

Air Quality Assessment

Mindel House, 10 Minshull Street and 11 Bloom Street, Manchester

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Executive Summary

Redmore Environmental Ltd was commissioned by Manchester Design and Build Limited to undertake an Air Quality Assessment to address a planning condition for the residential redevelopment of Mindel House, 10 Minshull Street and 11 Bloom Street, Manchester.

The proposed scheme involves the change of use and internal/external works to the existing buildings to accommodate 80 apartments including a single storey roof top extension to 11 Bloom Street with residents' amenity space above.

The development may lead to the exposure of future occupants to elevated pollution levels, as well as adverse air quality effects at sensitive locations. As such, an Air Quality Assessment and associated Mitigation Strategy was required in order to determine baseline conditions, assess potential impacts as a result of the scheme and identify and necessary mitigation measures.

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of 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 the operational phase of the proposed development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed using the relevant guidance. Due to the car free nature of the proposals, road traffic exhaust impacts were not predicted to be significant.

There is the potential for the exposure of future occupants to elevated pollution levels. Dispersion modelling was therefore undertaken in order to predict concentrations across the proposed development site as a result of emissions from the highway network. Results were subsequently verified using local monitoring data.

The results of the dispersion modelling assessment indicated that predicted pollution levels were below the relevant criteria at all locations across the development. As such, future residents are not predicted to be exposed to poor air quality.

Suitable mitigation was identified from relevant best practice guidance. The adoption of these measures will help minimise air quality impacts associated with the development.

Following completion of the Air Quality Assessment, it is requested that the planning condition is discharged.

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	7
2.6 Local Planning Policy	8
3.0 METHODOLOGY	9
3.1 Introduction	9
3.2 Construction Phase Assessment	9
Step 1	10
Step 2	10
Step 3	15
Step 4	15
3.3 Operational Phase Assessment	16
Potential Development Impacts	16
Potential Future Exposure	17
4.0 BASELINE	18
4.1 Introduction	18
4.2 Local Air Quality Management	18
4.3 Air Quality Monitoring	18
4.4 Background Pollutant Concentrations	20
4.5 Sensitive Receptors	20
5.0 ASSESSMENT	23
5.1 Introduction	23
5.2 Construction Phase	23
Step 1	23
Step 2	23
Step 3	25
5.3 Operational Phase	25
Potential Development Impacts	25

Potential Future Exposure	25
6.0 MITIGATION STRATEGY	27
6.1 Construction Phase	27
6.2 Operational Phase	28
7.0 CONCLUSION	31
8.0 ABBREVIATIONS	33

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 Manchester Design and Build Limited to undertake an Air Quality Assessment to address a planning condition for the residential redevelopment of Mindel House, 10 Minshull Street and 11 Bloom Street, Manchester.
- 1.1.2 The development may lead to the exposure of future occupants to poor air quality, as well as adverse impacts at sensitive locations. As such, an Air Quality Assessment and associated Mitigation Strategy was required in order to determine baseline conditions, assess potential impacts as a result of the scheme and identify and necessary mitigation measures.

1.2 Site Location and Context

- 1.2.1 The site is located at Mindel House, 10 Minshull Street and 11 Bloom Street, Manchester, at approximate National Grid Reference (NGR): 384450, 397980. Reference should be made to Figure 1 for a map of the site and surrounding area.
- 1.2.2 The proposals comprise the change of use and internal/external works to the existing buildings to accommodate 80 apartments (use class C3) including a single storey roof top extension to 11 Bloom Street with residents' amenity space above.
- 1.2.3 Planning consent for the development was granted by Manchester City Council (MCC) (reference: 119374/FO/2018), subject to a number of conditions. These include the following of relevance to this report:

"8) Prior to commencement of the development detailed mitigation measures to safeguard local air quality shall be submitted to and approved in writing by the City Council as local planning authority. Any agreed mitigation measures shall be implemented as part of the development and shall remain in situ whilst the use or development is in operation.

Reason: To secure a reduction in air pollution from traffic or other sources in order to protect existing and future residents from air pollution [Core Strategy Policy EN16]."

- 1.2.4 An Air Quality Assessment and associated Mitigation Strategy has therefore been produced in order to address the above condition. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 Legislation

2.1.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and 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 (AQTVs) were also provided for several additional pollutants.

2.1.3 Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007¹. The AQS sets out Air Quality Objectives (AQOs) that 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 Table 1 presents the AQOs for pollutants considered within this assessment.

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m ³)	Averaging Period
NO ₂	40	Annual mean

¹ The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

Pollutant	Air Quality Objective	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
	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

2.1.5 Table 2 presents the AQTVs considered within this assessment.

Table 2 Air Quality Target Values

Pollutant	Air Quality Target Values	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
PM _{2.5}	25	Annual mean

2.1.6 Table 3 summarises the advice provided in DEFRA guidance² on where the AQOs for pollutants considered within this report apply.

