

Upper Brook Street Masterplan Williams / Alliance UBS Limited Air Quality Assessment

Air Quality Assessment

**Upper Brook Street Masterplan (Williams Motor Co (Holdings)/
Alliance UBS Limited)**

Client: Property Alliance Group/ Moda Living/ Williams Motor Co (Holdings)

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Executive Summary

Redmore Environmental Ltd was commissioned by Property Alliance Group/ Moda Living/ Williams Motor Co (Holdings) to undertake an Air Quality Assessment in support of a planning application for a development on land off Upper Brook Street, Manchester.

The proposals comprise the demolition of existing buildings and erection of three ground floor + 12/14/41 storey buildings to be used for Purpose Built Student Accommodation (Use Sui Generis), comprising 1,100 bedrooms in total and 506m² of ground floor ancillary uses (café/ commercial and convenience store - Use Classes E (a)/(b)/(c)), three buildings comprising ground floor + 5/7/9 storeys for Science and Innovation uses (Use Class E (g)(i) & (ii)) and 834m² ground floor community uses (retail/café and medical facility (Use Classes E (a/b) and (e))) and the provision of new public realm, two new public squares, new access and parking, and associated works to be on Phase Two of the Upper Brook Street Masterplan.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the development during operation, as well as expose future occupants to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential effects as a result of the scheme.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of demolition, earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Potential impacts during operation of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. Additionally, future occupants may be exposed to any existing air quality issues. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the local highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that air quality impacts as a result of traffic generated by the development were not predicted to be significant at any sensitive location in the vicinity of the site.

The results of the assessment also demonstrated that predicted pollution levels were below the relevant air quality standards across the development. As such, the site is considered suitable for the proposed use from an air quality perspective.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

Table of Contents

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Site Location and Context	1
2.0	LEGISLATION AND POLICY	3
2.1	Legislation	3
2.2	Local Air Quality Management	5
2.3	Dust	5
2.4	National Planning Policy	6
2.5	National Planning Practice Guidance	8
2.6	Local Planning Policy	8
2.7	Manchester City Council Air Quality and Planning Technical Guidance	9
3.0	METHODOLOGY	10
3.1	Introduction	10
3.2	Construction Phase Assessment	10
	Step 1	11
	Step 2	11
	Step 3	17
	Step 4	18
3.3	Operational Phase Assessment	18
	Potential Development Impacts	18
	Potential Exposure	20
4.0	BASELINE	21
4.1	Introduction	21
4.2	Local Air Quality Management	21
4.3	Air Quality Monitoring	21
4.4	Background Pollutant Concentrations	23
4.5	Sensitive Receptors	23
	Construction Phase Sensitive Receptors	23
	Operational Phase Sensitive Receptors	26
5.0	ASSESSMENT	27
5.1	Introduction	27
5.2	Construction Phase Assessment	27
	Step 1	27
	Step 2	27

Step 3	30
Step 4	32
5.3 Operational Phase Assessment	32
Potential Development Impacts	33
Potential Exposure	37
Overall Impact Significance	38
6.0 MITIGATION	40
7.0 CONCLUSION	42
8.0 ABBREVIATIONS	44

Appendices

Appendix 1 - Assessment Input Data

Appendix 2 - Curricula Vitae

1.0 INTRODUCTION

1.1 Background

- 1.1.1 Redmore Environmental Ltd was commissioned by Property Alliance Group/ Moda Living/ Williams Motor Co (Holdings) to undertake an Air Quality Assessment in support of a planning application for a development on land off Upper Brook Street, Manchester.
- 1.1.2 The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the development during operation, as well as expose future occupants to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential effects as a result of the scheme.

1.2 Site Location and Context

- 1.2.1 The site is located on land off Upper Brook Street, Manchester, at approximate National Grid Reference (NGR): 384627, 397109. Reference should be made to Figure 1 for a map of the site and surrounding area.
- 1.2.2 The proposals comprise the demolition of existing buildings and erection of three ground floor + 12/14/41 storey buildings to be used for Purpose Built Student Accommodation (Use Sui Generis), comprising 1,100 bedrooms in total and 506m² of ground floor ancillary uses (café/ commercial and convenience store - Use Classes E (a)/(b)/(c)), three buildings comprising ground floor + 5/7/9 storeys for Science and Innovation uses (Use Class E (g)(i) & (ii)) and 834m² ground floor community uses (retail/café and medical facility (Use Classes E (a/b) and (e)) and the provision of new public realm, two new public squares, new access and parking, and associated works to be on Phase Two of the Upper Brook Street Masterplan.
- 1.2.3 The proposals have the potential to cause air quality impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the development during the operational phase. There is also the potential for exposure of future occupants to any existing air quality issues at the site. An Air Quality Assessment was therefore undertaken in

order to determine baseline conditions and consider potential effects as a result of the proposals. This is detailed in the following report.

2.0 **LEGISLATION AND POLICY**

2.1 **Legislation**

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO₂);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5});
- Benzene; and,
- Carbon monoxide.

2.1.2 Air Quality Target Values have also been provided for several additional pollutants. It should be noted that the AQLV for PM_{2.5} stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28th April 2023¹. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 The Environmental Improvement Plan 2023² was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to PM_{2.5}. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

¹ The AQS: Framework for Local Authority Delivery, DEFRA, 2023.

² Environmental Improvement Plan 2023, DEFRA, 2023.

2.1.5 Table 1 presents the AQOs, AQLV and Interim Target for pollutants considered within this assessment.

Table 1 Air Quality Objectives/Air Quality Limit Value/Interim Target

Pollutant	Air Quality Objective/Air Quality Limit Value/Interim Target	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
PM _{2.5}	20 ^(a)	Annual mean
	12 ^(b)	Annual mean

Note: (a) Current AQLV.

(b) Interim Target to be achieved by end of January 2028.

2.1.6 Table 2 summarises the advice provided in DEFRA guidance³ on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term

³ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Air Quality Management

2.2.1 Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Dust

2.3.1 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."

2.3.2 Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

2.4 National Planning Policy

2.4.1 The revised National Planning Policy Framework⁴ (NPPF) was published in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

2.4.2 The purpose of the planning system is to contribute to the achievements of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives including the following of relevance to air quality:

"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

2.4.3 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

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

[...]

preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of

⁴ NPPF, Ministry of Housing, Communities and Local Government, 2021.

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 [...]."

2.4.4 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It 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 [...]."

2.4.5 The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

"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."

2.4.6 The implications of the NPPF have been considered throughout this assessment.

2.5 National Planning Practice Guidance

2.5.1 The National Planning Practice Guidance⁵ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to the planning development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

2.5.2 These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.6 Local Planning Policy

2.6.1 The Manchester Local Development Framework consists of a series of planning documents of which the Core Strategy⁶ is central. This was adopted by Manchester City Council (MCC) on 11th July 2012.

2.6.2 A review of the Core Strategy identified Policy EN 16 Air Quality which is relevant to this assessment. This states:

"The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local effect of emissions from traffic generated by

⁵ <https://www.gov.uk/guidance/air-quality--3>.

⁶ Core Strategy, MCC, 2012.

the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.

When assessing the appropriateness of locations for new development the Council will consider the effects on air quality, alongside other plan objectives. This includes cumulative effects, particularly in Air Quality Management Areas."

- 2.6.3 This policy has been considered throughout this assessment by considering potential air quality effects as a result of the proposals.

2.7 Manchester City Council Air Quality and Planning Technical Guidance

- 2.7.1 MCC adopted the Air Quality and Planning Technical Guidance⁷ document in February 2022. This aims to provide help and advice in relation to air quality in a planning context to encourage good practice and mitigation of impacts. The guidance was considered as necessary throughout the assessment.

⁷ Air Quality and Planning Technical Guidance, MCC, 2022.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases, as well as expose future occupants to any existing air quality issues. These factors have been assessed in accordance with the following methodology.

3.2 Construction Phase Assessment

3.2.1 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1'⁸.

3.2.2 Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and,
- Trackout.

3.2.3 The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and,
- The risk of health effects due to a significant increase in exposure to PM₁₀.

3.2.4 The assessment steps are detailed below.

⁸ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Step 1

- 3.2.5 Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the site or the construction vehicle route up to 500m from the site entrance, then the assessment also proceeds to Step 2.
- 3.2.6 Should sensitive receptors not be present within the relevant distances then **negligible** impacts would be expected and further assessment is not necessary.

Step 2

- 3.2.7 Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on two factors:
- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and,
 - The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).
- 3.2.8 The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.
- 3.2.9 Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.

Table 3 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	• Total volume of building to be demolished greater than 50,000m³ • Potentially dusty material (e.g. concrete) • On-site crushing and screening • Demolition activities more than 20m above ground level

Magnitude	Activity	Criteria
	Earthworks	- Total site area greater than 10,000m² - Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) - More than 10 heavy earth moving vehicles active at any one time - Formation of bunds greater than 8m in height - More than 100,000 tonnes of material moved
	Construction	- Total building volume greater than 100,000m³ - On site concrete batching - Sandblasting
	Trackout	- More than 50 Heavy Duty Vehicle (HDV) trips per day - Potentially dusty surface material (e.g. high clay content) - Unpaved road length greater than 100m
Medium	Demolition	- Total volume of building to be demolished between 20,000m³ and 50,000m³ - Potentially dusty construction material - Demolition activities 10m to 20m above ground level
	Earthworks	- Total site area 2,500m² to 10,000m² - Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time - Formation of bunds 4m to 8m in height - Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	- Total building volume 25,000m³ to 100,000m³ - Potentially dusty construction material (e.g. concrete) - On site concrete batching
	Trackout	10 to 50 HDV trips per day - Moderately dusty surface material (e.g. high clay content) - Unpaved road length 50m to 100m
Small	Demolition	- Total volume of building to be demolished less than 20,000m³ - Construction material with low potential for dust release (e.g. metal cladding or timber) - Demolition activities less than 10m above ground and during wetter months

Magnitude	Activity	Criteria
	Earthworks	- Total site area less than 2,500m² - Soil type with large grain size (e.g. sand) - Less than 5 heavy earth moving vehicles active at any one time - Formation of bunds less than 4m in height - Total material moved less than 20,000 tonnes - Earthworks during wetter months
	Construction	- Total building volume less than 25,000m³ - Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	- Less than 10 HDV trips per day - Surface material with low potential for dust release - Unpaved road length less than 50m

3.2.10 Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 4.

Table 4 Construction Dust - Examples of Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	- Users expect high levels of amenity - High aesthetic or value property - People expected to be present continuously for extended periods of time - Locations where members of the public are exposed over a time period relevant to the AQO for PM₁₀. e.g. residential properties, hospitals, schools and residential care homes	Internationally or nationally designated site e.g. Special Area of Conservation
Medium	- Users would expect to enjoy a reasonable level of amenity - Aesthetics or value of their property could be diminished by soiling - People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	Nationally designated site e.g. Sites of Special Scientific Interest

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

3.2.11 The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and,
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

3.2.12 These factors were considered in the undertaking of this assessment.

3.2.13 The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 5.

Table 5 Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

3.2.14 Table 6 outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 6 Construction Dust - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Background Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32µg/m ³	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m ³	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m ³	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24µg/m ³	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32µg/m ³	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low

Receptor Sensitivity	Background Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
	28 - 32µg/m ³	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	Less than 24µg/m ³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

3.2.15 Table 7 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 7 Construction Dust - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

3.2.16 Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

3.2.17 Table 8 outlines the risk category from demolition activities.

Table 8 Construction Dust - Dust Risk Category from Demolition Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

3.2.18 Table 9 outlines the risk category from earthworks and construction activities.

Table 9 Construction Dust - Dust Risk Category from Earthworks and Construction Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

3.2.19 Table 10 outlines the risk category from trackout activities.

Table 10 Construction Dust - Dust Risk Category from Trackout Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Step 3

3.2.20 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance⁹ to reduce potential dust impacts based upon the relevant risk categories

⁹ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

3.2.21 Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be **not significant**.

3.2.22 The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. The IAQM guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

3.3 Operational Phase Assessment

Potential Development Impacts

3.3.1 The development has the potential to affect existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. Potential impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2019 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2025 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2025 should the proposals be completed).

3.3.2 Reference should be made to Appendix 1 for assessment input data and details of the verification process.

3.3.3 Locations sensitive to potential changes in off-site pollutant concentrations were identified within 200m of the highway network in accordance with the guidance

provided within the Design Manual for Roads and Bridges (DMRB)¹⁰ on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance¹¹ on where the AQOs apply, as summarised in Table 2, will be utilised to determine worst-case receptor positions in the vicinity of links likely to be affected by changes in traffic flows as a result of the development.

- 3.3.4 The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'¹². Using this methodology impacts will be defined based on the interaction between the predicted pollutant concentration from the DS scenario and the magnitude of change between the DM and DS scenarios, as outlined in Table 11.

