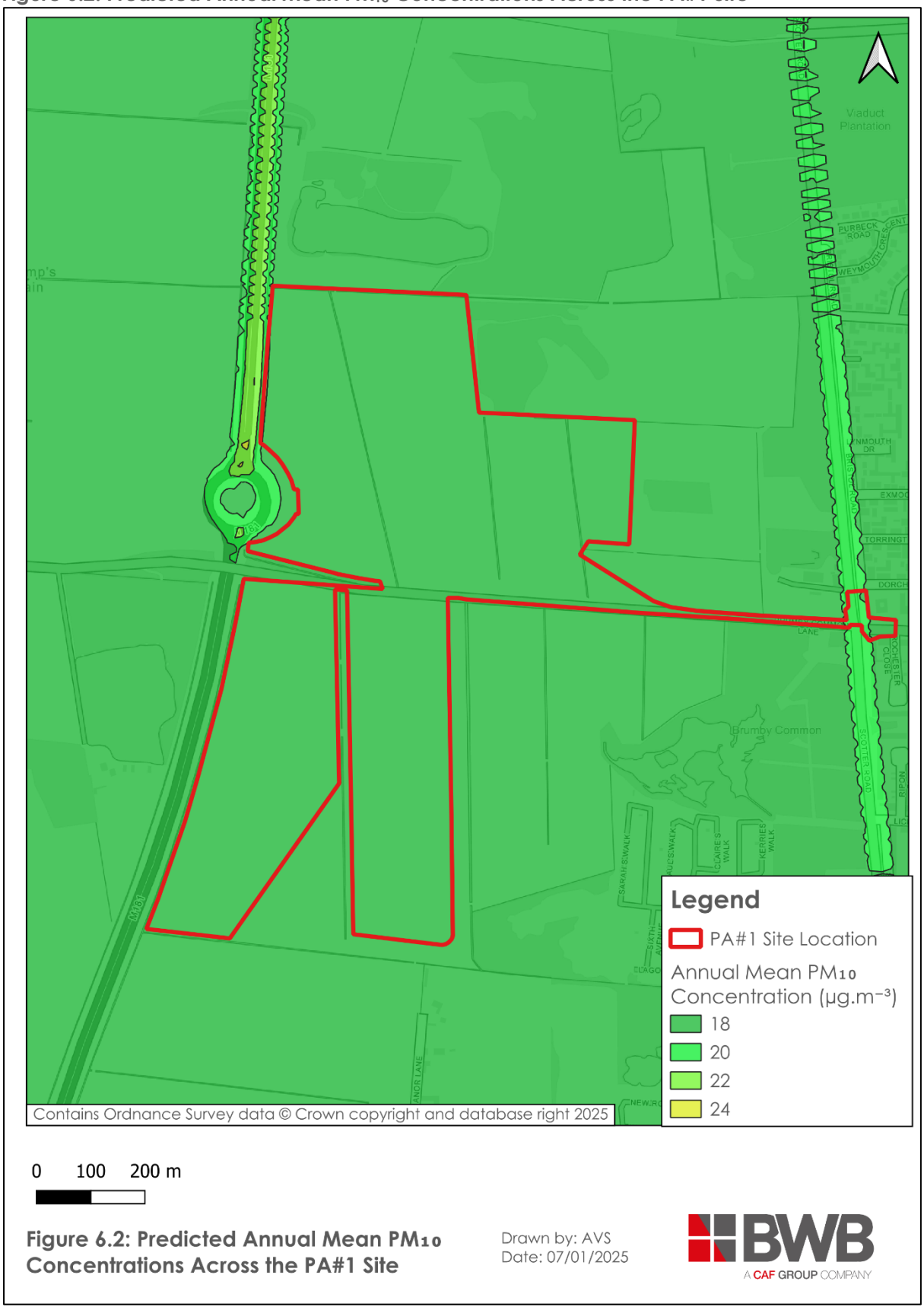

Figure 6.2: Predicted Annual Mean PM_{10} Concentrations Across the PA#1 Site

Drawn by: AVS
Date: 07/01/2025

BWB
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Figure 6.3: Predicted Annual Mean $PM_{2.5}$ Concentrations Across the PA#1 Site