Table 3 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
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

² Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
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 Under Section 82 of the Environment Act (1995) (Part IV) 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 3, 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), 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). Enforcement can insist that there be no dust beyond the boundary of the works. 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 practice measures.

2.4 National Planning Policy

2.4.1 The revised National Planning Policy Framework³ (NPPF) was published in February 2019 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 achievement 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 contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve 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:

[...]

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

³ NPPF, Ministry of Housing, Communities and Local Government, 2019.

possible, help to improve local environmental conditions such as air and water quality [...]"

2.4.4 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."

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

2.5 National Planning Practice Guidance

2.5.1 The National Planning Practice Guidance⁴ (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 considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?

⁴ <https://www.gov.uk/guidance/air-quality--3>.

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 Strategy⁵ is central. This was adopted by MCC on 11th July 2012 and provides policies which guide the determination of planning applications within the city.

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

⁵ Core Strategy, MCC, 2012.

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 elevated pollution levels. These issues 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 V1.1'⁶.

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

- Construction; and,
- Trackout.

3.2.3 The proposals do not include demolition or earthworks. As such, these activities were not considered within the assessment.

3.2.4 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.

3.2.5 The assessment steps are detailed below.

⁶ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Step 1

- 3.2.6 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.
- 3.2.7 Should sensitive receptors not be present within the relevant distances then **negligible** impacts would be expected and further assessment is not necessary.

Step 2

- 3.2.8 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).
- 3.2.9 The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.
- 3.2.10 Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 4.

Table 4 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	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

Magnitude	Activity	Criteria
Medium	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	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

3.2.11 Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 5.

Table 5 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

3.2.12 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.

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

3.2.14 The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 6.

Table 6 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

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

Table 7 Construction Dust - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	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	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

3.2.16 Table 8 outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 8 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

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

3.2.18 Table 9 outlines the risk category from construction activities.

Table 9 Construction Dust - Dust Risk Category from 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 guidance⁷ to reduce potential dust impacts based upon the relevant risk categories 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**.

⁷ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

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 impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'⁸ guidance to determine the potential for trips generated by the development to affect local air quality.

3.3.2 The following criteria are provided to help establish when an assessment of potential impacts on the local area is likely to be considered necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- A change of HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- Realignment of roads where the change is 5m or more and the road is within an AQMA; or,
- Introduction of a new junction or removal of an existing junction near to relevant receptors.

3.3.3 Should these criteria not be met, then the IAQM guidance⁹ considers air quality impacts associated with a scheme to be **not significant** and further assessment is not required.

⁸ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

⁹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Potential Future Exposure

- 3.3.4 The proposed development has the potential to expose future users to poor air quality. In order to assess NO₂, PM₁₀ and PM_{2.5} concentrations across the site, detailed dispersion modelling was therefore undertaken. Reference should be made to Appendix 1 for a full description of the assessment input data.
- 3.3.5 Results of the dispersion modelling were compared against the relevant AQOs and AQTV in order to determine the potential for exposure of future occupants to elevated pollutant concentrations and identify appropriate mitigation, if necessary.

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), MCC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean NO₂ concentrations 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 and vehicles travelling to and from the site to increase pollution levels in this sensitive area. These issues have 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 NO₂ results recorded in the vicinity of the development are shown in Table 11. Exceedences of the relevant AQO are shown in **bold**.

Table 11 Monitoring Results - NO₂

Monitoring Site		Monitored NO ₂ Concentration (µg/m ³)		
		2017	2018	2019
-	Manchester Piccadilly	36	35	36
9	Newton Street	51.1	45.8	44.9

4.3.2 As shown in Table 11, annual mean NO₂ concentrations were above the AQO at the Newton Street monitor during recent years. As this site is located within an AQMA, elevated concentrations would be expected.

4.3.3 Recent PM₁₀ results recorded in the vicinity of the development are shown in Table 12.

Table 12 Monitoring Results - PM₁₀

Monitoring Site		Monitored PM ₁₀ Concentration (µg/m ³)		
		2017	2018	2019
-	Manchester Piccadilly	20	21	20

4.3.4 As shown in Table 12, annual mean PM₁₀ concentrations were below the AQO at the Manchester Piccadilly monitor during recent years.

4.3.5 Recent PM_{2.5} results recorded in the vicinity of the development are shown in Table 13.

Table 13 Monitoring Results - PM_{2.5}

Monitoring Site		Monitored PM _{2.5} Concentration (µg/m ³)		
		2017	2018	2019
-	Manchester Piccadilly	8	11	12

4.3.6 As shown in Table 13, annual mean PM_{2.5} concentrations were below the AQTV at the Manchester Piccadilly monitor during recent years.

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

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 website¹⁰ 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	2021	2022
NO ₂	28.25	25.70	24.74
PM ₁₀	14.38	13.92	13.79
PM _{2.5}	9.13	8.82	8.73

4.4.2 As shown in Table 14, predicted background NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant AQOs and AQTV 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. Receptors sensitive to potential dust impacts during construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 15.