Table 11 Significance of Operational Phase Road Vehicle Exhaust Emission Impacts

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO/AQLV (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO/AQLV	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO/AQLV	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO/AQLV	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO/AQLV	Moderate	Moderate	Substantial	Substantial
110% or more of AQO/AQLV	Moderate	Substantial	Substantial	Substantial

- 3.3.5 The matrix shown in Table 11 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

- 3.3.6 Following the prediction of impacts at discrete receptor locations, the IAQM document¹³ provides guidance on determining the overall air quality impact significance of the

¹⁰ LA105: Air Quality, Highways England, 2019.

¹¹ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

¹² Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹³ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.3.7 The IAQM guidance¹⁴ states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

3.3.8 The determination of significance relies on professional judgement and reasoning has been provided as far as practicable. The IAQM guidance¹⁵ suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

Potential Exposure

3.3.9 The proposals have the potential to expose future occupants to elevated pollution levels. In order to assess NO₂, PM₁₀ and PM_{2.5} concentrations across the development site, detailed dispersion modelling was undertaken. The results were subsequently compared with the relevant AQOs and AQLV to determine any potential areas of exceedence and associated constraints to the proposed land use. Reference should be made to Appendix 1 for a full description of the assessment input data.

¹⁴ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

¹⁵ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

4.0 BASELINE

4.1 Introduction

- 4.1.1 Existing air quality conditions in the vicinity of the proposed development site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

4.2 Local Air Quality Management

- 4.2.1 As required by the Environment Act (1995), as amended by the Environment Act (2021), MCC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO₂ are above the AQO within the city. As such, a number of roads within Manchester have been included within the Greater Manchester Combined Authority (GMCA) AQMA. This is described as follows:

"This is the part of the Greater Manchester Combined Authority AQMA located within the Manchester City Council area."

- 4.2.2 The development is located within the AQMA. As such, there is the potential for the exposure of future occupants to poor air quality as well as vehicles travelling to and from the site to increase pollution levels in this sensitive area. This has been considered throughout the assessment.
- 4.2.3 MCC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMA's have been designated.

4.3 Air Quality Monitoring

- 4.3.1 Monitoring of pollutant concentrations is undertaken by MCC throughout their area of jurisdiction. Recent annual mean NO₂ concentrations recorded in the vicinity of the development are shown in Table 12. Exceedences of the AQO are shown in **bold**.

Table 12 Monitoring Results - NO₂

Monitoring Site		Monitored NO ₂ Concentration (µg/m ³)		
		2019	2020	2021
MAN1	Manchester Oxford Road	59.0	36.0	44.0
MA29ANO	Oxford Street	55.4	39.0	44.8
MA72NO	Lockton Close	32.8	24.5	27.5
MA82/83/84NO ^(a)	Manchester Oxford Road	52.0	33.9	40.7

NOTE: (a) Mean of triplicate results

4.3.2 As shown in Table 12, annual mean NO₂ concentrations were above the AQO of 40µg/m³ at the MAN1, MA29ANO and MA82/83/84NO monitors during 2019 and 2021. As these are located at roadside positions within an AQMA, elevated levels would be expected. Concentrations were below the criteria at the MA72NO survey site in recent years.

4.3.3 Pollutant concentrations during 2020 and 2021 were lower than previous years due to a reduction in traffic and associated emissions caused by the COVID-19 pandemic. The results should therefore be viewed with caution.

4.3.4 Recent PM₁₀ concentrations recorded in the vicinity of the site are shown in Table 13.

Table 13 Monitoring Results - PM₁₀

Monitoring Site		Annual Mean PM ₁₀ Concentration (µg/m ³)		
		2019	2020	2021
MAN1	Manchester Oxford Road	26	18	18

4.3.5 As shown in Table 13, annual mean PM₁₀ concentrations were below the AQO of 40µg/m³ at the MAN1 - Manchester Oxford Road monitor in recent years.

4.3.6 Reference should be made to Figure 2 for a map of the survey positions.

4.3.7 MCC do not undertake monitoring of PM_{2.5} within the vicinity of the site.

4.4 **Background Pollutant Concentrations**

4.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 384500, 397500. Data for this location was downloaded from the DEFRA website¹⁶ for the purpose of the assessment and is summarised in Table 14.

Table 14 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m ³)		
	2019	2023	2025
NO ₂	28.25	23.95	22.38
PM ₁₀	14.38	13.67	13.43
PM _{2.5}	9.13	8.64	8.47

4.4.2 As shown in Table 14, predicted background NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant AQOs and Interim Target at the development site.

4.5 **Sensitive Receptors**

4.5.1 A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for dust and road vehicle exhaust emission impacts in the following Sections.

Construction Phase Sensitive Receptors

4.5.2 Receptors sensitive to potential dust impacts from demolition, earthworks and construction were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access. These are summarised in Table 15.

¹⁶ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

Table 15 Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	10 - 100	0
Up to 50	More than 100	0
Up to 100	More than 100	-
Up to 350	More than 100	-

- 4.5.3 Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access. These are summarised in Table 16.

Table 16 Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	More than 100	0
Up to 50	More than 100	0

- 4.5.4 There are no ecological receptors within 50m of the development boundary or the access route within 500m of the site entrance. As such, ecological impacts have not been assessed further within this report.
- 4.5.5 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 17.

Table 17 Additional Area Sensitivity Factors to Potential Dust Impacts

Guidance	Comment
Whether there is any history of dust generating activities in the area	The baseline review indicated a number of developments have recently been constructed in the vicinity of the site. As such, there may have been a history of dust generation in recent years

Guidance	Comment
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal indicated a number of applications have been submitted within 700m of the site. It is therefore possible that there will be concurrent dust generation should these schemes be granted consent and the construction phases overlap with the proposed development
Pre-existing screening between the source and the receptors	There is no significant screening around the site boundary
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	As shown in Figure 3, the predominant wind bearing at the site is from the south. As such, receptors to the north of the boundary are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is likely that it will extend over one year. The sensitivity of nearby receptors is unlikely to change during this time
Any known specific receptor sensitivities which go beyond the classifications given in the document	No specific receptor sensitivities identified during the baseline assessment

4.5.6 Based on the criteria shown in Table 17, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties.

4.5.7 The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.2, is shown in Table 18.

Table 18 Sensitivity of the Surrounding Area to Potential Dust Impacts

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Medium

Operational Phase Sensitive Receptors

4.5.8 Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 19.

Table 19 Operational Phase Road Vehicle Exhaust Emissions Sensitive Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Kincardine Road	384656.3	397126.7
R2	Residential - Grosvenor Street	384663.2	397224.0
R3	Residential - Hanworth Close	384785.0	397165.0
R4	Residential - Mawson Road	384894.7	397049.6
R5	Residential - Brunswick Street	384994.0	396805.1
R6	Residential - Kincardine Road	384863.6	396929.2
R7	Residential - Oxford Road	384463.8	396900.1
R8	Residential - Grosvenor Street	384510.9	396733.8

4.5.9 Reference should be made to Figure 4 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

5.0 ASSESSMENT

5.1 Introduction

- 5.1.1 There is the potential for air quality impacts as a result of the construction and operation of the proposed development. These are assessed in the following Sections.

5.2 Construction Phase Assessment

Step 1

- 5.2.1 The undertaking of activities such as demolition, excavation, ground works, cutting, construction, concrete batching and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul roads and highway surfaces.
- 5.2.2 The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.
- 5.2.3 The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

Step 2

Demolition

- 5.2.4 Demolition will be undertaken at the start of the construction phase and will involve clearance of the existing structures on site. It is estimated that the building volume to be demolished is between 20,000m³ and 50,000m³. In accordance with the criteria outlined in Table 18, the magnitude of potential dust emissions from demolition is therefore **medium**.

5.2.5 Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 8, the development is considered to be a **medium** risk site for dust soiling as a result of demolition activities.

5.2.6 Table 18 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for human health impacts as a result of demolition activities.

Earthworks

5.2.7 Earthworks may involve excavating material, haulage, tipping and stockpiling. The area of the proposed development site is greater than 10,000m². In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **large**.

5.2.8 Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **high** risk site for dust soiling as a result of earthworks.

5.2.9 Table 18 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health impacts as a result of earthworks.

Construction

5.2.10 Due to the size of the proposals, the total building volume was estimated to be greater than 100,000m³. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **large**.

5.2.11 Table 18 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **high** risk site for dust soiling as a result of construction activities.

5.2.12 Table 18 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health impacts as a result of construction activities.

Trackout

- 5.2.13 Based on the site area and existing hard standing provision, it is anticipated that the unpaved road length will be less than 50m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **small**.
- 5.2.14 Table 18 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **low** risk site for dust soiling as a result of trackout activities.
- 5.2.15 Table 18 indicates the sensitivity of the area to human health impacts is **medium**. In accordance with the criteria outlined in Table 10, the development is considered to be a **negligible** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

- 5.2.16 A summary of the risk from each dust generating activity is provided in Table 20.

Table 20 Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	High	High	Low
Human Health	Low	Low	Low	Negligible

- 5.2.17 As indicated in Table 20, the potential risk of dust soiling is **high** from construction and earthworks, **medium** from demolition and **low** from trackout. The potential risk of human health effects is **low** from demolition, earthworks and construction and **negligible** from trackout.
- 5.2.18 It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase.

Step 3

5.2.19 The IAQM guidance¹⁷ provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 21. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

Table 21 Fugitive Dust Emission Mitigation Measures

Issue	Control Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment 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 LA
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the LA upon request • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, 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
Monitoring	• Undertake daily on-site and off-site inspection to monitor dust, record inspection results, and make the log available to the LA upon request • Carry out regular site inspections, record inspection results, and make an inspection log available to the LA upon request • Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions

¹⁷ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2017.

Issue	Control Measure
Site preparation	- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible - Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive 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 - 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 - Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable - Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
Operations	- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques - Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate - Use enclosed chutes and conveyors and covered skips - Minimise drop heights and use fine water sprays wherever appropriate - Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	Avoid bonfires or burning of waste materials
Demolition	- Ensure effective water suppression is used during demolition operations - Avoid explosive blasting, using appropriate manual or mechanical alternatives - Bag and remove any biological debris or damp down such material before demolition
Earthworks	- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable - Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil as soon as practicable - Only remove cover in small areas during work and not all at once
Construction	- Avoid scabbling (roughening of concrete surfaces) if possible - Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out - Ensure bulk cement and other fine power materials are delivered in enclosed tankers and stored in silos with suitable emissions control systems to prevent escape of material and overfilling during delivery

Issue	Control Measure
Trackout	• Use water-assisted dust sweeper on access and local roads, if required • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system, if required

Step 4

5.2.20 Assuming the relevant mitigation measures outlined in Table 21 are implemented, the residual impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance¹⁸.

5.3 Operational Phase Assessment

5.3.1 Vehicle movements associated with the operation of the proposal will generate exhaust emissions on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site, as well as consider potential exposure of occupants to AQO and Interim Target exceedences.

5.3.2 The assessment considered the following scenarios:

- 2019 - Verification;
- 2025 - DM; and,
- 2025 - DS.

5.3.3 The DM scenario (i.e. without the scheme) included baseline traffic data, inclusive of anticipated growth and committed developments, for the relevant assessment year. The DS scenario (i.e. with the scheme) included baseline traffic data, inclusive of anticipated growth and committed developments for the relevant assessment year, in addition to predicted vehicle trips associated with the operation of the proposals.

¹⁸ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

5.3.4 For the purpose of the assessment traffic data for 2025 was utilised as the development opening year. Air quality has been predicted to improve between 2019 and 2025. However, in order to provide a robust assessment, background concentrations for 2019 were utilised within the dispersion model. The use of 2022 traffic data and 2025 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

5.3.5 Reference should be made to Appendix 1 for full assessment input details.

Potential Development Impacts

Predicted Concentrations

5.3.6 Annual mean NO₂ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 22.

Table 22 Predicted Annual Mean NO₂ Concentrations

Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Kincardine Road	31.05	30.37	-0.68 ^(a)
R2	Residential - Grosvenor Street	30.80	30.59	-0.21 ^(a)
R3	Residential - Hanworth Close	29.54	29.45	-0.09 ^(a)
R4	Residential - Mawson Road	29.05	29.01	-0.04 ^(a)
R5	Residential - Brunswick Street	30.04	30.03	-0.01 ^(a)
R6	Residential - Kincardine Road	29.66	29.63	-0.03 ^(a)
R7	Residential - Oxford Road	29.67	29.67	0.00
R8	Residential - Grosvenor Street	31.24	31.15	-0.09 ^(a)

Note: (a) Beneficial concentration change due to removal of Inchley Road, and changes to street geometry, as a result of the proposals.

5.3.7 As indicated in Table 22, predicted annual mean NO₂ concentrations were below the relevant AQO at all sensitive receptors in both scenarios.