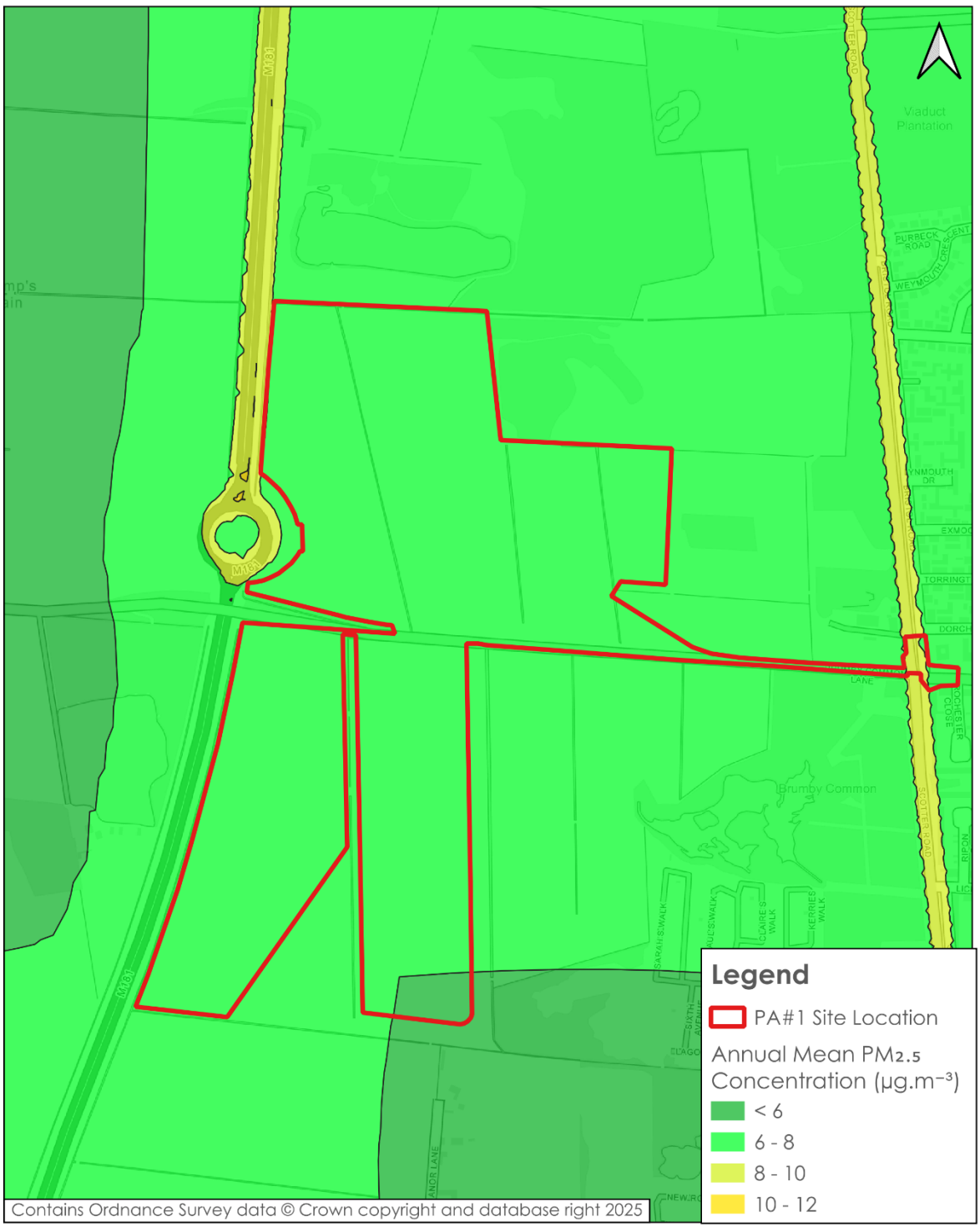


Figure 6.3: Predicted Annual Mean $PM_{2.5}$ Concentrations Across the PA#1 Site

Drawn by: AVS
Date: 07/01/2025

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

6.15 Defra is developing new guidance which will require planning applications will reduce population exposure to $PM_{2.5}$ from design stage. Consideration to the interim planning guidance[18], as considered in the development design, is summarised below:

