

Air Quality Assessment
Bowes Street, Manchester

Client: Rowlinson Construction Ltd

Reference: 1338r1

Date: 11th October 2016



Report Issue

Report Title: Air Quality Assessment - Bowes Street, Manchester

Report Reference: 1388

Field	Report Version			
	1	2	3	4
Prepared by	Emily Pears-Ryding			
Position	Graduate Air Quality Consultant			
Reviewed by	Jethro Redmore			
Position	Director			
Date of Issue	11 th October 2016			
Comments	-			

Heliport Business Park, Liverpool Road, Eccles, Manchester M30 7RU

info@red-env.co.uk | 0161 706 0075 | www.red-env.co.uk

This report has been prepared by Redmore Environmental Ltd in accordance with the agreed terms and conditions of appointment. Redmore Environmental Ltd cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

Executive Summary

Redmore Environmental Ltd was commissioned by Rowlinson Construction Ltd to undertake an Air Quality Assessment in support of a planning application for a residential-led development on land off Bowes Street, Manchester.

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 site during operation, as well as expose future occupants to elevated pollution levels. As such, an Air Quality Assessment was required 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 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 operational phase air quality impacts from vehicle exhaust emissions were assessed by predicting air quality conditions at sensitive locations both with and without the development in place. Results were subsequently verified using local monitoring data. Further to this dispersion modelling was undertaken in order to predict pollutant concentrations across the proposed site as a result of emissions from the highway network.

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

The results of the assessment also predicted exceedences of the relevant air quality standard across part of the development fronting Princess Road. As such, suitable mitigation in the form of mechanical ventilation for specific units has been specified to ensure a supply of clean air for future occupants and ensure they are not exposed to poor air quality.

Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposals, subject to the inclusion of the specified mitigation.

Table of Contents

1.0	INTRODUCTION	1
1.1	Background	1
1.2	Site Location and Context	1
2.0	LEGISLATION AND POLICY	2
2.1	European Directives	2
2.2	UK Legislation	2
2.3	Local Air Quality Management	4
2.4	Dust	5
2.5	National Planning Policy	5
2.6	National Planning Practice Guidance	6
2.7	Local Planning Policy	7
3.0	METHODOLOGY	8
3.1	Introduction	8
3.2	Construction Phase Assessment	8
	Step 1	9
	Step 2	9
	Step 3	15
	Step 4	15
3.3	Operational Phase Assessment	15
	Potential Development Impacts	16
	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	19
4.5	Sensitive Receptors	20
	Construction Phase Sensitive Receptors	20
	Operational Phase Sensitive Receptors	22
5.0	ASSESSMENT	24
5.1	Introduction	24
5.2	Construction Phase Assessment	24
	Step 1	24
	Step 2	24
	Step 3	26

Step 4	28
5.3 Operational Phase Assessment	28
Potential Development Impacts	29
Potential Future Exposure	34
Mitigation	35
Overall Impact Significance	38
6.0 CONCLUSION	40
7.0 ABBREVIATIONS	42

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 Rowlinson Construction Ltd to undertake an Air Quality Assessment in support of a planning application for a residential-led development on land off Bowes Street, Manchester.

1.1.2 The proposed development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases, as well as expose future occupants to elevated pollution levels. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects associated with the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land off Bowes Street, Manchester, at approximate National Grid Reference (NGR): 383983, 395010. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise the development of circa 182 residential dwellings and a care home, with outline planning for a health hub to the west of the site. The care home will provide circa 68 apartments over five storeys. Reference should be made to Figure 2 for a site layout plan.

1.2.3 The development has the potential to cause impacts at sensitive locations. These may include fugitive dust emissions during construction and road traffic exhaust emissions from vehicles travelling to and from the site during operation. Further to this, there are concerns that the proposals will introduce future users to exceedences of the relevant Air Quality Objectives (AQOs) or Air Quality Target Values (AQTVs). An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential impacts as a result of the proposals. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 European Directives

2.1.1 European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new Air Quality Limit Values (AQLVs) for particulate matter with an aerodynamic diameter of less than 2.5µm (PM_{2.5}). The consolidated Directives include:

- Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

2.1.2 The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

2.2 UK Legislation

2.2.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as AQTVs for an additional 5 pollutants.