5.3.8 Reference should be made to Figures 5 and 6 for graphical representations of annual mean NO₂ concentrations across the assessment area for the DM and DS scenarios, respectively.

5.3.9 Annual mean PM₁₀ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 23.

Table 23 Predicted Annual Mean PM₁₀ Concentrations

Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Kincardine Road	15.38	15.12	-0.26 ^(a)
R2	Residential - Grosvenor Street	15.27	15.19	-0.08 ^(a)
R3	Residential - Hanworth Close	14.83	14.80	-0.03 ^(a)
R4	Residential - Mawson Road	14.67	14.65	-0.01 ^(a)
R5	Residential - Brunswick Street	14.98	14.97	0.00
R6	Residential - Kincardine Road	14.87	14.86	-0.01 ^(a)
R7	Residential - Oxford Road	14.94	14.94	0.00
R8	Residential - Grosvenor Street	15.40	15.36	-0.03 ^(a)

Note: (a) Beneficial concentration change due to removal of Inchley Road, and changes to street geometry, as a result of the proposals.

5.3.10 As indicated in Table 23, predicted annual mean PM₁₀ concentrations were below the relevant AQO at all sensitive receptors in both scenarios.

5.3.11 Reference should be made to Figures 7 and 8 for graphical representations of annual mean PM₁₀ concentrations across the assessment area for the DM and DS scenarios, respectively.

5.3.12 Annual mean PM_{2.5} concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 24.

Table 24 Predicted Annual Mean PM_{2.5} Concentrations

Receptor		Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Kincardine Road	9.69	9.54	-0.14 ^(a)
R2	Residential - Grosvenor Street	9.62	9.58	-0.04 ^(a)
R3	Residential - Hanworth Close	9.38	9.36	-0.02 ^(a)
R4	Residential - Mawson Road	9.29	9.28	-0.01 ^(a)
R5	Residential - Brunswick Street	9.46	9.46	0.00
R6	Residential - Kincardine Road	9.40	9.40	-0.01 ^(a)
R7	Residential - Oxford Road	9.43	9.43	0.00
R8	Residential - Grosvenor Street	9.70	9.68	-0.02 ^(a)

Note: (a) Beneficial concentration change due to removal of Inchley Road, and changes to street geometry, as a result of the proposals.

5.3.13 As indicated in Table 24, predicted annual mean PM_{2.5} concentrations were below the AQLV and Interim Target at all sensitive receptors in both the DM and DS scenarios.

5.3.14 Reference should be made to Figures 9 and 10 for graphical representations of annual mean PM_{2.5} concentrations across the assessment area for the DM and DS scenarios, respectively.

Predicted Impacts

5.3.15 Predicted impacts on annual mean NO₂ concentrations at the sensitive receptor locations are summarised in Table 25.

Table 25 Predicted Impacts - NO₂

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Kincardine Road	76 - 94% of AQO	2 - 5	Slight
R2	Residential - Grosvenor Street	76 - 94% of AQO	1	Negligible

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R3	Residential - Hanworth Close	Below 75% of AQO	0	Negligible
R4	Residential - Mawson Road	Below 75% of AQO	0	Negligible
R5	Residential - Brunswick Street	76 - 94% of AQO	0	Negligible
R6	Residential - Kincardine Road	Below 75% of AQO	0	Negligible
R7	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R8	Residential - Grosvenor Street	76 - 94% of AQO	0	Negligible

5.3.16 As indicated in Table 25, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations except R1 - Residential - Kincardine Road, concentrations were predicted to be **slight**.

5.3.17 Predicted impacts on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in Table 26.

Table 26 Predicted Impacts - PM₁₀

Receptor		Predicted Annual Mean PM ₁₀ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Kincardine Road	Below 75% of AQO	2 - 5	Negligible
R2	Residential - Grosvenor Street	Below 75% of AQO	0	Negligible
R3	Residential - Hanworth Close	Below 75% of AQO	0	Negligible
R4	Residential - Mawson Road	Below 75% of AQO	0	Negligible
R5	Residential - Brunswick Street	Below 75% of AQO	0	Negligible
R6	Residential - Kincardine Road	Below 75% of AQO	0	Negligible
R7	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R8	Residential - Grosvenor Street	Below 75% of AQO	0	Negligible

5.3.18 As indicated in Table 26, impacts on annual mean PM₁₀ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

5.3.19 Predicted impacts on annual mean PM_{2.5} concentrations at the sensitive receptor locations are summarised in Table 27.

Table 27 Predicted Impacts - PM_{2.5}

Receptor		Predicted Annual Mean PM _{2.5} Concentration	Predicted Concentration Change as Proportion of AQLV (%)	Impact Significance
R1	Residential - Kincardine Road	Below 75% of AQLV	2 - 5	Negligible
R2	Residential - Grosvenor Street	Below 75% of AQLV	0	Negligible
R3	Residential - Hanworth Close	Below 75% of AQLV	0	Negligible
R4	Residential - Mawson Road	Below 75% of AQLV	0	Negligible
R5	Residential - Brunswick Street	Below 75% of AQLV	0	Negligible
R6	Residential - Kincardine Road	Below 75% of AQLV	0	Negligible
R7	Residential - Oxford Road	Below 75% of AQLV	0	Negligible
R8	Residential - Grosvenor Street	Below 75% of AQLV	0	Negligible

5.3.20 As indicated in Table 27, impacts on annual mean PM_{2.5} concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

Potential Exposure

5.3.21 The proposed development has the potential to cause the exposure of future occupants to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Appendix 1 to quantify air quality conditions at the site. Reference should be made to Figures 6, 8 and 10 for graphical representations of annual mean NO₂, PM₁₀ and PM_{2.5} concentrations.

5.3.22 As shown in Figure 6, annual mean NO₂ concentrations were predicted to be below the AQO of 40µg/m³ across the site. The maximum level was 31.62µg/m³.

5.3.23 As shown in Figure 8, annual mean PM₁₀ concentrations were predicted to be below the AQO of 40µg/m³ across the site. The maximum level was 23.42µg/m³.

5.3.24 As shown in Figure 10, annual mean PM_{2.5} concentrations were predicted to be below the AQLV of 20µg/m³ across the site. The maximum level was 15.04µg/m³. This is above the Interim Target of 12µg/m³. However, it is anticipated that vehicle exhaust emission rates and background concentrations will improve in future years through local and national policy initiatives. Therefore, annual mean PM_{2.5} concentrations will reduce across the proposed development site by 2028.

5.3.25 Based on the assessment results, future occupants are not predicted to be exposed to pollutant concentrations above the AQOs or AQLV. The site is therefore considered to be suitable for residential use from an air quality perspective.

Overall Impact Significance

5.3.26 The overall significance of road traffic emission impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations and the considerations outlined previously. Further justification is provided in Table 28.

Table 28 Overall Impact Significance of Road Vehicle Exhaust Emission Impacts

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were below the relevant AQOs, AQLV and Interim Target at all sensitive receptors in the DM scenario It is considered unlikely that future air quality conditions will change significantly in the absence of the development given the established nature of the area
The extent of current and future population exposure to the impacts	The development is not predicted to affect the population exposed to exceedences of the AQOs or AQLV
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	The assessment assumed that background pollutant levels will not reduce in future years. This provides worst-case results when compared with DEFRA and National Highways methodologies

Guidance	Comment
	Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

5.3.27 The IAQM guidance¹⁹ states that only if the impact is **moderate** or **substantial**, the effect is considered **significant**. As impacts were predicted to be **negligible**, overall effects are considered **not significant**, in accordance with the stated methodology.

¹⁹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

6.0 MITIGATION

6.1.1 A number of mitigation measures have also been included within the development in accordance with the requirements of the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'²⁰ to encourage the use of sustainable transport modes, manage vehicle flow and reduce pollution around the site. Table 29 describes the good practice principles detailed in the IAQM guidance along with how each has been addressed with regards to the proposals.

Table 29 Good Practice Design Principles

Phase	Principle	Action
Design Phase	New developments should not contravene the Council's Air Quality Action Plan ²¹ , or render any of the measures unworkable	It is confirmed that the proposals will not contravene MCC's Air Quality Action Plan, or render any of the measures unworkable
	Wherever possible, new developments should not create a new "street canyon", or a building configuration that inhibits effective pollution dispersion	Although the proposed development will lead to the generation of a street canyon along Upper Brook Street, this is considered acceptable considering the modelled concentrations indicated future occupants are not exposed to elevated pollution concentrations at the site
	Delivering sustainable development should be the key theme of any application	The proposals have been designed to encourage sustainable behaviours, such as active and public transport due to its close proximity to the city centre, local bus routes and train lines, as well as local amenities
	New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads, or directing combustion generated pollutants through or chimney stacks	As outlined previously, predicted pollutant concentrations are below the relevant AQOs and AQLV at the site

²⁰ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

²¹ Greater Manchester Air Quality Action Plan (GMAQAP) 2016-2021, GMCA, 2016.

Phase	Principle	Action
Operational Phase	The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1,000m ² of commercial floor space. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made	No car parking is provided as part of the scheme. As such, there is no requirement for EV charging points
	Where development generates significant additional traffic, provision of a detailed Travel Plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety	A Travel Plan will be provided if requested by MCC. This can be secured through planning condition if necessary
	All gas-fired boilers to meet a minimum standard of <40mgNO_x/kWh. All gas-fired CHP plant to meet a minimum emissions standard of: Spark ignition engine: 250mgNO_x/Nm³; Compression ignition engine: 400mgNO_x/Nm³; Gas turbine: 50mgNO_x/Nm³. A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of: Solid biomass boiler: 275mgNO_x/Nm³ and 25mgPM/Nm³	Any boilers included in the development will be provisioned in accordance with the relevant requirements

6.1.2 It is considered the above methods will minimise potential air quality impacts associated with the scheme and are sufficient for a development of this scale and nature.

7.0 CONCLUSION

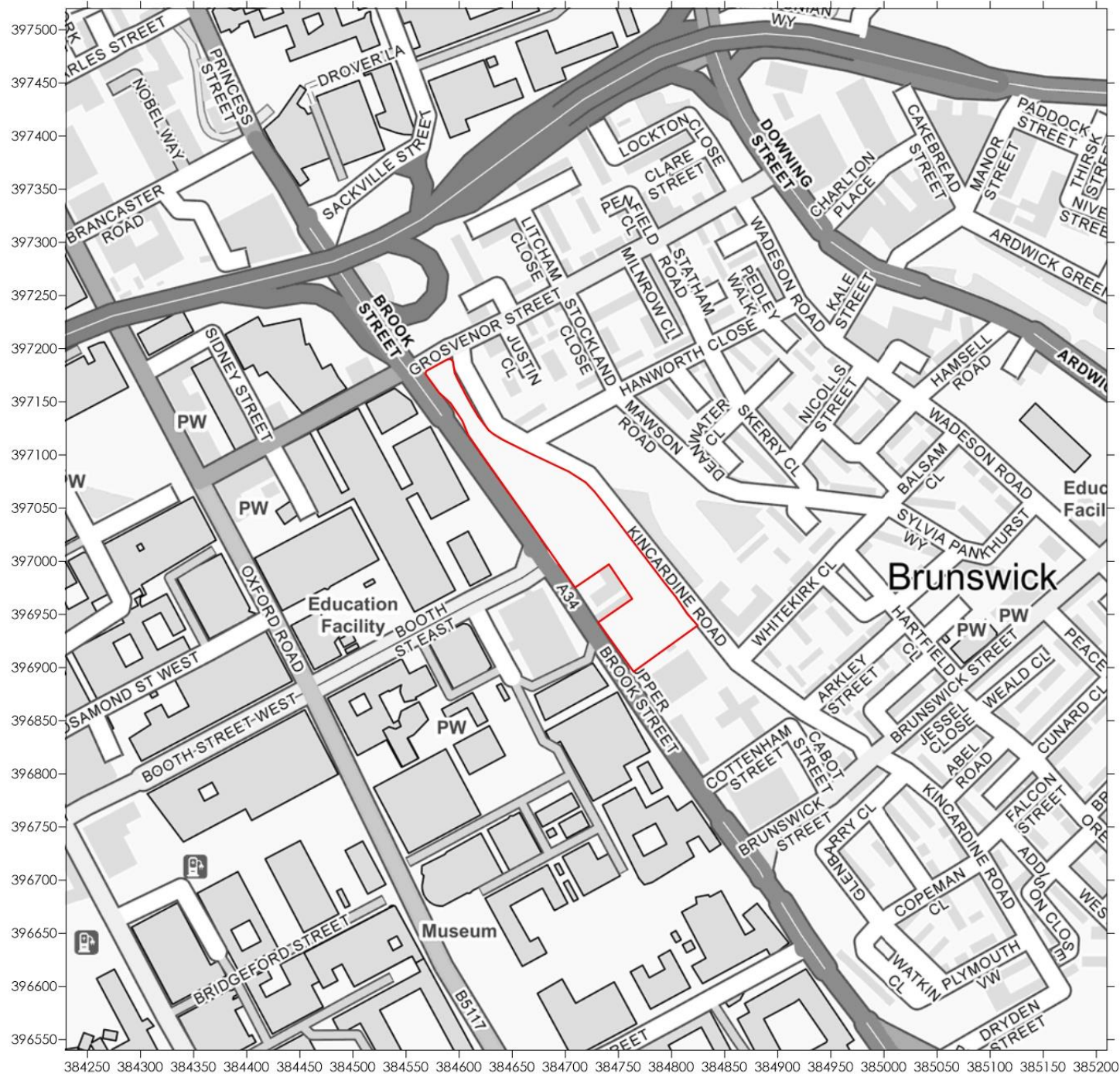
- 7.1.1 Redmore Environmental Ltd was commissioned by Property Alliance Group/ Moda Living/ Williams Motor Co (Holdings) to undertake an Air Quality Assessment in support of a planning application for a development on land off Upper Brook Street, Manchester.
- 7.1.2 The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the development during operation, as well as expose future occupants to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential effects as a result of the scheme.
- 7.1.3 During the construction phase of the development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by demolition, earthworks, construction and trackout activities was predicted to be **not significant**.
- 7.1.4 Dispersion modelling was undertaken in order to predict operational phase air quality effects as a result of emissions associated with traffic from the development. Results were subsequently verified using local monitoring data.
- 7.1.5 Review of the dispersion modelling results indicated that impacts on annual mean NO₂, PM₁₀ and PM_{2.5} concentrations as a result of traffic generated by the development were predicted to be **negligible** at all sensitive receptor locations except R1 - Residential - Kincardine Road, concentrations were predicted to be **slight**.
- 7.1.6 The results of the assessment also demonstrated that predicted pollution levels were below the relevant AQOs and AQLV across the development. As such, the site is considered suitable for the proposed use from an air quality perspective.
- 7.1.7 Following consideration of the relevant issues, air quality impacts as a result of the operation of the development were considered to be **not significant**, in accordance with the IAQM guidance.
-