- A review of nearby pollution sources identified M181 Motorway as the main pollutant source in the vicinity of the PA#1 Site. Upon review of publicly available data and following dispersion modelling of $PM_{2.5}$ across the PA#1 Site, annual mean $PM_{2.5}$ concentrations across and in the vicinity of the PA#1 Site suggest no exceedances of the 2040 future objective of 10µg.m^{-3}.
- As part of the operational phase road emissions assessment, existing sensitive receptors were identified and pollutant concentrations at these receptors were predicted. These included nearby schools which are classified as vulnerable groups. The assessment considered the annual mean $PM_{2.5}$ concentrations against the 2040 future objective of 10µg.m^{-3}.
- A construction phase dust assessment was conducted to consider the impact of dust. On review of background mapping[23], annual mean $PM_{2.5}$ concentrations across and in the vicinity of the Site are below 10µg.m^{-3}. Therefore, it is considered that with the implementation of the mitigation measures detailed in Section 5, the residual impacts from the construction phase are considered to be 'not significant'.
- When considering the design of the PA#1 Site, the proposed residential parcels are set back from the main emissions sources of $PM_{2.5}$ (the M181 Motorway).

6.16 Based on the above, the PA#1 Site was considered suitable for the proposed residential use, when considering the 2040 future objective of 10µg.m^{-3}. Based on the above and as summarised in Section 6, no exceedances of the 2040 future objective were predicted at any existing receptors, including identified vulnerable groups. Therefore, no further mitigation is required.

Development Measures

6.17 The impact of the development was predicted to be 'negligible' and 'not significant' and pollutant concentrations across the Site were predicted to be below the current relevant air quality objectives, therefore, no mitigation is required. However, measures included as part of the development which may be beneficial to air quality include the provision of electric vehicle charging points and a Travel Plan.

7. CONCLUSION

7.1 An air quality impact assessment was undertaken for the proposed residential led mixed use development at Lincolnshire Lakes, Scunthorpe known as Planning Application 1 at Lincolnshire Lakes (North).

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[19].

7.3 A detailed road traffic emissions assessment was undertaken to consider the impact of development-generated road traffic on with regard to the current relevant air quality objectives at identified existing receptor locations. Road traffic emissions were modelled using the dispersion model ADMS-Roads and concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified sensitive receptor locations. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance[17]. The Proposed Development was not predicted to result in any new exceedances of the relevant air quality objectives and the impact of the Proposed Development with regard to the current relevant air quality objectives was predicted to be 'negligible' in accordance with IAQM and EPIC (previously EPUK) guidance[20].

7.4 Pollutant concentrations were also predicted across the PA#1 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 PA#1 Site was considered to be suitable for the proposed residential use with regard to the current relevant air quality objectives.