Table 15 Construction Dust Sensitive Receptors

Distance from Site Boundary (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
Up to 100	More than 100	-

¹⁰ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>.

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

- 4.5.2 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

- 4.5.3 There are no ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have not been assessed further within this report.
- 4.5.4 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 desk top study did not indicate any dust generating activities in the local area
The likelihood of concurrent dust generating activity on nearby sites	A number of sites are currently under development in Manchester City Centre. As such, there is potential for concurrent dust generation during the construction phase
Pre-existing screening between the source and the receptors	There is no pre-existing screening between the site and surrounding receptors
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-west. As such, receptors to the north-east of the site are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion

Guidance	Comment
Duration of the potential impact, as a receptor may become more sensitive over time	It is unlikely that receptor sensitivity will change during the construction period
Any known specific receptor sensitivities which go beyond the classifications given in the document	No specific receptor sensitivities identified during the baseline assessment

4.5.5 Based on the criteria shown in Table 5, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because receptor included residential properties.

4.5.6 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	
	Construction	Trackout
Dust Soiling	High	High
Human Health	Medium	Medium

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**

Step 1

- 5.2.1 The undertaking of activities such as cutting, construction and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements on the local road network also have the potential to result in the re-suspension of dust from 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

Construction

- 5.2.4 The total volume of the proposed extension is likely to be less than 25,000m³. In accordance with the criteria outlined in Table 4, the magnitude of potential dust emissions from construction is therefore **small**.
- 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 9, the development is considered to be a **low** risk site for dust soiling as a result of construction activities.

- 5.2.6 Table 18 indicates the sensitivity of the area to human health impacts is **medium**. 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

- 5.2.7 Based on the site area and the access route comprising all tarmacked surfaces, it is anticipated that the unpaved road length will be less than 50m. In accordance with the criteria outlined in Table 4, the magnitude of potential dust emissions from trackout is therefore **small**.
- 5.2.8 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.
- 5.2.9 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

- 5.2.10 A summary of the risk from each dust generating activity is provided in Table 19.

Table 19 Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk	
	Construction	Trackout
Dust Soiling	Low	Low
Human Health	Low	Negligible

- 5.2.11 As indicated in Table 19, the potential risk of dust soiling is **low** from construction and trackout. The potential risk of human health effects is **low** from construction and **negligible** from trackout.
- 5.2.12 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

- 5.2.13 The IAQM guidance¹¹ provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during construction. These have been adapted for the development site as outlined in Section 6.1.

5.3 Operational Phase

Potential Development Impacts

- 5.3.1 Any vehicle movements associated with the development will generate exhaust emissions on the local and regional road networks. Review of the Transport Statement¹² produced by SCP indicated that the proposals are anticipated to be car free as the scheme does not include any parking spaces and vehicle ownership in the local area is very low.
- 5.3.2 Based on the provided information, the proposals are not anticipated to result in an increase of LDV flows of more than 100 AADT on any individual road link, include significant highway realignment or the introduction of a junction and there will not be a requirement for more than 25 HDV deliveries per day. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant**, in accordance with the IAQM¹³ screening criteria shown in Section 3.3.

Potential Future Exposure

- 5.3.3 The proposed development has the potential to cause the exposure of future occupants to elevated pollution levels. Dispersion modelling was therefore undertaken with the

¹¹ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

¹² Proposed Residential Development, Minshull Street, Manchester - Transport Statement, SCP, 2018.

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

inputs described in Appendix 1 to quantify air quality conditions at the site. Reference should be made to Figures 4, 5 and 6 for graphical representations of the results.

- 5.3.4 As shown in Figure 4, annual mean NO₂ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the site. The maximum level at the boundary was 29.8µg/m³. As such, future residents are not predicted to be exposed to NO₂ concentrations above the AQO.
- 5.3.5 As shown in Figure 5, annual mean PM₁₀ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the site. The maximum level at the boundary was 14.6µg/m³. As such, future residents are not predicted to be exposed to PM₁₀ concentrations above the AQO.
- 5.3.6 As shown in Figure 6, annual mean PM_{2.5} concentrations were predicted to be below the AQTV of 25µg/m³ at all locations across the site. The maximum level at the boundary was 9.2µg/m³. As such, future residents are not predicted to be exposed to PM_{2.5} concentrations above the AQTV.
- 5.3.7 It should be noted that pollutant levels decrease with distance from pollutant sources, such as roads. As annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were predicted to be below the relevant AQOs and AQTV at ground level, further assessment above this height was not considered necessary.

6.0 **MITIGATION STRATEGY**

6.1 **Construction Phase**

6.1.1 Site specific mitigation measures to reduce potential dust impacts during construction have been identified from the IAQM guidance¹⁴ based upon the relevant risk categories identified in Table 19. These are summarised in Table 20.