7.1.8 Based on the assessment results, air quality factors are not considered a constraint to the development.

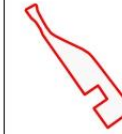
8.0 **ABBREVIATIONS**

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DM	Do-Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EB	Eastbound
GMCA	Greater Manchester Combined Authority
EFT	Emission Factor Toolkit
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
MCC	Manchester City Council
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
WB	Westbound
Z ₀	Roughness length

Figures



Legend



Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Upper Brook Street Masterplan
(Williams Motor Co (Holdings)/
Alliance UBS Limited)

Project Reference

5327-1

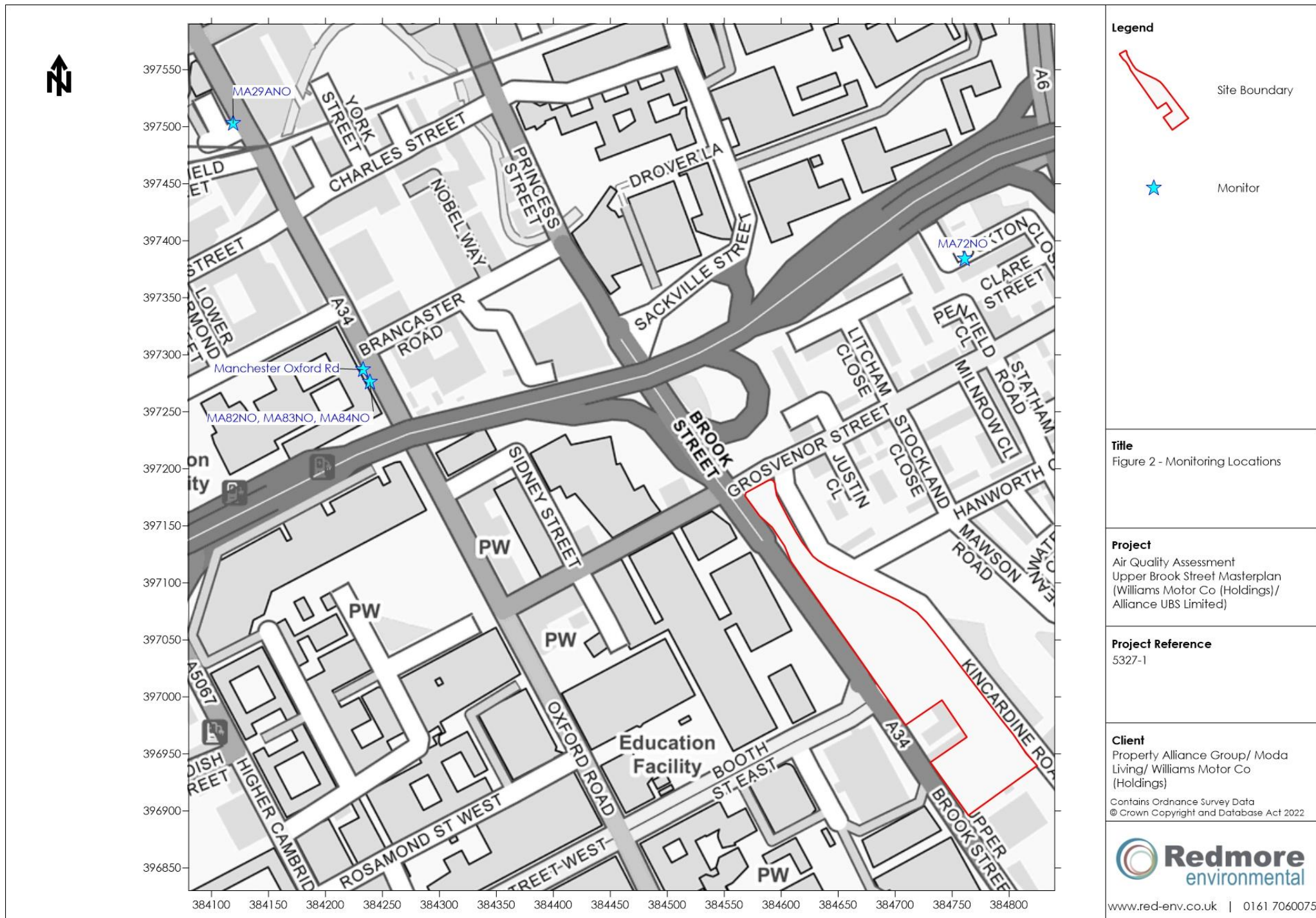
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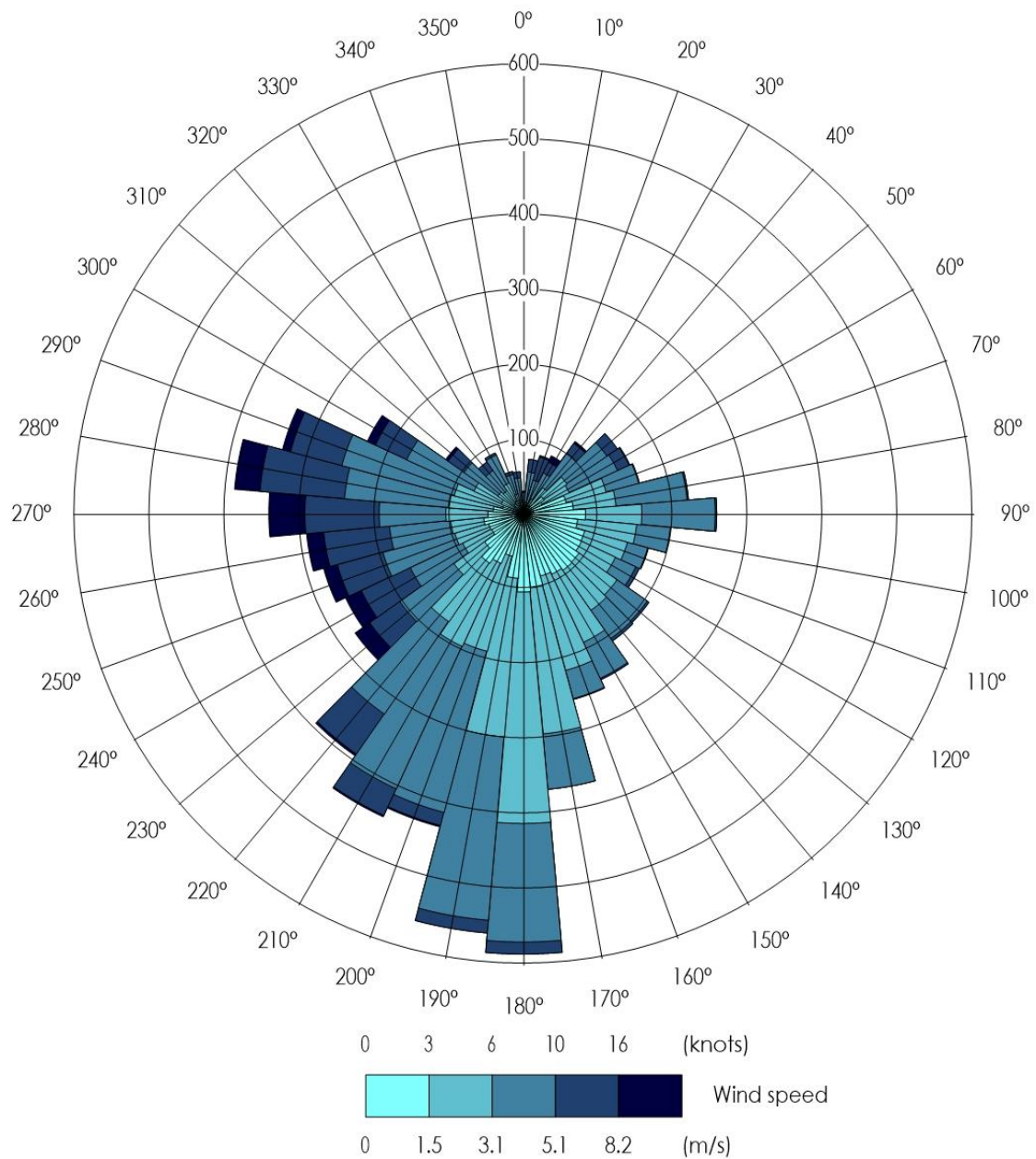
Property Alliance Group/ Moda
Living/ Williams Motor Co
(Holdings)

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Legend

Title

Figure 3 - Wind Rose of 2019
Manchester Airport
Meteorological Data

Project

Air Quality Assessment
Upper Brook Street Masterplan
(Williams Motor Co (Holdings)/
Alliance UBS Limited)