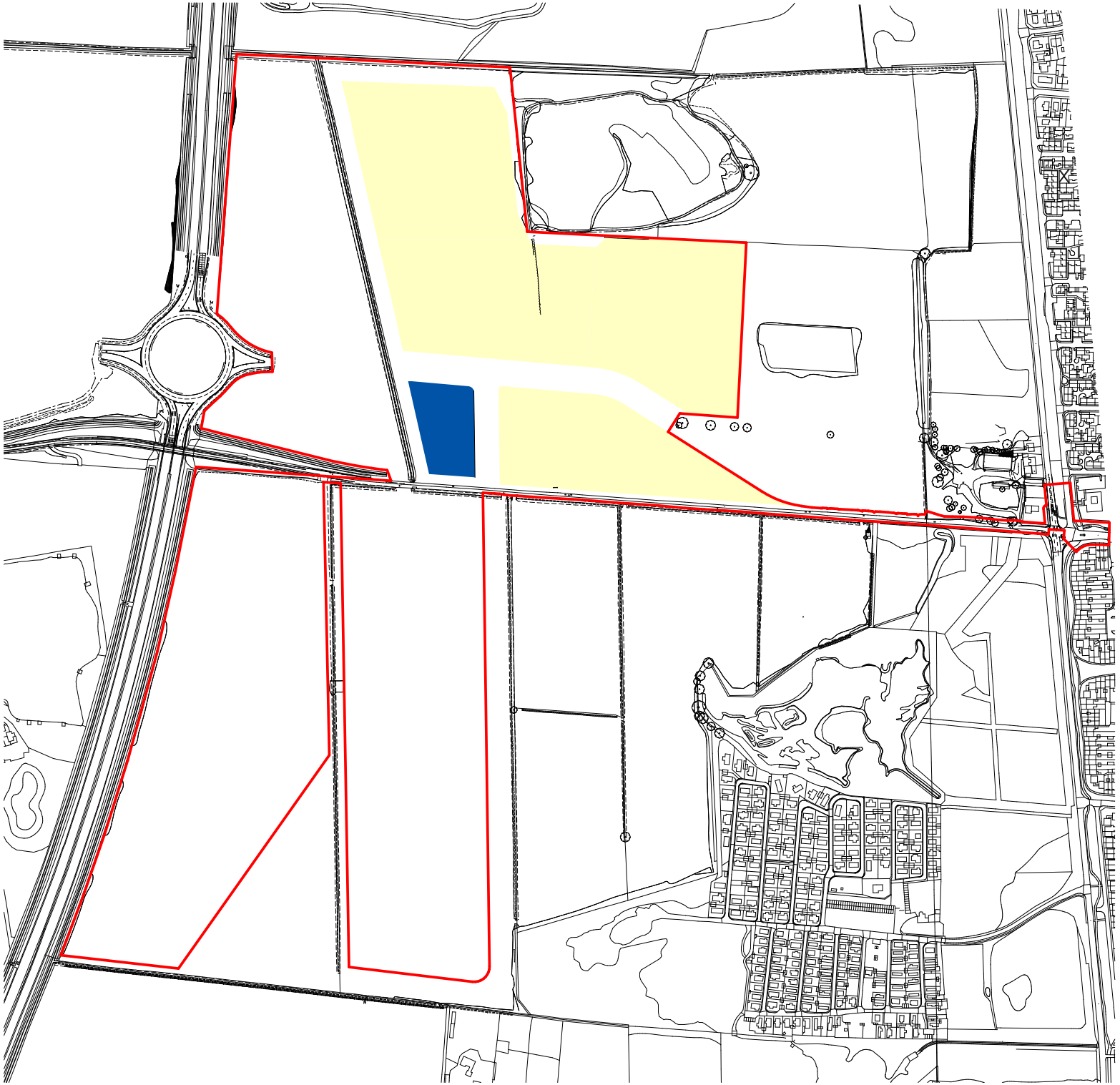
7.5 Based on the assessment results, the impact of the Proposed Development on local air quality with regards to the current relevant air quality objectives was considered to be not significant. Measures included as part of the Proposed Development which may be beneficial to air quality include a Travel Plan and Electric Vehicle Charging.

APPENDICES

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_2	Nitrogen dioxide.
NOx	Nitrogen oxides.
Percentile	The percentage of results below a given value.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre ($\mu g.m^{-3}$)	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g.m^{-3}$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX B: PROPOSED DEVELOPMENT MASTERPLAN



KEY

- PA#1 RED LINE BOUNDARY
- RESIDENTIAL
- LOCAL CENTRE

N

20 0 20 40 60 80 100

SCALE 1:2500 m

Rev	Description	Date	Dm	Ckd
P1	FIRST ISSUE	15.01.24	TD	CG

Status

SKETCH - NOT FOR CONSTRUCTION

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Project

LINCOLNSHIRE LAKES

Client

Hargreaves Land

Drawing Title

LINCOLNSHIRE LAKES PARAMETER PLANS - LAND USE

Proj Ref	Origin	Zone	Level	Type	Role	Num	Status	Rev
7730 -	SMR -	00 -	ZZ -	DR -	A -	2021 -	S3 -	P1

SMR Job Ref	Sheet	Scale	Drawn
7730-00-2021	A1	NOTED	HE

APPENDIX C: PLANNING POLICY AND LEGISLATION

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[1] sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000[2], as amended, for the purpose of the Local Air Quality Management Framework. The Air Quality (England) Regulations were amended in 2002[5] and again in 2010[6], with miscellaneous amendments added in 2020[10] following the UK exit from the EU. Additionally, an updated $PM_{2.5}$ objective was published in 2023[9] with an interim target to be achieved by 2028[24].

C.2 The UK Government are required under the Environment Act 1995[3] to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997[7] and was most recently reviewed and updated in 2007[8] and most recently reviewed and updated in 2023[9]. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

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

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

National Planning Policy Framework

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

C.6 The NPPF[12] recognises air quality within Section 15: Conserving and enhancing the natural environment, and states that:

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

[…]

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[12] states:

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

[...]"