Table 20 Fugitive Dust Emission Mitigation Measures

Issue	Control Measure
Communications	• 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
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 MCC 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
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 MCC 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
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 • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used
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

¹⁴ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Issue	Control Measure
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques • 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	• No bonfires or burning of waste materials
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
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

6.1.2 Assuming the relevant mitigation measures outlined in Table 20 are implemented, the residual impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance¹⁵.

6.2 Operational Phase

6.2.1 As air quality impacts associated with the operational phase of the development were predicted to be **not significant** and exposure of future occupants to exceedences of the AQOs and AQTV was not predicted, further mitigation to control effects is not considered necessary. However, a number of additional measures have been included within the development in accordance with the requirements of the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁶ to encourage the use of sustainable transport modes, manage vehicle flow and reduce pollution around the site. Table 21 describes the good practice principles detailed in the IAQM guidance along with how each has been addressed with regards to the proposals.

¹⁵ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2017.

¹⁶ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

Table 21 Good Practice Design Principles

Phase	Principle	Action
Design Phase	New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable	It is confirmed that the proposed development 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	The proposals include the redevelopment of existing buildings. As such, the scheme will not create a new street canyon
	Delivering sustainable development should be the key theme of any application	The proposal has been designed to encourage sustainable behaviours, such as active and public transport, due to its accessible location by non motorised transport modes and proximity to 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	Predicted pollutant concentrations were predicted to be below the relevant AQOs and AQTV across the site. As such, exposure of future residents to poor air quality is considered unlikely
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	As the development does not include any car parking, it is not proposed to provide any EV charging facilities
	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 full Travel Plan will be submitted in support of the development as required by Condition 14 of the planning consent

Phase	Principle	Action
	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	Heating will be provided by electric panel heaters and hot water will be via electric water heaters on each floor. As such, there is no requirement for gas or biomass fired heating or CHP plant

6.2.2 The above measures are considered appropriate for a development of this size and nature and are anticipated to control emissions to a suitable level throughout operation.

7.0 CONCLUSION

- 7.1.1 Redmore Environmental Ltd was commissioned by Manchester Design and Build Limited to undertake an Air Quality Assessment to address a planning condition for the residential redevelopment of Mindel House, 10 Minshull Street and 11 Bloom Street, Manchester.
- 7.1.2 The development may lead to the exposure of future occupants to poor air quality, as well as adverse impacts at sensitive locations. As such, an Air Quality Assessment and associated Mitigation Strategy was required in order to determine baseline conditions, assess potential impacts as a result of the scheme and identify and necessary mitigation measures.
- 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 construction and trackout activities was predicted to be **not significant**.
- 7.1.4 Potential impacts during the operational phase of the proposed development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against the screening criteria provided within the IAQM¹⁷ guidance. Due to the car free nature of the proposals, road traffic exhaust impacts were predicted to be **not significant**.
- 7.1.5 The proposed development has the potential to expose future occupants to elevated pollution levels. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict concentrations as a result of emissions from the local highway network. Results were subsequently verified using monitoring data collected by MCC.
- 7.1.6 The results of the dispersion modelling assessment indicated that predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were below the relevant AQOs and AQTV across the proposed site.

¹⁷ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

7.1.7 Suitable mitigation for the construction and operational phases was identified from relevant IAQM best practice guidance. The adoption of these measures will help minimise air quality impacts associated with the development.