2.2.2 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 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.

2.2.3 Table 1 presents the AQOs for pollutants considered within this assessment.

Table 1 Air Quality Objectives

Pollutant	Air Quality Objective	
	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

2.2.4 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

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

¹ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

² Local Air Quality Management (TG16), DEFRA, 2016.

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
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

2.3 Local Air Quality Management

- 2.3.1 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.

2.4 Dust

- 2.4.1 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2010), 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."

- 2.4.2 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.

2.5 National Planning Policy

- 2.5.1 The National Planning Policy Framework³ (NPPF) was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to the proposed development:

"The planning system should contribute to and enhance the natural and local environment by: [...]"

Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"

³ NPPF, Department for Communities and Local Government, 2012.

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

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

2.6 National Planning Practice Guidance

2.6.1 The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans 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 a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?
9. How do considerations about air quality fit into the development management process?

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

⁴ <http://planningguidance.planningportal.gov.uk>.

2.7 Local Planning Policy

2.7.1 The Manchester Local Development Framework consists of a series of planning documents of which the Core Strategy⁵ is central. This was adopted by Manchester City Council (MCC) on 11th July 2012 and provides policies which guide the determination of planning applications with the city.

2.7.2 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."

2.7.3 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 have been assessed in accordance with the following methodology, which was agreed with Rebecca Twigg, Neighbourhood Officer - Environmental Protection at MCC, on 16th June 2016 via email.

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 three types to reflect their different potential impacts. These are:

- 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.

⁶ 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 4.

Table 4 Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	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

Magnitude	Activity	Criteria
	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	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	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 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
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, playing fields, farmland, footpaths, short term car park 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 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
	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 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

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
	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
			1 - 10	Medium	Low	Low	Low
	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

3.2.15 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

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

3.2.18 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

3.2.19 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

3.2.20 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**.

3.2.21 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

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, as well as expose future occupants to poor air quality. Potential impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2018 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2018 should the proposals be completed).

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

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

Potential Development Impacts

- 3.3.3 Locations sensitive to potential changes in 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)⁸ on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance⁹ on where the AQOs apply, as summarised in Table 3, was utilised to determine appropriate receptor positions.
- 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'¹⁰. Using this methodology impacts were 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 Impact

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

⁸ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

⁹ Local Air Quality Management (TG16), DEFRA, 2016.

¹⁰ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

3.3.6 Following the prediction of impacts at discrete receptor locations, the IAQM document¹¹ provides guidance on determining the overall air quality impact significance of the 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 guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. It should be noted that this is a binary judgement of either **significant** or **not significant**. The determination of significance relies on professional judgement and reasoning has been provided as far as practicable. The IAQM guidance¹² suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

Future Exposure

3.3.8 The proposed development has the potential to expose future residents to poor air quality. It should be noted that the development will provide residential units from first floor upwards within Block A and from ground floor at the remaining residential units and the care home. Concentrations were therefore quantified from ground to second floor level using dispersion modelling. The results were subsequently compared with the relevant AQOs and AQTVs to determine the potential for any exceedence.

¹¹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

¹² Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

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 concentrations of NO₂ are above the AQO within the city. As such, one AQMA has been declared, which is described as follows:

"An area covering Manchester City Centre, the area around Manchester Airport and the main arterial traffic routes in the city."

- 4.2.2 The development is partially located within the AQMA. As such, there is the potential for the exposure of future residents 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 using continuous and periodic methods throughout their area of jurisdiction. Recent results from sites in the vicinity of the development are shown in Table 12. Exceedences of the relevant AQO are shown in **bold**.

Table 12 Monitoring Results

Monitoring Site		Monitored NO ₂ Concentration (µg/m ³)		
		2013	2014	2015
82	Manchester Oxford Road	54.64	67.53	65.92
77	Hewitt Street	39.44	38.68	37.53

4.3.2 As shown in Table 12, annual mean NO₂ concentrations were above the AQO at the 82-Manchester Oxford Road monitor over the last three years. Due to the location of the analyser on a congested road within an AQMA, elevated concentrations would be expected. Reference should be made to Figure 2 for a map of the monitoring locations.

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: 383500, 395500. Data for this location was downloaded from the DEFRA website¹³ for the purpose of the assessment and is summarised in Table 13.