Planning Practice Guidance

C.8 The Planning Practice Guidance (PPG) for air quality[13] was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

C.9 The PPG[13] sets out the following with regard to air quality and planning:

- *"What air quality considerations does planning need to address;*
- *What is the role of plan-making with regard to air quality;*
- *Air quality concerns relevant to neighbourhood planning;*
- *What information is available about air quality;*
- *When could air quality considerations be relevant to the development management process;*
- *What specific issues may need to be considered when assessing air quality impacts;*
- *How detailed does an air quality assessment need to be; and*
- *How can an impact on air quality be mitigated".*

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

C.11 The PPG[13] states that development plans may need to consider:

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

C.12 The PPG[13] also states what may be considered relevant to determining a planning application and these include whether a development would:

- *"Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of*

electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value".*

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

Local Planning Policy

North Lincolnshire Council Local Development Framework Core Strategy

C.14 NLC adopted its Core Strategy in 2011[14]. The following policies of Core Strategy are in relation to air quality

- *CS2: Delivering More Sustainable Development*

  […] All future development in North Lincolnshire will be required to contribute towards achieving sustainable development. Proposals should comply with the overall spatial strategy together with the following sustainable development principles:

  […] Take account of local environmental capacity and to improve air, water and soil quality and minimise the risk and hazards associated with flooding […]

- *CS18: Sustainable Resource Use and Climate Change*

  The council will actively promote development that utilises natural resources as efficiently and sustainably as possible. This will include:

  […] Ensuring development and land use helps to protect people and the environment from unsafe, unhealthy and polluted environments, by protecting and improving the quality of the air, land and water […]

North Lincolnshire Council Saved 2003 Local Plan Policies

C.15 The 2003 Local Plan was superseded by the Local Development Framework however some 2003 Local Plan Policies were saved. In particular DS1:

- *DS1: General Requirements*

  A high standard of design is expected in all developments in both built-up areas and the countryside and proposals for poorly designed development will be refused. All proposals will be considered against the criteria set out below:

  […] v) no pollution of water, air or land should result which poses a danger or creates detrimental environmental conditions […].

C.16 The above policies were taken into consideration throughout the undertaking of the assessment.

APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

Road Link	Speed	Scenario 1: 2022 Verification Year		Scenario 2: 2024 Base Year		Scenario 3: 2027 Opening Year Without Development		Scenario 4: 2027 Opening Year With Development		Scenario 3: 2027 Opening Year Without Development - Sensitivity		Scenario 4: 2027 Opening Year With Development - Sensitivity	
	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	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
A1077 (S)	80	16,706	4,070	16,836	4,102	17,230	4,198	23,237	4,223	14,020	4,198	19,673	4,223
M181	113	7,689	1,835	7,802	1,862	7,984	1,905	10,254	1,930	10,099	1,905	12,546	1,930
A18 Doncaster Road	64	25,831	1,625	26,031	1,638	27,446	1,676	31,206	1,676	23,444	1,676	26,764	1,676
Scotter Road (N)	48	15,985	1,008	16,109	1,016	17,533	1,040	17,896	1,040	16,568	1,040	16,568	1,040
Scotter Road (S)	48	17,452	1,056	17,587	1,064	19,046	1,089	19,408	1,089	19,191	1,089	19,191	1,089
A1077 (N)	80	12,816	2,559	12,915	2,579	13,217	2,640	15,528	2,665	13,217	2,640	15,476	2,665
A1077 Phoenix Parkway (S)	80	10,755	1,930	10,838	1,945	11,233	1,991	12,690	2,016	11,233	1,991	12,656	2,016
Doncaster Road	48	9,088	611	9,159	616	9,373	630	12,089	630	10,127	630	12,780	630
M180 (W) Junction 3	113	45,872	12,299	46,547	12,480	47,635	12,772	48,398	12,772	47,709	12,772	48,455	12,772
M180 (E) Junction 3	113	29,211	9,471	29,641	9,610	30,334	9,835	31,893	9,847	33,190	9,835	34,714	9,847
Scotter Road North of A18	48	10,901	513	Verification Only									