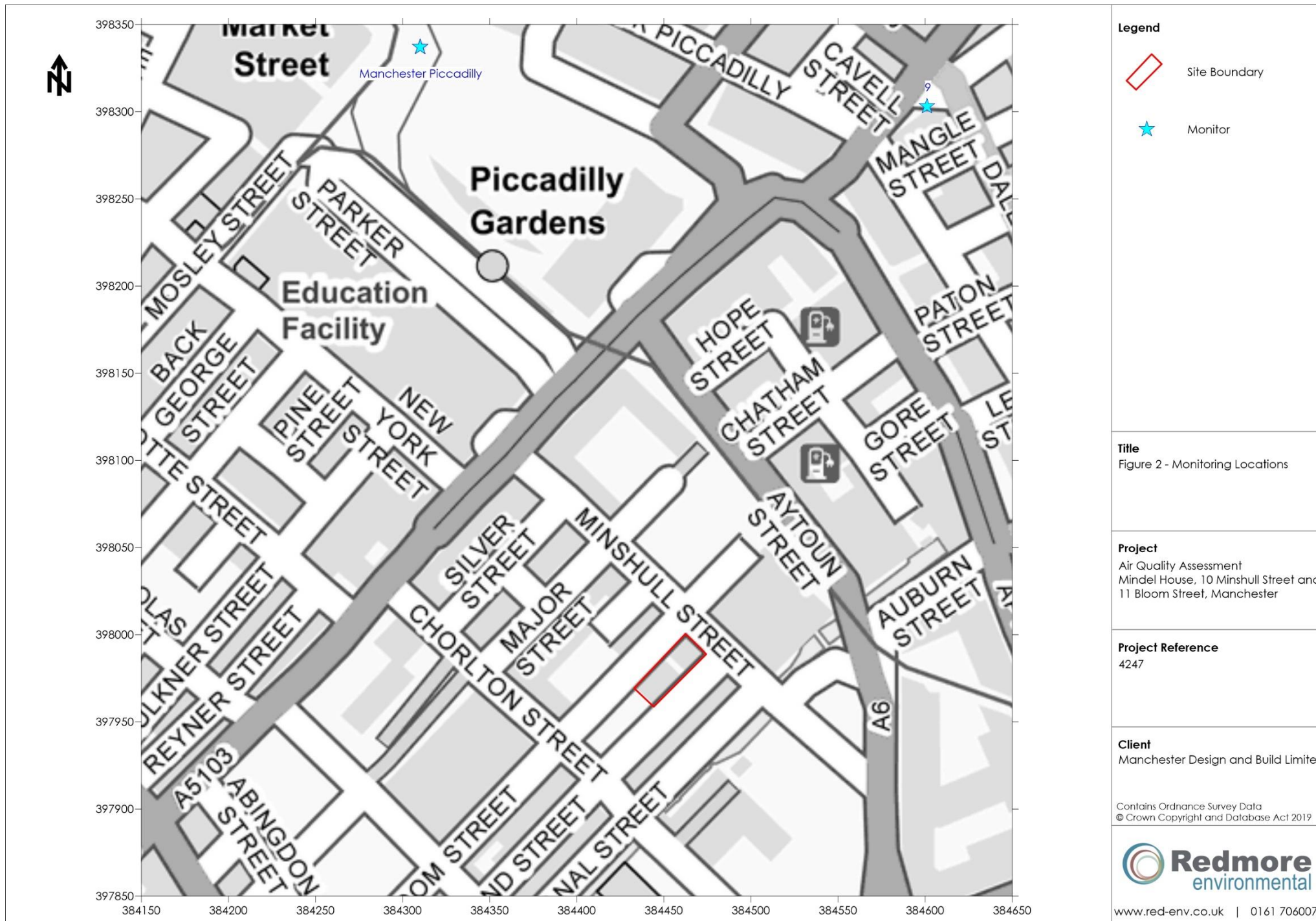
7.1.8 Following completion of the Air Quality Assessment, it is requested that the planning condition is discharged.