Table 13 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m ³)		
	2015	2016	2018
NO ₂	24.91	25.04	21.69
PM ₁₀	19.15	15.18	14.93
PM _{2.5}	11.44	10.81	10.56

4.4.2 As shown in Table 13, predicted background NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant AQOs and AQTV at the development site.

¹³ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>.

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 during earthworks and construction were identified from a desk-top study of the area up to 350m from the development boundary. These are summarised in Table 14.

Table 14 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	10 - 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 15. For the purpose of the assessment it was assumed construction phase traffic would access the site from Bowes Street. This ensured a worst-case assessment.

Table 15 Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	10 - 100	0
Up to 50	10 - 100	0

- 4.5.4 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.

- 4.5.5 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 16.

Table 16 Additional Area Sensitivity Factors

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 review of the planning portal did not indicate any additional development proposals likely to result in concurrent dust generation in the vicinity of the site
Pre-existing screening between the source and the receptors	Alexandra Park lies to the west of the site. This would limit the dispersion of dust to receptors in this area. There is no other significant screening around the site
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
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 possible that it will extend over one year
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline

- 4.5.6 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 users would expect to enjoy a reasonable level of amenity, aesthetics or the value of their property could be diminished by soiling and people would be expected to be present for extended periods of time e.g. 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 17.

Table 17 Sensitivity of the Surrounding Area

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

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 18. These include positions within the AQMA. Receptor heights were selected based on the location of residential units to allow for less sensitive land uses, such as retail, at ground level.

Table 18 Operational Phase Sensitive Receptor Locations

Receptor		NGR (m)		Receptor Height (m)
		X	Y	
R1	Residential - Princess Road	383850.7	394955.1	1.5
R2	Residential - Parkside Road	383852.8	394872.3	1.5
R3	Residential - Laurel Avenue	384096.2	394875.0	1.5
R4	Residential - Bowes Street	384084.4	395052.8	1.5
R5	Residential - Princess Road	383843.8	395075.8	4.5
R6	Residential - Princess Road	383868.8	394711.6	1.5
R7	Residential - Princess Road	383878.4	394574.1	1.5
R8	Residential - Princess Road	383840.9	395196.1	4.5
R9	Residential - Princess Road	383836.4	395414.8	4.5
R10	Residential - Russell Street	383762.2	395175.7	1.5

4.5.9 The sensitive receptors identified in Table 18 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposals that have not been

individually identified above. 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 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 road 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

Earthworks

- 5.2.4 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The proposed development site is estimated to cover an area greater than 10,000m². In accordance with the criteria outlined in Table 4, the magnitude of potential dust emissions from earthworks is therefore **large**.

5.2.5 Table 17 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 activities.

5.2.6 Table 17 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health as a result of earthwork activities.

Construction

5.2.7 Due to the size of the development site the total building volume is likely to be over 100,000m³. In accordance with the criteria outlined in Table 4, the magnitude of potential dust emissions from construction is therefore **large**.

5.2.8 Table 17 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.

5.2.9 Table 17 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health as a result of construction activities.

Trackout

5.2.10 Information on the number of HDV trips to be generated during the construction phase of the development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project.

5.2.11 Based on the site area, 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**.

5.2.12 Table 17 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.

5.2.13 Table 17 indicates the sensitivity of the area to human health is **low**. In accordance with the criteria outlined in Table 10, the development is considered to be a **negligible** risk site for human health as a result of trackout activities.

Summary of the Risk of Dust Effects

5.2.14 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		
	Earthworks	Construction	Trackout
Dust Soiling	High	High	Low
Human Health	Low	Low	Negligible

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

5.2.16 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

5.2.17 The IAQM guidance¹⁴ 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 20. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the LA.

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

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 • 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
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. This should include regular dust soiling checks of surfaces within 100m of site boundary, with cleaning to be provided if necessary • Carry out regular site inspections to monitor compliance with the DMP, 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
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 • Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas

Issue	Control Measure
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 • 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 and burning of waste materials
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
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 powder materials are delivered in enclosed tankers and stored in silos
Trackout	• Use water-assisted dust sweeper on access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system

Step 4

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

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

¹⁵ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

concentrations at sensitive locations in the vicinity of the site, as well as consider potential exposure of future occupants to AQO exceedences.