D.1 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

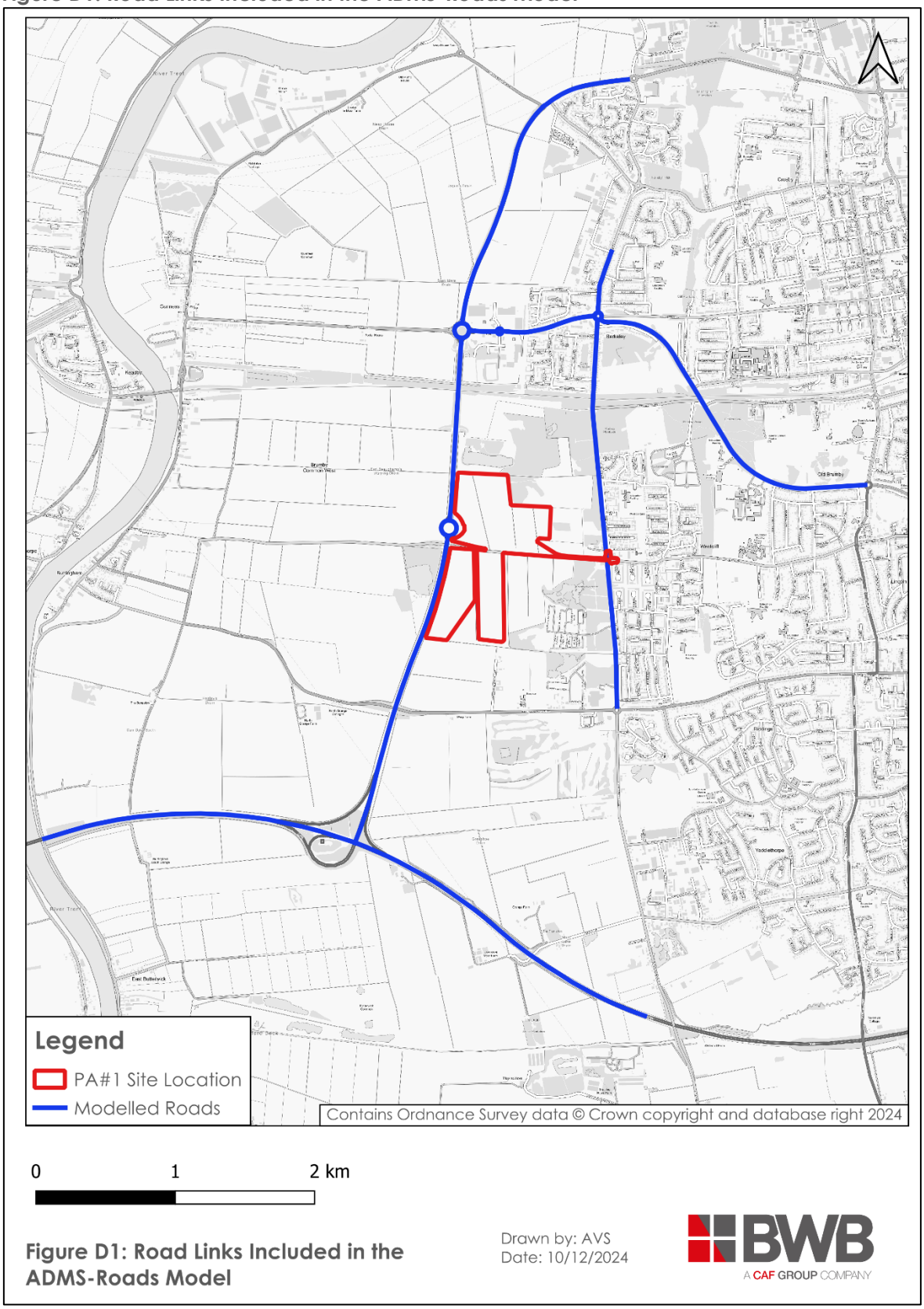
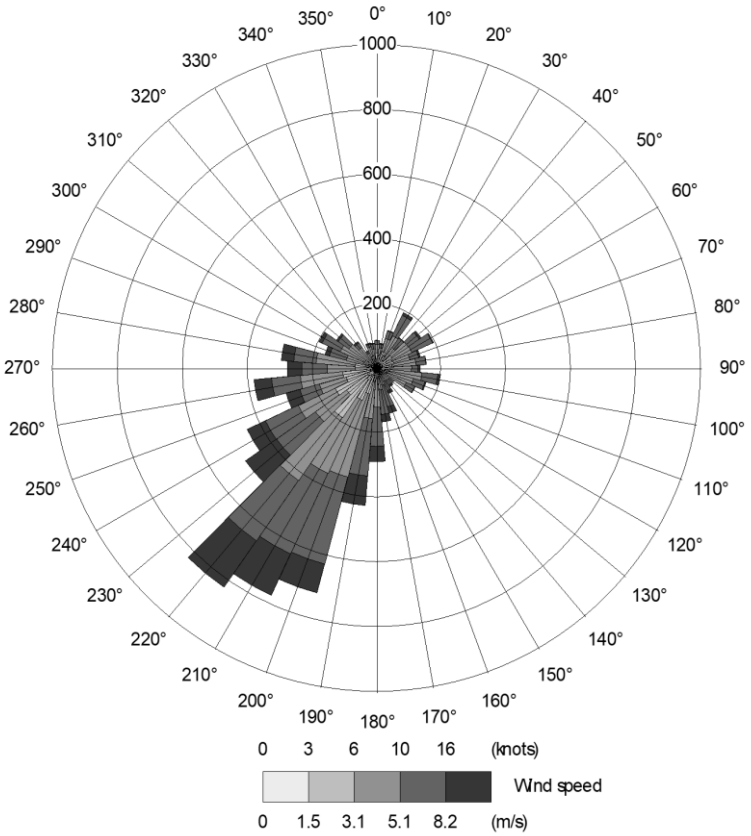