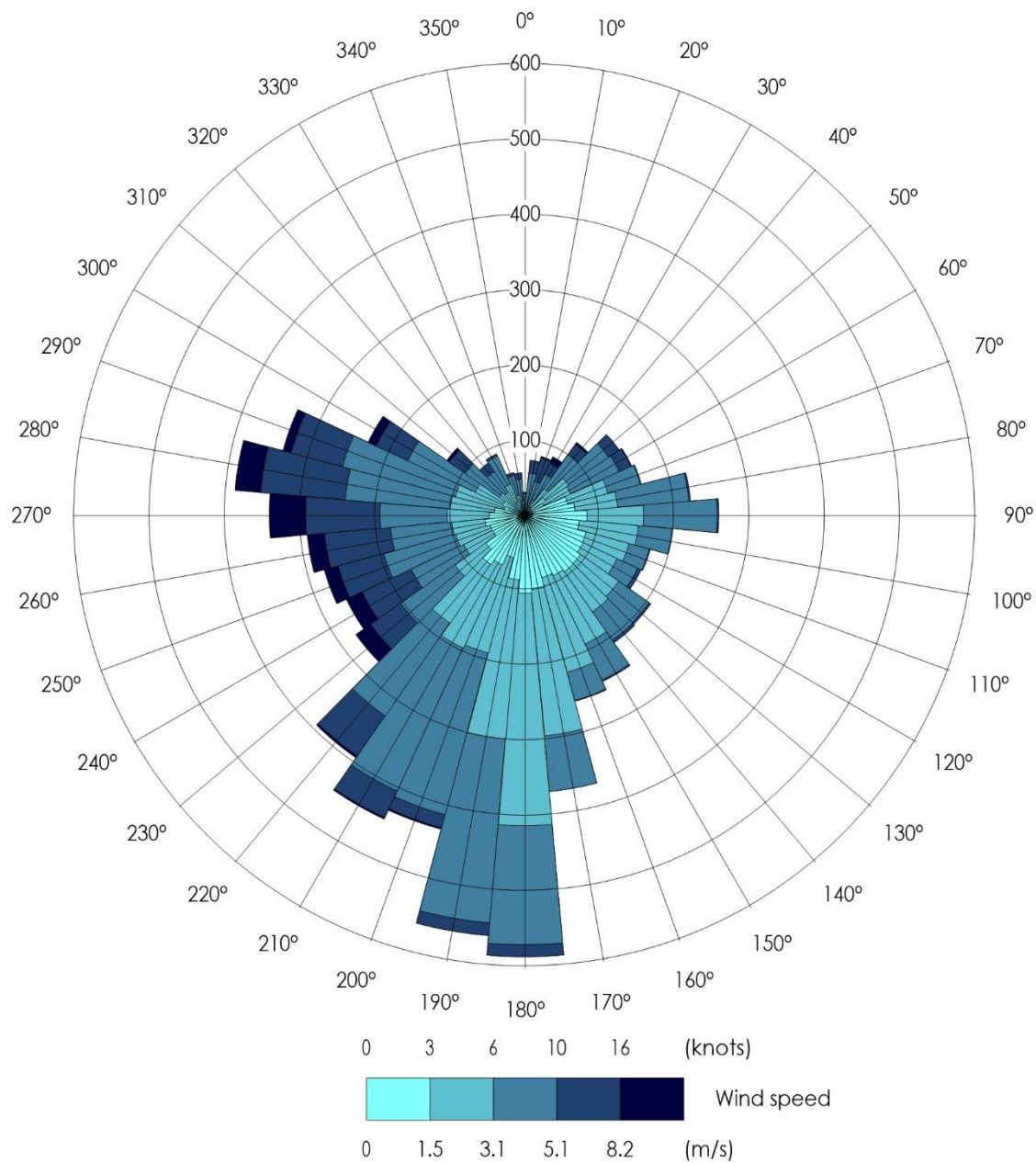
8.0 **ABBREVIATIONS**

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
AQTV	Air Quality Target Value
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges
EV	Electric Vehicle
GMCA	Grater Manchester Combined Authority
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
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
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
Z ₀	Roughness length

Figures







Legend

Title
Figure 3 - Wind Rose of 2019
Manchester Airport Meteorological
Data

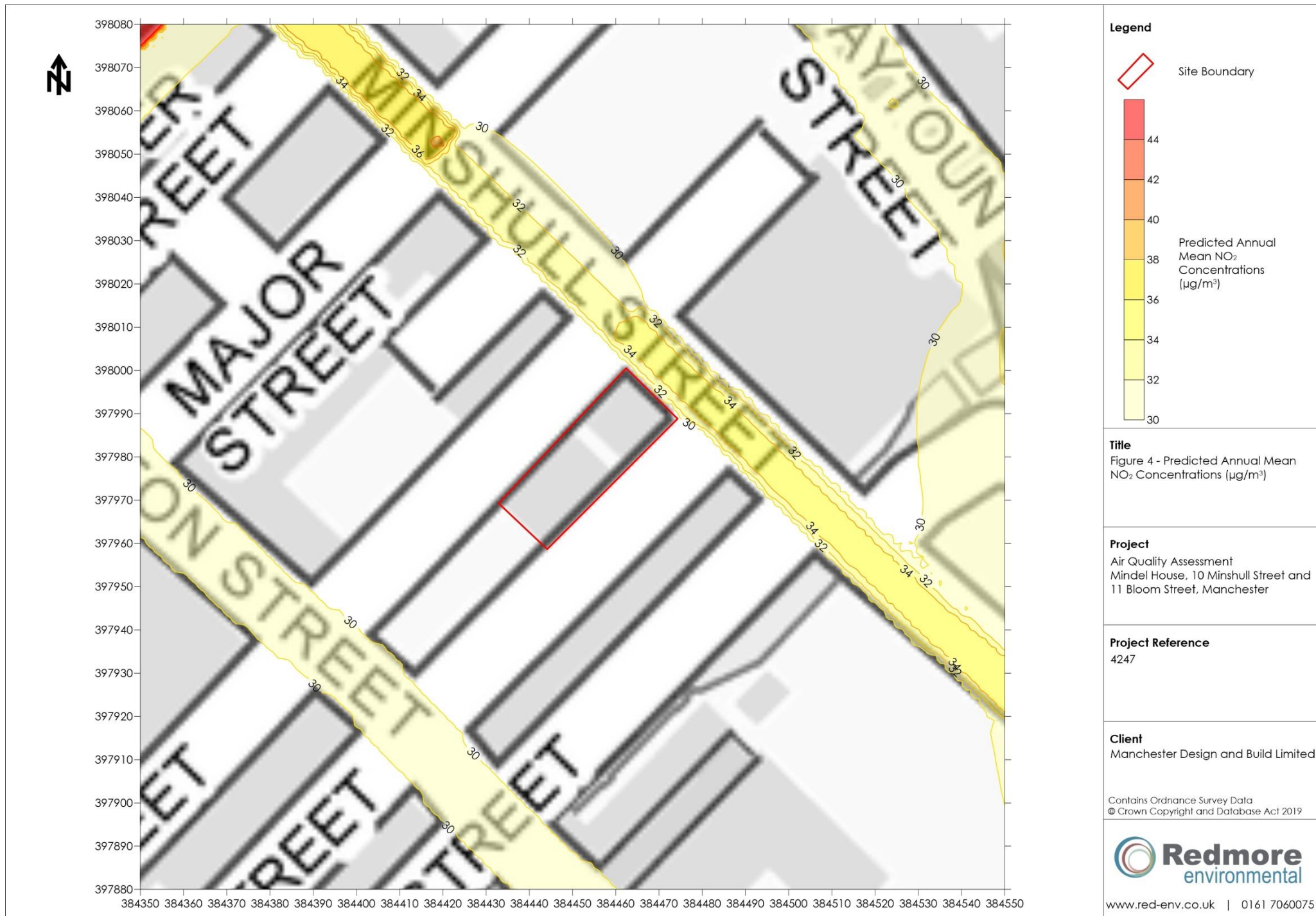
Project
Air Quality Assessment
Mindel House, 10 Minshull Street and
11 Bloom Street, Manchester