5.3.2 The assessment considered the following scenarios:

- 2015 - Verification;
- 2018 - DM; and,
- 2018 - DS.

5.3.3 The "DM" scenario (i.e. without development) included baseline traffic data for the relevant assessment year. The "DS" scenario (i.e. with development) included baseline traffic data for the relevant assessment year in addition to predicted traffic associated with the operation of the proposals.

5.3.4 For the purpose of the assessment traffic data for 2018 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2015 were utilised within the dispersion model. The use of 2018 traffic data and 2015 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 21. Exceedences of the relevant AQOs are shown in **bold**.

Table 21 Predicted Annual Mean NO₂ Concentrations

Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Princess Road	44.23	44.37	0.14
R2	Residential - Parkside Road	46.45	46.63	0.18
R3	Residential - Laurel Avenue	35.08	35.15	0.07
R4	Residential - Bowes Street	35.15	35.54	0.39
R5	Residential - Princess Road	40.56	40.76	0.20
R6	Residential - Princess Road	43.47	43.59	0.12
R7	Residential - Princess Road	42.15	42.25	0.10
R8	Residential - Princess Road	40.46	40.56	0.10
R9	Residential - Princess Road	40.54	40.63	0.09
R10	Residential - Russell Street	36.76	36.80	0.04

5.3.7 As indicated in Table 21, predicted annual mean NO₂ concentrations were above the relevant AQO at seven sensitive receptors in both the DM and DS scenarios. These are located within an AQMA and high pollution concentrations would therefore be expected. Annual mean NO₂ concentrations were predicted to be below the relevant AQO at two receptors. It should be noted that there were no new exceedences in the DS scenario when compared with the DM.

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 22.

Table 22 Predicted Annual Mean PM₁₀ Concentrations

Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Princess Road	21.23	21.26	0.03
R2	Residential - Parkside Road	21.71	21.75	0.04
R3	Residential - Laurel Avenue	19.37	19.38	0.01
R4	Residential - Bowes Street	19.38	19.46	0.08
R5	Residential - Princess Road	20.46	20.50	0.04
R6	Residential - Princess Road	21.07	21.09	0.03
R7	Residential - Princess Road	20.79	20.81	0.02
R8	Residential - Princess Road	20.44	20.46	0.02
R9	Residential - Princess Road	20.46	20.47	0.02
R10	Residential - Russell Street	19.69	19.70	0.01

5.3.10 As indicated in Table 22, predicted annual mean PM₁₀ concentrations were below the relevant AQO at all sensitive receptors in both the DM and DS 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 23.

Table 23 Predicted Annual Mean PM_{2.5} Concentrations

Receptor		Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Princess Road	14.13	14.15	0.02
R2	Residential - Parkside Road	14.42	14.44	0.02
R3	Residential - Laurel Avenue	13.01	13.02	0.01

Receptor		Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)		
		DM	DS	Change
R4	Residential - Bowes Street	13.02	13.07	0.05
R5	Residential - Princess Road	13.67	13.69	0.02
R6	Residential - Princess Road	14.03	14.05	0.02
R7	Residential - Princess Road	13.87	13.88	0.01
R8	Residential - Princess Road	13.66	13.67	0.01
R9	Residential - Princess Road	13.67	13.68	0.01
R10	Residential - Russell Street	13.21	13.21	0.01

5.3.13 As indicated in Table 23, predicted annual mean PM_{2.5} concentrations were below the relevant AQTV 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 24.

Table 24 Predicted Impacts - NO₂

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Princess Road	110% or more of AQO	0	Negligible
R2	Residential - Parkside Road	110% or more of AQO	0	Negligible
R3	Residential - Laurel Avenue	76 - 94% of AQO	0	Negligible
R4	Residential - Bowes Street	76 - 94% of AQO	1	Negligible
R5	Residential - Princess Road	95 - 102% of AQO	0	Negligible

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R6	Residential - Princess Road	103 - 109% of AQO	0	Negligible
R7	Residential - Princess Road	103 - 109% of AQO	0	Negligible
R8	Residential - Princess Road	95 - 102% of AQO	0	Negligible
R9	Residential - Princess Road	95 - 102% of AQO	0	Negligible
R10	Residential - Russell Street	76 - 94% of AQO	0	Negligible