Figure D1: Road Links Included in the ADMS-Roads Model

APPENDIX E: WIND ROSE FOR 2022 FOR HUMBERSIDE METEOROLOGICAL RECORDING STATION

E.1 Meteorological data for 2022 Verification Year scenario for the Humberside recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2022 is detailed below and illustrates a predominant wind direction from the southwest.



APPENDIX F: MODEL VERIFICATION

F.1 Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra[17]. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

F.2 The model was run for Scenario 1: 2022 Verification Year to predict the 2022 annual mean road contributions of NOx at the monitoring locations in the study area. The model NOx outputs at these locations were compared to the 2022 monitored concentrations to provide adjustment factors. **Table F1** present the verification process for NOx.

F.3 DT2, DT3 and DT4 were utilised in the model verification as they were considered representative of conditions across the Study Area. DT24 was excluded from the model verification as on review it was considered to be a kerbside site and was not considered suitable for use in the model verification process in accordance with Defra guidance[17]. The locations of DT2, DT3 and DT4 are shown in **Figure 4.1.**

F.4 No monitoring of PM_{10} or $PM_{2.5}$ is undertaken that is representative of 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	DT2	DT3	DT4
2022 monitored total NO_2 ($\mu g.m^{-3}$)	24.3	19.8	20.7
2022 background NO_2 concentration ($\mu g.m^{-3}$)	8.4	7.9	7.9
Monitored road contribution NOx ($\mu g.m^{-3}$)	36.6	26.3	28.5
Modelled road contribution NOx ($\mu g.m^{-3}$)	7.6	7.5	7.9
Ratio of monitored road NOx to modelled road NOx	4.8	3.5	3.6
Adjustment factor for modelled road contribution NOx	3.9708		
Adjusted modelled road contribution NOx ($\mu g.m^{-3}$)	30.1	29.8	31.5
Modelled total NO_2 concentration ($\mu g.m^{-3}$)	21.8	21.2	21.9
Monitored total NO_2 concentration ($\mu g.m^{-3}$)	24.3	19.8	20.7
% difference between modelled and monitored total NO_2 concentration	-10.5	7.2	5.7
RMSE % (should be less than 25% and ideally less than 10%)	3.5		

Road-NOx component, determined from NOx to NO_2 calculator

F.5 A road-NOx factor of **3.9708** was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. This factor was then applied to the modelled road-NOx concentration

at each receptor, before conversion to NO_2 concentrations using the NOx to NO_2 calculator provided by Defra[17].

F.6 The RMSE was calculated to be 3.5% which is well within the ideal 10% as detailed in Defra guidance[17], indicating that model performance is good.

APPENDIX G: SENSITIVITY ANALYSIS

G.1 A sensitivity analysis was undertaken to determine the impact of the Proposed Development when also considering the 2,500 dwelling Maltgrade development. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations for Scenario 6: 2027 Opening Year with development - Sensitivity, to consider the impact of development-generated vehicles on with regard to the current relevant air quality objectives.

G.2 Predicted pollutant concentrations are detailed in **Tables G1**, **G2** and **G3** for NO_2, PM_{10} and $PM_{2.5}$ respectively together with Scenario 4: 2027 Opening Year without development – Sensitivity concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided.