Project Reference

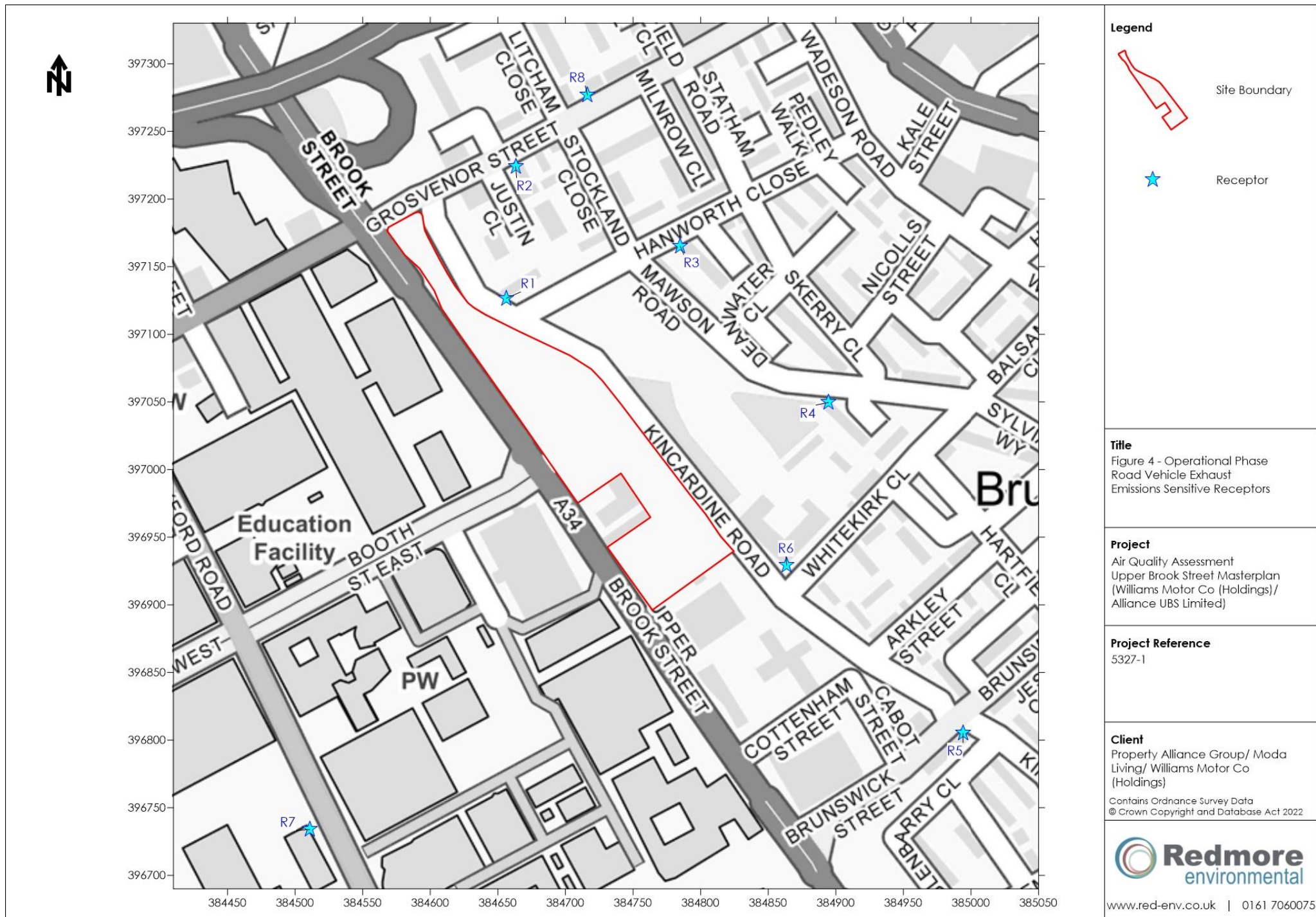
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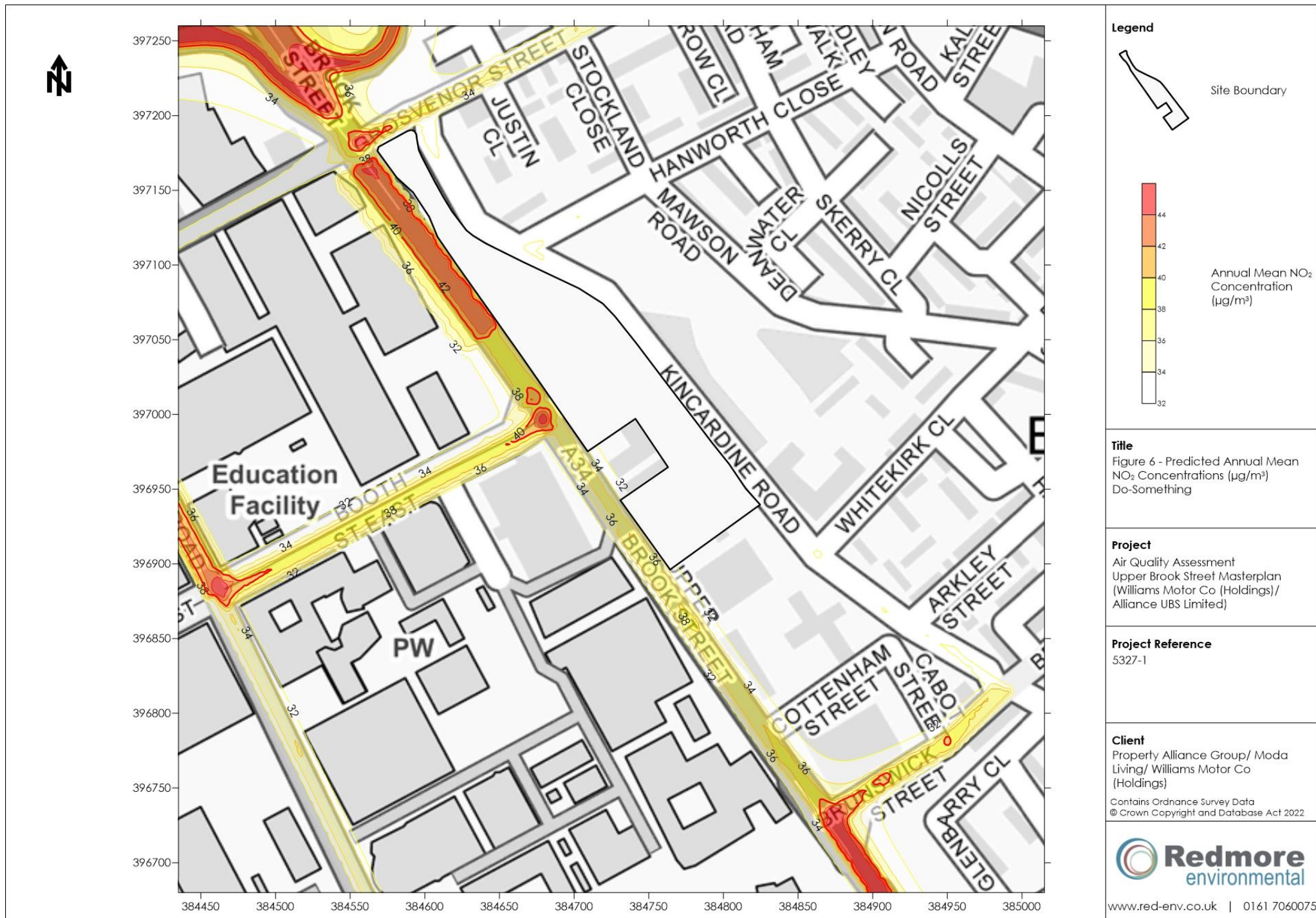
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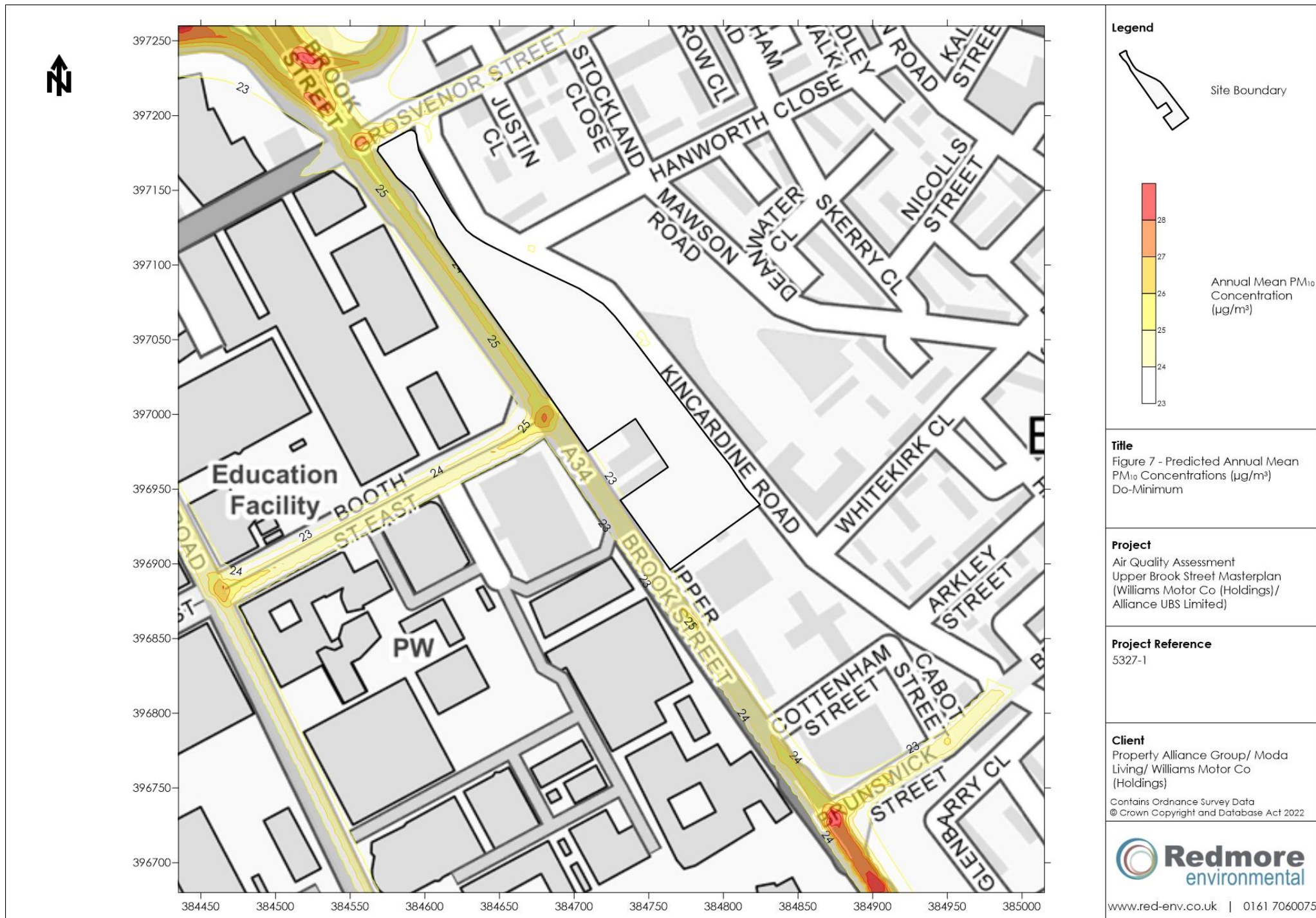