5.3.16 As indicated in Table 24, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

5.3.17 Predicted impacts on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in Table 25.

Table 25 Predicted Impacts - PM₁₀

Receptor		Predicted Annual Mean PM ₁₀ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Princess Road	Below 75% of AQO	0	Negligible
R2	Residential - Parkside Road	Below 75% of AQO	0	Negligible
R3	Residential - Laurel Avenue	Below 75% of AQO	0	Negligible
R4	Residential - Bowes Street	Below 75% of AQO	0	Negligible
R5	Residential - Princess Road	Below 75% of AQO	0	Negligible
R6	Residential - Princess Road	Below 75% of AQO	0	Negligible
R7	Residential - Princess Road	Below 75% of AQO	0	Negligible
R8	Residential - Princess Road	Below 75% of AQO	0	Negligible
R9	Residential - Princess Road	Below 75% of AQO	0	Negligible
R10	Residential - Russell Street	Below 75% of AQO	0	Negligible

5.3.18 As indicated in Table 25, 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 26.

Table 26 Predicted Impacts - PM_{2.5}

Receptor		Predicted Annual Mean PM _{2.5} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Princess Road	Below 75% of AQTV	0	Negligible
R2	Residential - Parkside Road	Below 75% of AQTV	0	Negligible
R3	Residential - Laurel Avenue	Below 75% of AQTV	0	Negligible
R4	Residential - Bowes Street	Below 75% of AQTV	0	Negligible
R5	Residential - Princess Road	Below 75% of AQTV	0	Negligible
R6	Residential - Princess Road	Below 75% of AQTV	0	Negligible
R7	Residential - Princess Road	Below 75% of AQTV	0	Negligible
R8	Residential - Princess Road	Below 75% of AQTV	0	Negligible
R9	Residential - Princess Road	Below 75% of AQTV	0	Negligible
R10	Residential - Russell Street	Below 75% of AQTV	0	Negligible

5.3.20 As indicated in Table 26, 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 Future Exposure

5.3.21 The proposed development has the potential to cause exposure of future residents 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 Figure 6, 8, 10, 11 and 12 for graphical representations of the results.

5.3.22 As shown in Figure 6, annual mean NO₂ concentrations were predicted to be above the AQO of 40µg/m³ at several locations fronting Princess Road at ground floor level. The

maximum level at the building façade was 46.92µg/m³. As such, mitigation techniques have been specified in Section 0 to protect future occupants in these locations.

5.3.23 As shown in Figure 11, annual mean NO₂ concentrations were predicted to be above the AQO at several locations fronting Princess Road at first floor level. The maximum level at the building façade was 40.58µg/m³. As such, mitigation techniques have been specified in Section 0 to protect future occupants in these locations.

5.3.24 As shown in Figure 12, annual mean NO₂ concentrations were predicted to be below the AQO at all locations across the development site at second floor. The maximum level at the building façade was 37.48µg/m³. As such, mitigation was not considered necessary at this level.

5.3.25 It should be noted that pollutant levels decrease with distance from pollutant sources. As annual mean NO₂ concentrations were predicted to be below the AQO at second floor, further assessment above this height was not considered necessary.

5.3.26 As shown in Figure 8, annual mean PM₁₀ concentrations were predicted to be below the AQO of 40µg/m³ at all locations across the development. The maximum level at the site boundary was 23.19µg/m³. As such, future occupants are not predicted to be exposed to PM₁₀ concentrations above the AQO.

5.3.27 As shown in Figure 9, annual mean PM_{2.5} concentrations were predicted to be below the AQTV of 25µg/m³ at all locations across the development. The maximum level at the site boundary was 15.29µg/m³. As such, future occupants are not predicted to be exposed to PM_{2.5} concentrations above the AQO.

Mitigation

5.3.28 There are a number of air quality mitigation options available to reduce or off-set impacts associated with a development. However, all techniques have financial implications and may therefore affect scheme viability. As such, they should only be included if necessary.