Project Reference
4247

Client
Manchester Design and Build Limited



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Appendix 1 - Assessment Input Data

Introduction

The proposed development has the potential to expose future residents to elevated pollution levels. In order to assess NO₂, PM₁₀ and PM_{2.5} concentrations across the site, dispersion modelling was undertaken in accordance with the following methodology. Modelling was undertaken for 2019 to allow verification against recent monitoring results and to avoid any issues with forecasting of future air quality conditions.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.0.1). 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:

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

These are detailed in the following Sections.

Assessment Area

The assessment area was defined based on the development location and roads likely to impact pollutant levels across the site. Ambient concentrations were predicted over NGR: 384350, 397880 to 384550, 398080. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

It should be noted that although the grid only covered the proposed site, source geometries were extended in order to ensure the impact of all relevant emissions in the vicinity of the development were considered.

Reference should be made to Figure 7 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour AADT flows and fleet composition as HDV proportion, was obtained from an Air Quality Assessment¹⁸ undertaken by Redmore Environmental for the Kampus development to the south-east of the site.

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

Table A1.1 Traffic Data

Link		2019 24-hour AADT Flow	HDV Prop. of Fleet (%)	Average Vehicle Speed (km/h)	Road Width (m)
L1	Portland Street, west of Parker Street	15,770	24.84	25	15.4
L2	Portland Street, east of Parker Street	15,770	24.84	25	15.4
L3	Portland Street, west of Piccadilly	15,770	24.84	25	15.4
L4	Portland Street, east of Piccadilly	15,770	24.84	25	15.4
L5	Piccadilly	13,116	16.63	25	11.2
L6	Newton Street	12,341	4.00	20	9.8
L7	Piccadilly, west of Newton Street	93	100.00	15	12.4
L8	Lever Street	4,138	22.52	25	8.9
L9	Aytoun Street, south of Auburn Street	8,883	1.21	25	12.2
L10	Aytoun Street, north of Auburn Street	1,146	1.23	25	7.3
L11	Aytoun Street, south of Chatham Street	1,146	1.23	25	7.3

¹⁸ Air Quality Assessment - Kampus, Manchester, Redmore Environmental, 2016.

Link		2019 24-hour AADT Flow	HDV Prop. of Fleet (%)	Average Vehicle Speed (km/h)	Road Width (m)
L12	Aytoun Street, north of Chatham Street	1,146	1.23	15	7.3
L13	Minshull Street, south of Bloom Street	2,636	2.78	30	6.3
L14	Minshull Street, north of Bloom Street	2,636	2.78	30	6.3
L15	Minshull Street, south of Portland Street	2,636	2.78	30	6.3
L16	Chorlton Street	1,927	0.99	30	11.0
L17	Auburn Street	6,247	1.21	15	5.5
L18	Church Street	4,465	7.42	20	7.7
L19	Dale Street	4,465	7.42	20	7.7

Reference should be made to Figure 7 for a graphical representation of the road link locations.

Street 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 5.0.0.1. 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 principle 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 A1.2. It should be noted that the parameters of some canyons were purposely included at 0m in order to represent the one-sided nature of the building topography.

Table A1.2 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	12.30	9.00	249.55	13.20	27.00	249.55
L2	0.00	0.00	0.00	13.20	27.00	48.17
L3	12.30	21.00	85.36	13.20	21.00	85.36
L4	0.00	0.00	0.00	13.20	21.00	63.16
L5	15.90	9.00	401.34	6.40	15.00	386.34
L6	7.90	17.00	302.52	15.00	17.00	302.52
L8	7.45	17.00	225.65	7.45	17.00	225.65
L9	0.00	0.00	0.00	12.40	24.00	157.97
L10	13.10	18.00	61.98	7.90	21.00	61.98
L11	0.00	0.00	0.00	7.90	21.00	68.47
L12	14.30	27.00	81.82	7.90	21.00	76.82
L13	5.65	12.00	126.44	5.65	18.00	75.72
L14	5.65	15.00	58.70	0.00	0.00	0.00
L15	5.65	21.00	79.88	5.65	21.00	79.88
L16	8.40	12.00	202.75	8.40	21.00	202.75

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
L17	14.90	27.00	86.36	11.20	25.00	86.36
L18	7.76	15.00	206.87	7.76	15.00	206.87
L19	6.50	18.00	225.25	21.20	18.00	245.25

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 10.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

There is current uncertainty over NO₂ concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2019 emission factors were utilised in preference to the development opening year in order to provide robust model outputs. As predictions for 2019 were verified, it is considered the results are a robust indication of worst case concentrations for the future year.