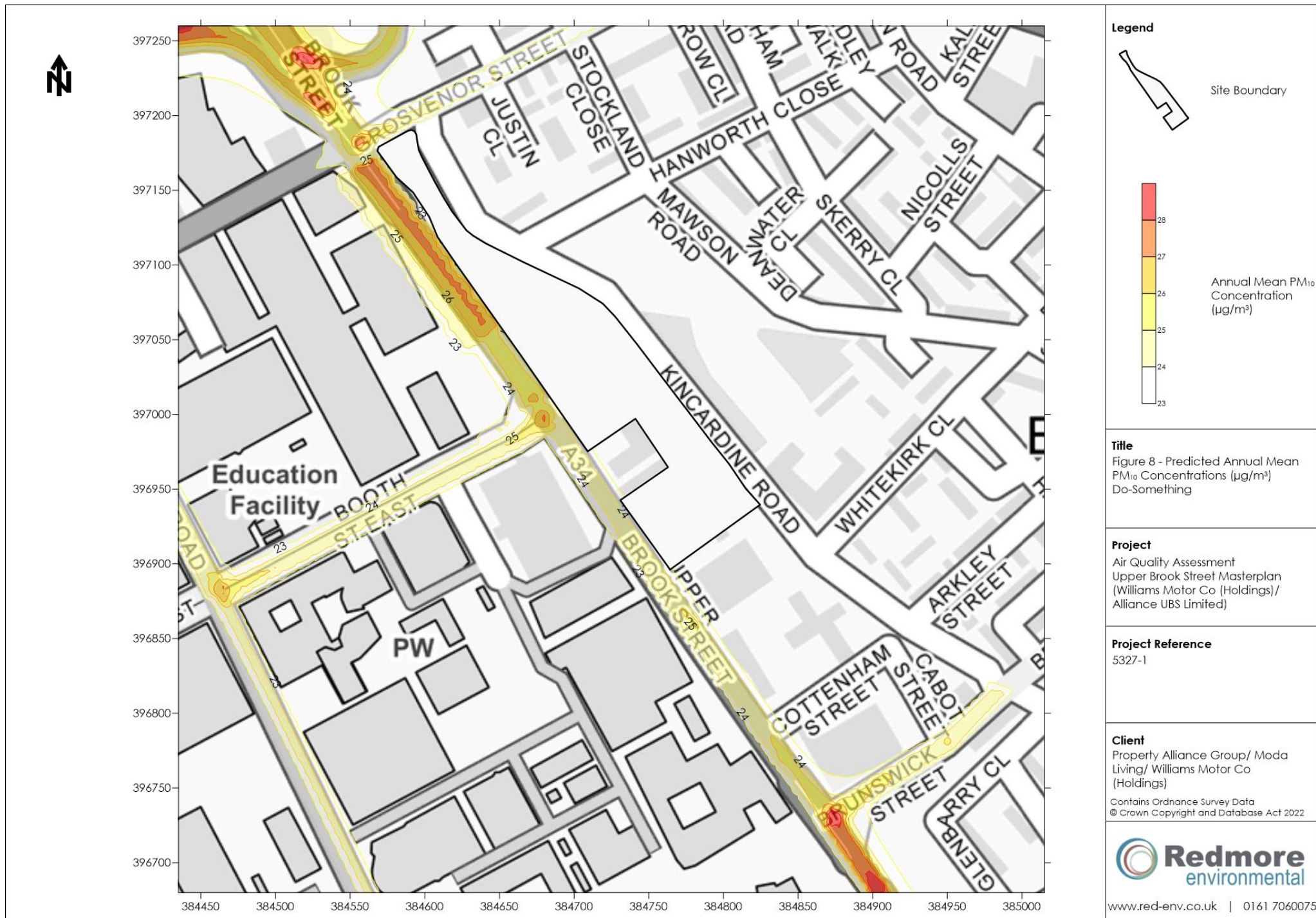
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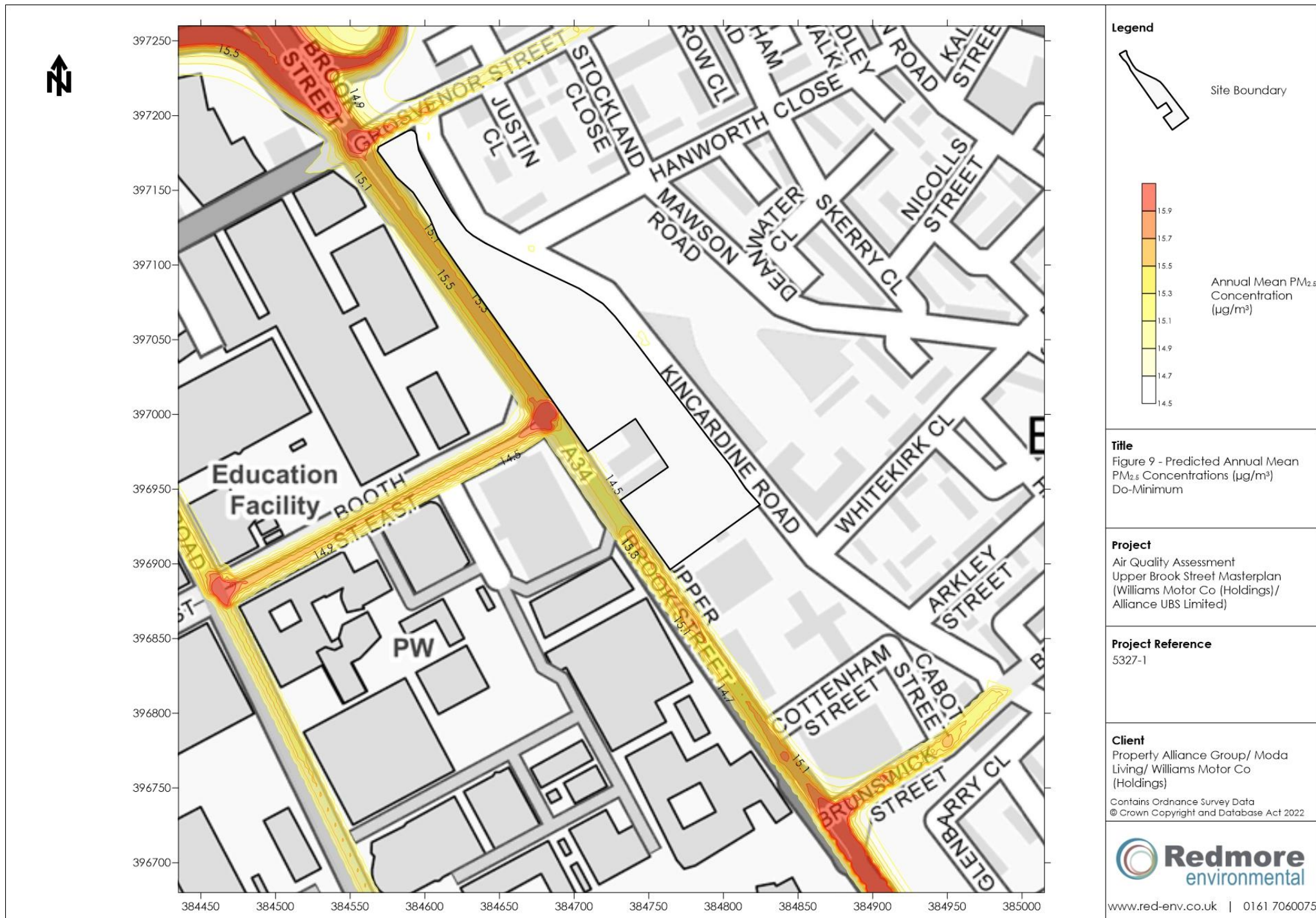


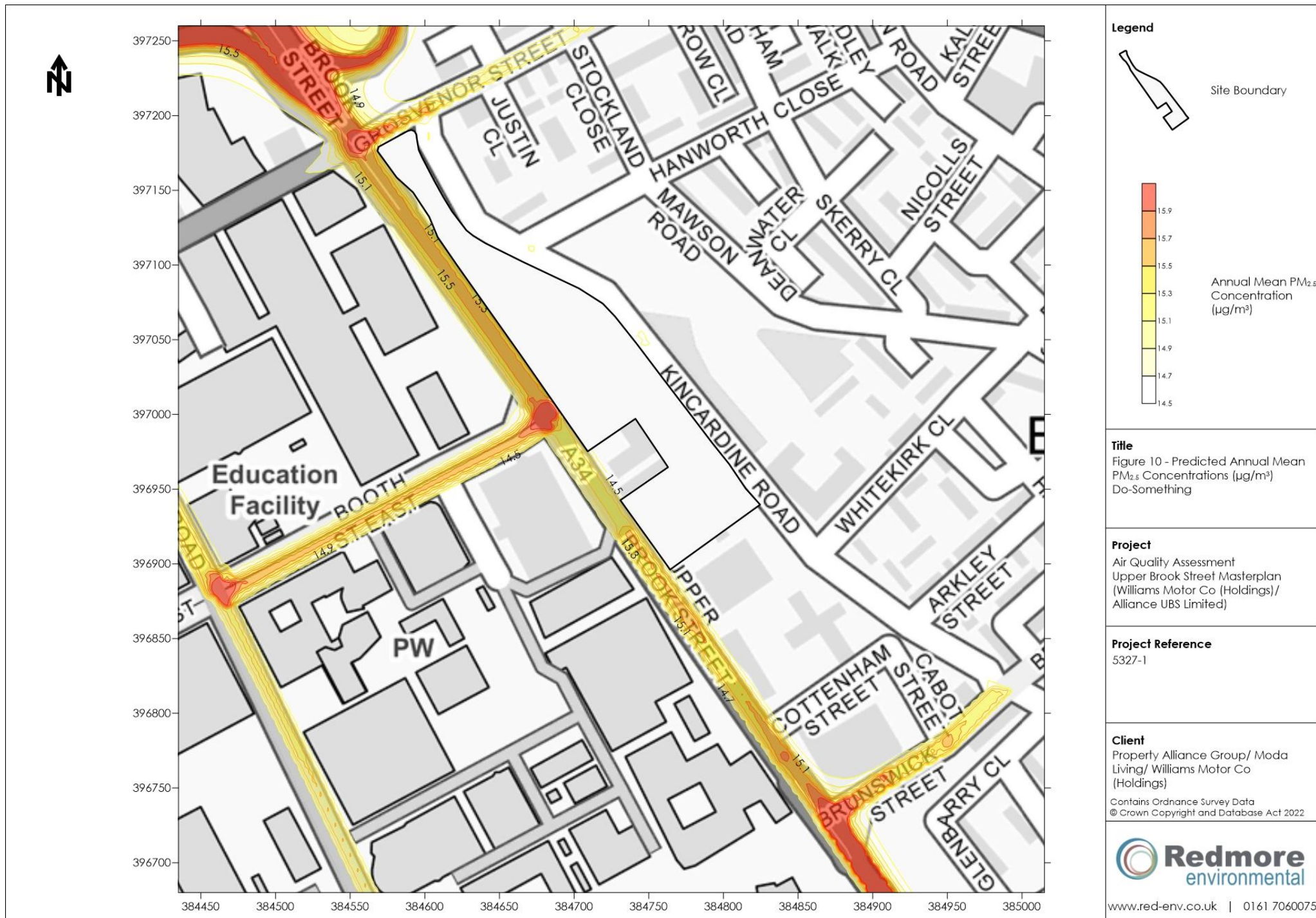


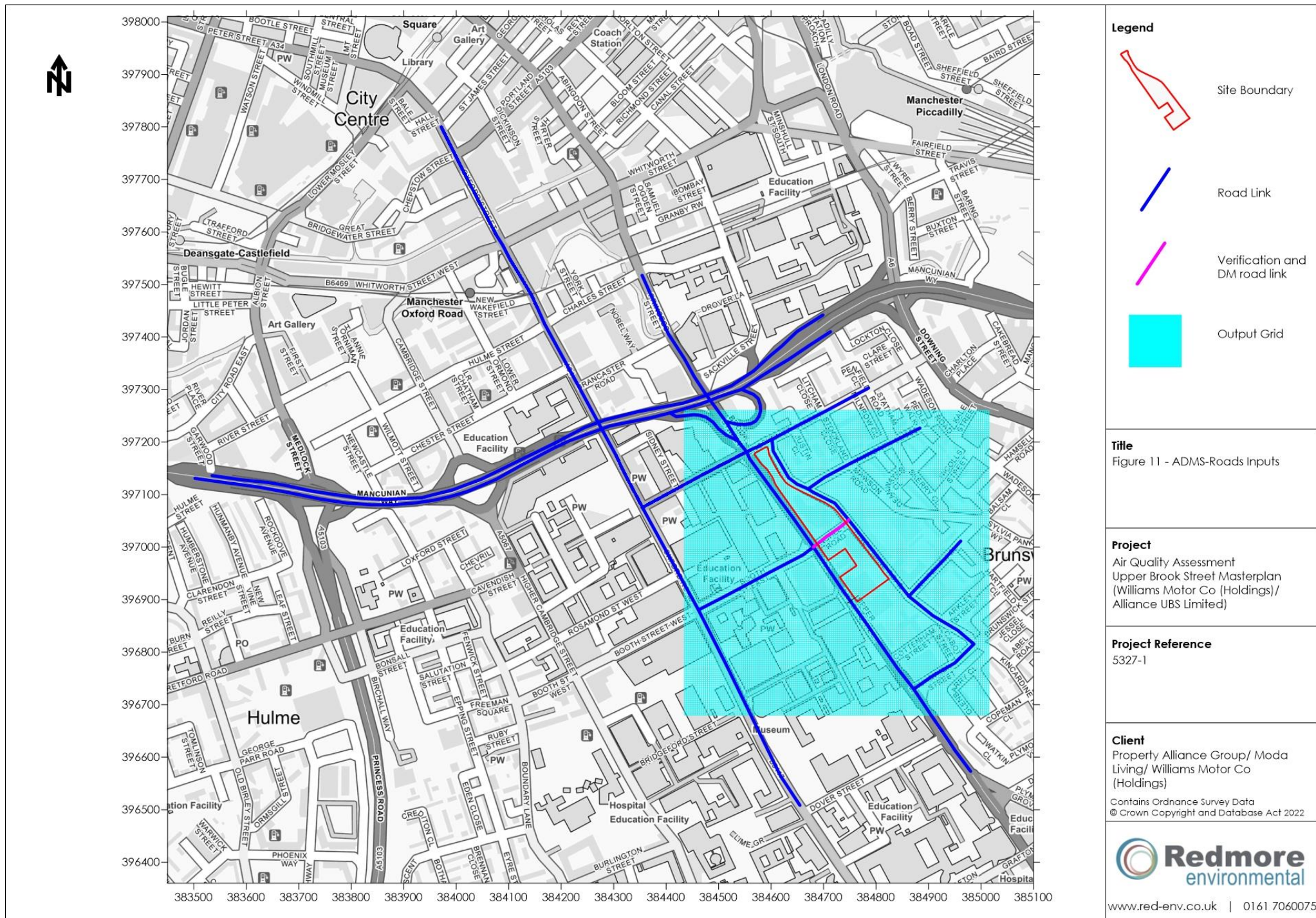












Appendix 1 - Assessment Input Data

Introduction

The proposed development has the potential to cause air quality impacts as a result of exhaust emissions associated with vehicles travelling to and from the site, as well as expose future occupants to elevated pollution levels. In order to assess NO₂, PM₁₀ and PM_{2.5} concentrations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.1.3). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

Additional options can also be selected within the ADMS-Roads user interface in order to take account of site specific characteristic that may affect model outputs, such as canyons.

The relevant inputs are detailed in the following Sections.

Assessment Area

Ambient concentrations were predicted over the area NGR: 384435, 396680 385015 to 385015, 397260. One Cartesian grid was used within the model to produce data suitable for contour

plotting using the Surfer software package. Reference should be made to Figure 11 for a graphical representation of the assessment grid extents.

Receptors potentially sensitive to changes in pollutant concentrations were included in the assessment as outlined in the main report text.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as HDV proportion, was provided by Focus Transport Planning, the Transport Consultants for the scheme.

Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the baseline assessment is provided in Table A1.1.