Table G1: Predicted Annual Mean NO_2 Concentrations and Development Impact at Existing Receptor Locations – Sensitivity

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)				
	Scenario 5: 2027 Opening Year Without Development – Sensitivity ($\mu g.m^{-3}$)	Scenario 6: 2027 Opening Year With Development – Sensitivity ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	20.2	21.5	+1.4	3	Negligible
R2	19.6	20.8	+1.3	3	Negligible
R3	23.3	23.7	+0.3	1	Negligible
R4	11.1	11.7	+0.6	2	Negligible
R5	12.7	13.8	+1.1	3	Negligible
R6	11.4	12.0	+0.6	2	Negligible
R7	19.0	19.1	+0.1	0	Negligible
R8	18.2	18.2	+0.1	0	Negligible
R9	16.3	16.4	+0.1	0	Negligible
R10	18.3	18.4	+0.1	0	Negligible
R11	9.7	10.4	+0.6	2	Negligible
R12	12.0	12.5	+0.5	1	Negligible

** Discrepancies in changes due to rounding effects*

Table G2: Predicted Annual Mean PM_{10} Concentrations and Development Impact at Existing Receptor Locations - Sensitivity

Receptor	Predicted PM_{10} Concentration ($\mu g.m^{-3}$)				
	Scenario 5: 2027 Opening Year Without Development – Sensitivity ($\mu g.m^{-3}$)	Scenario 6: 2027 Opening Year With Development – Sensitivity ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	17.9	18.3	+0.4	1	Negligible
R2	17.7	18.1	+0.4	1	Negligible
R3	16.9	17.0	+0.1	0	Negligible
R4	13.0	13.1	+0.2	0	Negligible
R5	13.8	14.2	+0.4	1	Negligible
R6	12.7	12.9	+0.2	0	Negligible
R7	15.8	15.9	<0.1	0	Negligible
R8	17.7	17.7	<0.1	0	Negligible
R9	17.1	17.1	<0.1	0	Negligible
R10	15.5	15.5	<0.1	0	Negligible
R11	15.4	15.5	0.1	0	Negligible
R12	15.2	15.3	0.1	0	Negligible

** Discrepancies in changes due to rounding effects*

Table G3: Predicted Annual Mean $PM_{2.5}$ Concentrations and Development Impact at Existing Receptor Locations – Sensitivity

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)				
	Scenario 5: 2027 Opening Year Without Development – Sensitivity ($\mu g.m^{-3}$)	Scenario 6: 2027 Opening Year With Development – Sensitivity ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	8.0	8.3	0.2	1	Negligible
R2	7.9	8.1	0.2	1	Negligible

Receptor	Predicted $PM_{2.5}$ Concentration ($\mu g.m^{-3}$)				
	Scenario 5: 2027 Opening Year Without Development – Sensitivity ($\mu g.m^{-3}$)	Scenario 6: 2027 Opening Year With Development – Sensitivity ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R3	8.6	8.7	+0.1	0	Negligible
R4	6.5	6.6	+0.1	0	Negligible
R5	6.7	6.9	+0.2	1	Negligible
R6	6.4	6.5	+0.1	0	Negligible
R7	7.8	7.8	<0.1	0	Negligible
R8	7.9	7.9	<0.1	0	Negligible
R9	7.6	7.6	<0.1	0	Negligible
R10	7.8	7.8	<0.1	0	Negligible
R11	6.3	6.4	<0.1	0	Negligible
R12	6.6	6.7	+0.1	0	Negligible

** Discrepancies in changes due to rounding effects*

G.3 Annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations in Scenario 5: 2027 Opening Year without development - Sensitivity and Scenario 6: 2027 Opening Year with development - Sensitivity are predicted to be below the current annual mean air quality objectives at all modelled receptor locations. $PM_{2.5}$ concentrations are also predicted to be below the 2028 interim target of $12\mu g.m^{-3}$ and the 2040 future objective of $10\mu g.m^{-3}$.

G.4 Impacts at all receptor locations are predicted to be 'negligible' and 'not significant' in accordance with IAQM and EPIC (formerly EPUK) guidance[20].

G.5 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[17] it may be assumed that exceedance of the 1-hour mean objective is unlikely. The calculation detailed in **Table 3.1** was used to determine potential exceedance of the 24-hour PM_{10} short term objective; no exceedances were predicted.

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