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 13.8km 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 utilised meteorological data.

Roughness Length

A z_0 of 1.5m was used to describe the modelling extents. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cities, woodlands'.

A z_0 of 0.3m was used to describe the meteorological site. This value of z_0 is considered appropriate for the morphology of the area due to the large expanse of flat land use, such as runways and surrounding grassland, and is suggested within ADMS-Roads as being suitable for 'agricultural areas (max)'.

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 the modelling extents and meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

Background Concentrations

Background concentrations provided by DEFRA for the grid square containing the site, as shown in Table 14, were used in the assessment to represent annual mean NO_2 , PM_{10} and $\text{PM}_{2.5}$ levels across the modelling extents without the contribution from road vehicles.

Similarly to emission factors, background concentrations from 2019 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance¹⁹.

¹⁹ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

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 using traffic data, meteorological data and monitoring results from this year.

MCC undertook monitoring of NO₂ concentrations at one location within the vicinity of roads included within the model during 2019. The result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance²⁰. The monitored annual mean NO₂ concentration and calculated road NO_x concentration is summarised in Table A1.3.

Table A1.3 Verification - Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
9	Newton Street	44.90	34.99

The annual mean road NO_x concentration predicted from the dispersion model and the 2019 road NO_x concentration calculated from the monitoring result are summarised in Table A1.4.

²⁰ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Table A1.4 Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
9	Newton Street	34.99	27.73

The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 1.2616 was required to be applied to all NO_x modelling results.

Monitoring of PM₁₀ and PM_{2.5} concentrations is not undertaken within the vicinity of roads included within the model. The NO_x verification factor was therefore used to adjust PM₁₀ and PM_{2.5} model predictions in accordance with the DEFRA guidance²¹.

²¹ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Appendix 2 - Curricula Vitae

KEY EXPERIENCE:

Jethro is a Chartered Environmentalist and Director of Redmore Environmental with specialist experience in the air quality and odour sectors. His key capabilities include:

- Production and management of Air Quality, Dust and Odour Assessments for a wide-range of clients from the retail, residential, infrastructure, commercial and industrial sectors.
- Production and co-ordination of Environmental Permit applications for a variety of industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads, ADMS-5, AERMOD-PRIME and BREEZE-ROADS. 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.
- Provision of expert witness services at Planning Inquiries.
- Design and project management of pollutant monitoring campaigns.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Provision of expert advice to local government and international environmental bodies, as well as involvement in production of industry guidance.

SELECT PROJECTS SUMMARY:

Industrial

Shanks Waste Management - Odour Assessments of two waste management facilities to support Environmental Permit Applications.

Tatweer Petroleum - dispersion modelling of Bahrain oil field.

Doha South Sewage Treatment Works - AQA for works extension in Qatar.

IRIS Environmental Appraisal Report Reviews, Isle of Man Government - odour assessment reviews.

Lankem, Greater Manchester - Environmental Permit Application for chemical manufacturing plant.

Newport Docks Bulk Drying, Pelleting and CHP Facility - air quality EIA for gas CHP.

Springshades, Leicester - Environmental Permit Variation Application for textile manufacturing plant.

Valspar, Chester - Odour Assessment and production of Odour Management Plan for a paint manufacturing plant in response to neighbour complaints.

Agrivert - dispersion modelling of odour and CHP emissions from numerous AD plants.

James Cropper Paper Mill, Cumbria - air quality EIA, Environmental Permit Variation and Human Health Risk Assessment for new biomass boiler adjacent to SSSI.

Rigg Approach, Leyton - Air Quality Assessment in support of waste transfer site.

Lynchford Lane Waste Transfer Station - biomass facility energy recovery plant.

Barnes Wallis Heat and Power, Cobham - biomass facility adjacent to AQMA.

Residential

Wood St Mill, Bury - residential development adjacent to scrap metal yard.

Hyams Lane, Holbrook - Odour Assessment to support residential development adjacent to sewage works.

North Wharf Gardens, London - peer review of EIA undertaken for large residential development.

Loxford Road, Alford - Air Quality EIA for residential development, included consideration of impacts from associated package sewage works

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre.

Castleford Growth Delivery Plan - baseline air quality constraints assessment for town redevelopment.

York St, Bury - residential development adjacent to AQMA.

Temple Point Leeds - residential development adjacent to M1.

Commercial and Retail

Etihad Stadium - Air Quality EIA for the extension to the capacity of the Etihad Stadium, Manchester.

Wakefield College - redevelopment of city centre campus in AQMA.

Manchester Airport Cargo Shed - commercial development.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

National Youth Theatre, Islington - redevelopment to provide new arts space and accommodation.