Table A1.1 Traffic Data - Verification

Link		Verif. 24-Hour AADT Flow	HDV Prop. of Fleet (%)	Road Width (m)	Mean Vehicle Speed (km/h)
L1	Oxford Street	5,463	43.58	7.7	30
L2	Oxford Street approaching Whitworth Street junction	5,463	43.58	7.7	20
L3	Oxford Street exiting Whitworth Street junction	5,463	43.58	7.7	20
L4	Oxford Street between Whitworth Street and Charles Street	5,463	43.58	7.7	20
L5	Oxford Street approaching Charles Street junction	5,463	43.58	10.5	10
L6	Oxford Road exiting Charles Street junction	5,463	43.58	11.1	10
L7	Oxford Road between Charles Street and Mancunian Way	5,463	43.58	8.9	20
L8	Oxford Road	5,463	43.58	10.1	20
L9	Upper Mancunian Way - westbound (WB)	43,882	4.15	8.3	60
L10	Upper Mancunian Way - WB	43,882	4.15	8.3	60

Link		Verif. 24-Hour AADT Flow	HDV Prop. of Fleet (%)	Road Width (m)	Mean Vehicle Speed (km/h)
L11	Upper Mancunian Way - eastbound (EB)	46,903	3.65	8.5	60
L12	Upper Mancunian Way - EB	46,903	3.65	8.5	60
L13	Oxford Road, south of Cavendish Street	5,463	43.58	12.5	20
L14	Upper Mancunian Way - WB slip road	10,971	4.15	6.8	20
L15	Upper Mancunian Way - WB, after slip road	41,466	4.39	11.1	60
L16	A34 - Upper Brook Street slip road	10,971	4.15	6.9	20
L17	A57 (M) - WB	22,813	4.11	13.4	60
L18	A57 (M) - EB	24,385	3.92	12.3	60
L19	A34 - Upper Brook Street, south of site	25,845	2.09	15.9	50
L20	A34 - Upper Brook Street, south of Hanworth Close	18,317	3.24	16.4	50
L21	A34 - Upper Brook Street, north of Hanworth Close	18,317	3.24	17.2	50
L22	A34 - Upper Brook Street, north of Grosvenor Street	18,317	3.24	20.2	50
L23	Princess Street	8,081	4.50	11.2	40
L24	Booth-Street-East	11,137	1.72	9.2	30
L25	Oxford Road	5,244	43.58	8.2	40
L26	Grosvenor Street, west of Upper Brook Street	1,931	7.27	8.2	30
L27	A34 - Upper Brook Street, south of Booth-Street-East	25,845	2.09	10.5	50
L28	A34 - Upper Brook Street, south of Brunswick Street	25,164	2.03	9.8	50
L29	Brunswick Street	8,991	1.87	9.4	30
L30	Grosvenor Street, east of Upper Brook Street	3,218	1.51	5.4	30
L31	Kincardine Road, north of Hanworth Close	1,570	1.55	6.4	30
L32	Hanworth Close	853	0.13	5.3	30
L33	Kincardine Road, south of Hanworth Close	2,027	1.25	5.4	30
L34	Whitekirk Close	556	1.19	4.9	30
L35	Kincardine Road, south of Whitekirk Close	307	1.44	5.2	30

Link		Verif. 24-Hour AADT Flow	HDV Prop. of Fleet (%)	Road Width (m)	Mean Vehicle Speed (km/h)
L36	Inchley Road	3,145	1.48	10.9	25
L37	Grosvenor Street, east of Kincardine Road	4,114	1.45	7.6	30

It should be noted that Inchley Road will be removed as part of the proposed development. This will result in changes to vehicle flows in the vicinity of the site as a result of traffic re-routing. A summary of the traffic data used in the DM and DS scenarios is provided in Table A1.2.

Table A1.2 Traffic Data - DM and DS Scenarios

Link		24-Hour AADT Flow		HDV Prop. of Fleet (%)		Road Width (m)	Mean Vehicle Speed (km/h)
		DM 2025	DS 2025	DM 2025	DS 2025		
L1	Oxford Street	5,691	5,699	43.58	43.53	14.4	25
L2	Oxford Street approaching Whitworth Street junction	5,691	5,699	43.58	43.53	14.4	25
L3	Oxford Street exiting Whitworth Street junction	5,691	5,699	43.58	43.53	16.7	45
L4	Oxford Street between Whitworth Street and Charles Street	5,691	5,699	43.58	43.53	13.3	25
L5	Oxford Street approaching Charles Street junction	5,691	5,699	43.58	43.53	13.5	25
L6	Oxford Road exiting Charles Street junction	5,691	5,699	43.58	43.53	10.8	40
L7	Oxford Road between Charles Street and Mancunian Way	5,691	5,699	43.58	43.53	15.4	25
L8	Oxford Road	5,691	5,699	43.58	43.53	9.4	40
L9	Upper Mancunian Way - WB	45,716	45,759	4.15	4.15	6.3	40
L10	Upper Mancunian Way - WB	45,716	45,759	4.15	4.15	8.2	25
L11	Upper Mancunian Way - EB	48,864	48,864	3.65	3.65	10.4	25
L12	Upper Mancunian Way - EB	48,864	48,906	3.65	3.64	14.7	40
L13	Oxford Road, south of Cavendish Street	5,691	5,699	43.58	43.53	13.1	25

Link		24-Hour AADT Flow		HDV Prop. of Fleet (%)		Road Width (m)	Mean Vehicle Speed (km/h)
		DM 2025	DS 2025	DM 2025	DS 2025		
L14	Upper Mancunian Way - WB slip road	11,429	11,472	4.15	4.15	17.0	25
L15	Upper Mancunian Way - WB, after slip road	43,200	43,200	4.39	4.39	15.7	25
L16	A34 - Upper Brook Street slip road	11,429	11,429	4.15	4.15	15.7	40
L17	A57 (M) - WB	23,767	23,767	4.11	4.11	6.1	25
L18	A57 (M) - EB	25,404	25,447	3.92	3.92	6.1	45
L19	A34 - Upper Brook Street, south of site	14,757	14,761	3.91	3.94	7.4	25
L20	A34 - Upper Brook Street, south of Hanworth Close	19,083	19,273	3.24	3.23	6.4	25
L21	A34 - Upper Brook Street, north of Hanworth Close	19,083	19,273	3.24	3.23	7.2	25
L22	A34 - Upper Brook Street, north of Grosvenor Street	19,083	19,341	3.24	3.21	6.9	25
L23	Princess Street	8,419	8,504	4.50	4.47	6.5	45
L24	Booth-Street-East	11,887	11,888	1.69	1.70	9.9	25
L25	Oxford Road	5,691	5,733	41.84	41.54	8.8	20
L26	Grosvenor Street, west of Upper Brook Street	2,039	2,046	7.21	7.22	9.0	20
L27	A34 - Upper Brook Street, south of Booth-Street-East	14,757	14,761	3.91	3.94	35.0	25
L28	A34 - Upper Brook Street, south of Brunswick Street	26,520	26,522	2.03	2.05	33.0	25
L29	Brunswick Street	10,423	10,425	1.83	1.90	30.0	70
L30	Grosvenor Street, east of Upper Brook Street	4,868	4,870	1.56	1.66	33.0	25
L31	Kincardine Road, north of Hanworth Close	1,044	1,046	1.55	2.22	33.0	25
L32	Hanworth Close	1,211	1,211	0.10	0.10	33.0	70
L33	Kincardine Road, south of Hanworth Close	1,044	1,046	1.55	2.22	18.0	45
L34	Whitekirk Close	549	550	1.26	1.26	29.0	25
L35	Kincardine Road, south of Whitekirk Close	1,269	1,276	7.00	2.00	17.0	25
L36	Inchley Road	3,145	-(a)	1.54	-(a)	22.8	25

Link		24-Hour AADT Flow		HDV Prop. of Fleet (%)		Road Width (m)	Mean Vehicle Speed (km/h)
		DM 2025	DS 2025	DM 2025	DS 2025		
L37	Grosvenor Street, east of Kincardine Road	4,012	4,013	1.54	1.56	21.0	25

Note: (a) Inchley Road will be removed as part of the development.

Reference should be made to Figure 11 for a graphical representation of the road link locations.

Canyons

Where buildings or walls surround roads, pollutant dispersion patterns are altered which can lead to high pollutant concentrations. These street canyons can significantly influence air quality along a road and therefore it is important to take consideration of their effects when undertaking dispersion modelling.

The release of ADMS-Roads version 4.0.1.0 in December 2015 incorporated a number of new features including an advanced street canyon module, which have been retained in version 5.0.1.3. Advanced street canyon modelling allows a number of parameters to be included in the dispersion model in order to predict pollutant dispersion patterns which better reflect air flow within complex urban geometries.

Canyons have five principal effects on dispersion which can influence pollutant concentrations. These are:

- Pollutants are channelled along street canyons;
- Pollutants are dispersed across street canyons by circulating flow at road height;
- Pollutants are trapped in recirculation regions;
- Pollutants leave the canyon through gaps between buildings - as if there was no canyon; and,
- Pollutants leave the canyon from the canyon top.

The combined modelling of these effects will result in concentration patterns unique to each canyon. The parameters used in the assessment are outlined in Table A1.3. It should be noted that where buildings are only present on one side of the road, parameters were purposely included at 0m.

Table A1.3 Verification and DM Canyon Parameters

Link	Parameter (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L1	13.8	25.0	219.4	9.0	25.0	199.4
L2	13.8	25.0	5.0	9.0	25.0	5.0
L3	13.8	25.0	25.0	9.0	25.0	25.0
L4	13.5	25.0	108.0	9.9	10.0	108.0
L5	13	25.0	33.7	7.7	25.0	33.7
L6	10.5	3.0	135.2	12.6	15.0	135.2
L7	13.4	15.0	150.0	9.9	25.0	150.0
L8	10.5	10.6	111.8	0.0	0.0	0.0
L13	13.9	10.0	155.7	9.2	6.0	190.7
L24	15	12.0	91.0	11.4	16.0	159.0
L26	9.2	9.0	129.0	9.1	16.0	164.0

The proposals will affect the street topography along Upper Brook Street. The parameters used in the assessment to represent the future conditions are outlined in Table A1. 4

Table A1. 4 Future Year Canyon Parameters

Link	Parameter (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L1	13.8	25.0	219.4	9.0	25.0	199.4
L2	13.8	25.0	5.0	9.0	25.0	5.0
L3	13.8	25.0	25.0	9.0	25.0	25.0
L4	13.5	25.0	108.0	9.9	10.0	108.0
L5	13.0	25.0	33.7	7.7	25.0	33.7

Link	Parameter (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L6	10.5	3.0	135.2	12.6	15.0	135.2
L7	13.4	15.0	150.0	9.9	25.0	150.0
L8	10.5	10.6	111.8	0.0	0.0	0.0
L13	13.9	10.0	155.7	9.2	6.0	190.7
L20	46.7	12.0	45.0	16.8	15.0	40.0
L21	22.2	12.0	105.0	8.7	80.0	125.0
L24	15.0	12.0	91.0	11.4	16.0	159.0
L26	9.2	9.0	129.0	9.1	16.0	164.0

A choice of two modes is provided for use in the advanced canyon module. Standard mode assumes that each road is part of a continuous network of roads with similar canyon properties. Network mode analyses the road network to determine transport of pollutants between adjoining street canyons, allows for varying concentrations along the canyon and accounts for transport of pollutants out of the end of a canyon. Network mode is considered most accurate for detailed local analysis and as such was selected for use in the model.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 11.0). This has been produced by DEFRA and incorporates COPERT 5.3 vehicle emission factors and fleet information.

Meteorological Data

Meteorological data used in the assessment was taken from Manchester Airport meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Manchester Airport is located at NGR: 381792, 384116, which is approximately 13.2km south-west of the development.

It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 3 for a wind rose of the utilised meteorological data.

Roughness Length

The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1m was used to describe the modelling extents. This is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cities and woodlands'.

A z_0 of 0.2m was used to describe the meteorological site. This is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (min)' due to the large expanse of surrounding flat land use, such as runways and grassland.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe both the modelling extents and the meteorological site. This value is considered appropriate for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

Background Concentrations

Background NO_2 , PM_{10} and $\text{PM}_{2.5}$ concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the development site, as shown in Table 14.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance²².

Verification

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of the assessment, model verification was undertaken for 2019, meteorological data and monitoring results from this year. The choice of 2019 as the verification year aligns with the IAQM position statement 'Use of 2020 and 2021 Monitoring Datasets'²³, which states:

"If you are carrying out an air quality study that includes validation against monitoring data, use 2019 monitoring data as the last typical year"

Monitoring of NO₂ concentrations was undertaken at two locations within the vicinity of roads included in the model during 2019. The results were obtained and the road contributions to total NO_x concentrations calculated following the methodology contained within DEFRA guidance²⁴.

²² Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

²³ Use of 2020 and 2021 Monitoring Datasets, IAQM, 2021.

²⁴ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table A1. 5.

Table A1. 5 NO_x Verification - Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
MAN1	Manchester Oxford Road	59.0	69.19
MA29ANO	Oxford Street	55.4	60.04

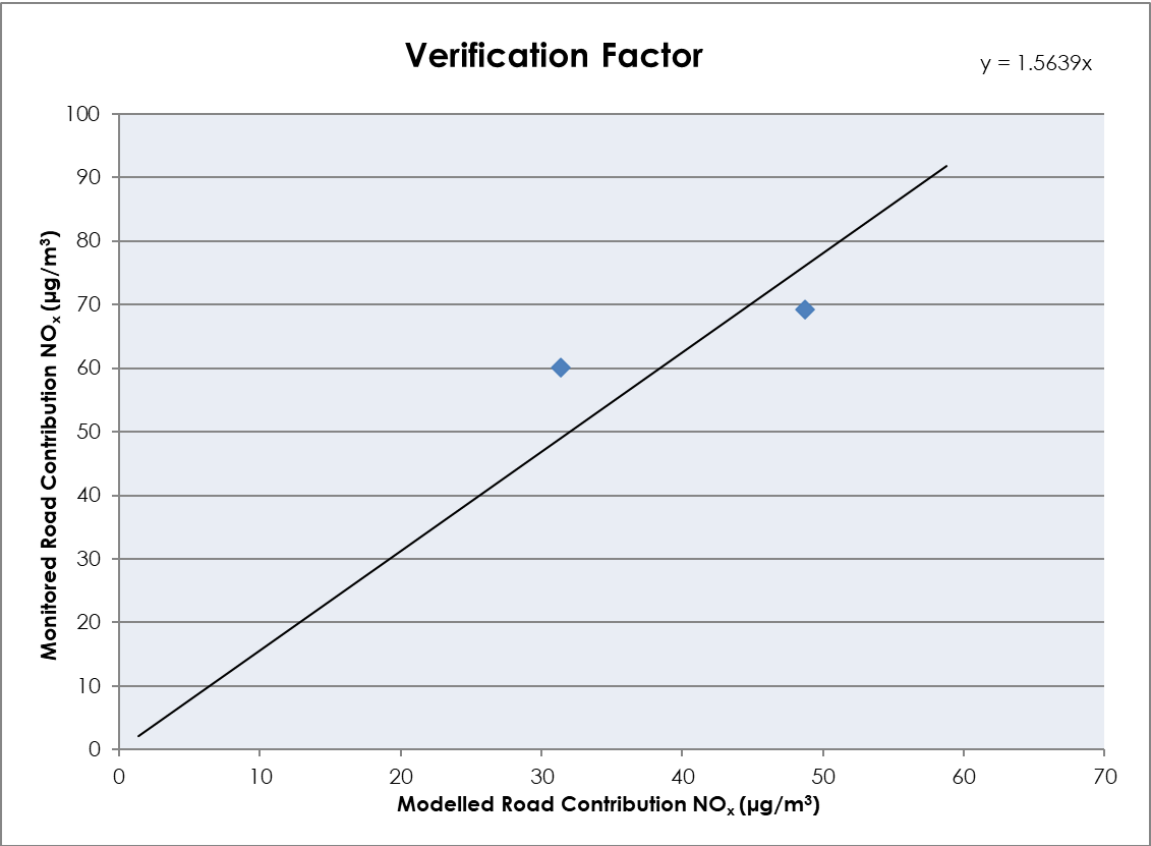
The annual mean road NO_x concentrations predicted from the dispersion model and the 2019 road NO_x concentrations calculated from the monitoring results are summarised in Table A1. 6.

Table A1. 6 NO_x Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
MAN1	Manchester Oxford Road	69.19	48.75
MA29ANO	Oxford Street	60.04	31.38

The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 1.5639 was required to be applied to all NO_x modelling results, as shown in Graph 1.

Graph 1 NO_x Verification Factor



Monitoring of PM₁₀ concentrations was undertaken at one location within the vicinity of roads included in the model during 2019. The monitored and modelled annual mean PM₁₀ concentrations are summarised in Table A1. 7.

Table A1. 7 PM₁₀ Verification - Monitored and Modelled Result

Monitoring Location		Monitored PM ₁₀ Concentration (µg/m³)	Modelled PM ₁₀ Concentration (µg/m³)
MAN1	Manchester Oxford Road	26.0	17.5

The monitored and modelled PM₁₀ concentrations were compared to calculate the associated ratio. This indicated a verification factor of 1.4829 was required to be applied to all modelling results.

Monitoring of PM_{2.5} concentrations is not undertaken within the assessment extents. The PM₁₀ verification factor was therefore used to adjust model predictions of this species in lieu of more accurate data in accordance with DEFRA guidance²⁵.

²⁵ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Appendix 2 - Curricula Vitae

KEY EXPERIENCE:

Emily is an Associate Director with specialist experience in the air quality sector. Her key capabilities include:

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads and ADMS-5. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of Environmental Impact Assessments and scoping reports for developments throughout the UK.
- Assessment of fugitive dust impacts from a range of mineral extraction developments.
- Assessment of petrol stations to address benzene concentrations and their impact on adjacent developments.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Assessment of potential effects associated with network realignment schemes and highway developments.

SELECT PROJECTS SUMMARY:

Broad Street, Birmingham

Air Quality Assessment in support of a residential-led development on land at Broad Street, Birmingham. The proposals were located adjacent to a section of the Midland Metro Westside which runs along Broad Street. Consideration was made to the potential for re-alignment of the local road network as a result of the Metro to effect pollution levels at the development. The assessment indicated NO₂ concentrations exceeded air quality criteria from ground to third floor level as a result of road vehicle exhaust emissions. Mitigation was therefore specified for the affected units.

Home Farm, Forest Road, Warfield

Ecological Air Quality Assessment in support of a residential development. Natural England held concerns regarding potential impacts at sensitive ecological designations as a result of traffic exhaust emissions associated with the development. The predicted change in NO_x and ammonia concentrations and nitrogen and acid deposition was below the relevant criteria at all locations within the ecological designations. Impacts were therefore not considered to be significant.

Saltcoats Road, Stevenston

Air Quality Assessment in support of an educational campus and associated energy centre. Impacts associated with emissions from the proposed gas and biomass boilers were assessed through detailed dispersion modelling. This indicated impacts on annual mean NO₂ and PM₁₀ concentrations were predicted to be not significant.

Blackthorn & Piddington

Environmental Impact Assessment in support of a railway embankment scheme on land at the Network Railway Embankment between Piddington and Blackthorn. Due to the extensive stabilisation works a Fugitive Dust Emissions Assessment was undertaken in addition to consideration of road vehicle exhaust emissions. Due to the location of the site in relation to nearby sensitive receptors, potential impacts associated with construction works were not considered to be significant.

Blackmoorfoot Road, Huddersfield

Air Quality in support of a residential-led development in close proximity to an operational minerals facility. Due to the presence of the Johnsons Wellfield Quarry to the south of the site a Fugitive Dust Emissions Assessment was undertaken to determine potential impacts. Dispersion modelling of road vehicle exhaust emissions was also undertaken in support of the scheme. Results indicated the overall significance of fugitive dust emissions from the quarry and air quality impacts associated with operation of the development itself were not significant.

Lockwood Bar, Huddersfield

Air Quality Assessment for the proposed highway realignment scheme along Lockwood Road, Huddersfield. Changes in pollution levels were considered at sensitive receptors as a result of variations to road geometry and associated redistribution of vehicle trips across the local area. Results of the dispersion modelling study indicated air quality impacts as a result of the scheme were not significant.

KEY EXPERIENCE:

Imo is a Graduate Environmental Consultant with specialist experience in the air quality sector. Her key capabilities include:

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle exhaust emissions using ADMS-Roads. Studies have included assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality.
- Assessment of construction dust impacts from a range of development sizes.
- Measurement and assessment of indoor air quality in support of BREEAM accreditation. She has conducted Total Volatile Organic Compound (TVOC) and formaldehyde monitoring at numerous commercial developments throughout the UK in pursuit of the relevant credit specified under BREEAM category Hea 02 'Indoor Air Quality'.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.

SELECT PROJECTS SUMMARY:

Cavendish Road, London

Air Quality Assessment in support of a residential-led development comprising 23-unit part-five/part-six storey block of flats located in an Air Quality Management Area (AQMA). The development had the potential to expose future occupants to poor air quality and cause impacts at sensitive locations. Detailed dispersion modelling and a construction dust assessment indicated air quality factors were not a constraint to the development.

Civic Way, Ellesmere Port

Indoor Air Quality Monitoring in support of the construction of a new Public Services Hub. The scheme was registered to pursue certification through the BREEAM 2018 standard. As such, Indoor Air Quality Monitoring was undertaken at seven locations to determine conditions within the building and identify any issues. The results indicated concentrations of formaldehyde were below the BREEAM criteria at all positions. Additional measures were recommended as TVOC concentrations exceeded the BREEAM criteria at all sampling locations.

Crowland Street, Sefton

Air Quality Assessment and Mitigation Measures report in relation to a residential development on land off Crowland Street, Sefton. The proposals had the potential to cause impacts at sensitive locations, as well as expose future occupants to any existing air quality issues. As such, an assessment was undertaken in order to determine baseline conditions, assess any potential constraints to development and identify any further work required to support a planning application for the site.

Union Terrace, Aberdeen

Air Quality Assessment in support of proposed residential development comprising 85 residential dwellings, as well as provision of 33 car parking spaces. The development had the potential to cause impacts at sensitive locations and expose future residents to poor air quality. This assessment considered the number of potential routes that any trips could be distributed upon and predicted the proposals impact to be not significant. The distance from the AQMA, distance from major pollution sources, background concentrations and local monitoring data was assessed to ensure the site was suitable for the proposed use from an air quality perspective.

Victoria Road, Birmingham

Air Quality Assessment in support of a residential development comprising the erection of a three-storey building containing 40 apartments. This development was located just outside the boundary of the Birmingham Clean Air Zone (CAZ). ADMS-Roads dispersion modelling was undertaken to determine the exposure of future residents to elevated pollutant concentrations. The results indicated that concentrations were below the relevant AQOs or AQLV.

KEY EXPERIENCE:

Emily is a Senior Environmental Consultant with specialist experience in the air quality sector. Her key capabilities include:

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle exhaust emissions using ADMS-Roads. Studies have included assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality.
- Advanced canyon modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Assessment of construction dust impacts from a range of development sizes.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Air quality monitoring at industrial sites to quantify pollutant concentrations
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.

SELECT PROJECTS SUMMARY:

Bowlers Yard, Manchester

Air Quality Assessment in support of an eleven storey residential development to provide circa 65 units on land known as Bowlers Yard, Manchester. The site was located in an Air Quality Management Area (AQMA) and concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM_{2.5}, PM₁₀ and NO₂ concentrations across the site. Results indicated that pollution levels were below the air quality objectives across the development.

Freemasons Arms Hotel, Heywood

Air Quality Assessment to support a residential-led development in an AQMA. Detailed dispersion modelling was undertaken with the inclusion of advanced canyon modelling to evaluate the impact of the urban topography within the locality on the dispersion of traffic related pollutants. Predicted concentrations of NO₂ were found to exceed air quality criteria at the building façade fronting Market Place at first floor level. As such, mitigation was specified for the affected units to ensure future residents would not be exposed to poor air quality.

Griffin Road, London

Air Quality Assessment in support of a residential development located in an AQMA. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM₁₀ and NO₂ concentrations across the site. Results indicated that pollution levels were classified as APEC - A in accordance with the London Councils Air Quality and Planning Guidance.

High Street, Dudley

Odour Impact Assessment in support of a proposed residential-led development. Due to the location of the site, being above an existing hot food takeaway, odour surveys were required to assess the level of odour across the development. A risk assessment was also undertaken in accordance with the relevant odour guidance. An appropriate ventilation system was identified on the basis of the assessment results.

East Common Lane, Selby

Air Quality Assessment in support of an industrial development on land associated with Access 63 Business Park, East Common Lane Selby. Due to the size of the development it was possible that traffic generated from the scheme may cause negative impacts on sensitive receptors nearby. NO₂ and PM₁₀ concentrations were quantified at specific receptor points to ensure there would be no significant increases in pollution levels. Results revealed negligible impacts at all locations.

Wharton Road, Winsford

Air Quality Assessment in support of a residential development of circa 138 units on land off Wharton Road, Winsford. Using sensitive receptors, located in areas where increased road traffic may affect NO₂ concentrations, a comparison was made between overall concentrations with and without the development in place. Results revealed pollutant concentrations were below the relevant standards across the site and impacts associated with the development were not significant.