5.3.29 As shown in Figure 11, exceedences of the annual mean AQO for NO₂ were predicted over the western part of the development site fronting Princess Road at ground and first floor level. As such, mitigation for the Health Hub and Block A in these areas is required to

ensure a supply of clean air for future occupants. This should be provided in the form of a mechanical ventilation system. The air inlet should be positioned at the rear of both buildings at a height of 4.5m or above. This will ensure the air supply is taken from a location where exceedences of the AQO were not predicted. Alternatively, if there are design issues associated with providing an inlet at the designated location, a NO₂ absorption filter could be included within the system to reduce pollutant concentrations within the airstream prior to entering the unit.

5.3.30 Mechanical ventilation is suggested within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality' guidance document¹⁶ and as such is considered a suitable solution for a development of this size and nature.

5.3.31 A number of additional 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'¹⁷ to encourage the use of sustainable transport modes, manage vehicle flow and reduce pollution around the site. Table 27 describes the good practice principles detailed in the IAQM guidance along with how each has been addressed with regards to the proposals.

¹⁶ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

¹⁷ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

Table 27 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	The Greater Manchester Air Quality Action Plan¹⁸ (GMAQAP) highlights key actions to be taken to improve air quality both across Greater Manchester. The GMAQAP includes the following actions which relate specifically to the development: • Promotion of public transport; • Reduction of road traffic emissions; • Encouraging active transport; and, • Production of travel plans by relevant parties. The location of the development encourages active transport as amenities and good public transport links are in walking distance of the site. A full Travel Plan will be produced, which highlights that the site is located in an area with excellent public transport, walking and cycling infrastructure. Based on the above comments it is considered likely that the development will act in support of the actions highlighted in the GMAQAP
	Wherever possible, new developments should not create a new "street canyon", or a building configuration that inhibits effective pollution dispersion	The development will not lead to the generation of a street canyon
	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 location
	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	Residential land use has been positioned away from Princess Road as far as practicable. As shown previously, there are no significant impacts on pollutant concentrations within the surrounding area

¹⁸ GMAQAP, MCC, 2004.

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	The number of EV charging points to be supplied to the development has not been finalised. However, the development only includes 130 residential car parking spaces. This is significantly less than one space per unit, thus discouraging car ownership
	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 produced in support of the development
	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 to be included in the development will be provisioned in accordance with the relevant requirements

5.3.32 It is considered the above methods would further reduce potential impacts associated with the proposals. Specific mitigation suited to the development may be stipulated as a planning condition if deemed necessary by the LA.

Overall Impact Significance

5.3.33 The overall significance of operational phase 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

Guidance	Comment
The existing and future air quality in the absence of the development	Exceedences of the annual mean AQO for NO₂ were predicted at seven sensitive receptor locations. Exceedences of the annual mean AQO for PM₁₀ and AQTV for PM_{2.5} were not predicted at any sensitive receptor location It is considered unlikely that future air quality conditions will change significantly in the absence of the development based on 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 existing population exposed to exceedences of the AQOs
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	The assessment assumed that vehicle exhaust emission rates and background pollutant levels will not reduce in future years. This provides worst-case results when compared with DEFRA and Highways Agency methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

5.3.34 The IAQM guidance¹⁹ states that only if the impact is greater than **slight**, 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, 2015.

6.0 CONCLUSION

- 6.1.1 Redmore Environmental Ltd was commissioned by Rowlinson Construction Ltd to undertake an Air Quality Assessment in support of a planning application for a residential-led development on land off Bowes Street, Manchester.
- 6.1.2 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 site during operation, as well as expose future residents to any existing air quality issues. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.
- 6.1.3 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 earthworks, construction and trackout activities was predicted to be not significant.
- 6.1.4 The proposed development has the potential to expose future users to elevated pollution levels and impact existing air quality in the vicinity of the site during operation. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict pollutant concentrations as a result of emissions from the local highway network. Results were subsequently verified using monitoring data collected by MCC.
- 6.1.5 Impacts on NO₂, PM₁₀ and PM_{2.5} concentrations as a result of operational phase road vehicle exhaust emissions were predicted to be **negligible** at all discrete receptor locations. 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.
- 6.1.6 The results of the dispersion modelling assessment indicated that predicted annual mean NO₂ concentrations were above the relevant AQO across part of the development fronting Princess Road. As such, suitable mitigation in the form of a mechanical ventilation system has been specified for the relevant areas. This should ensure a supply of clean air for future occupants and ensure they are not exposed to exceedences of the AQOs.

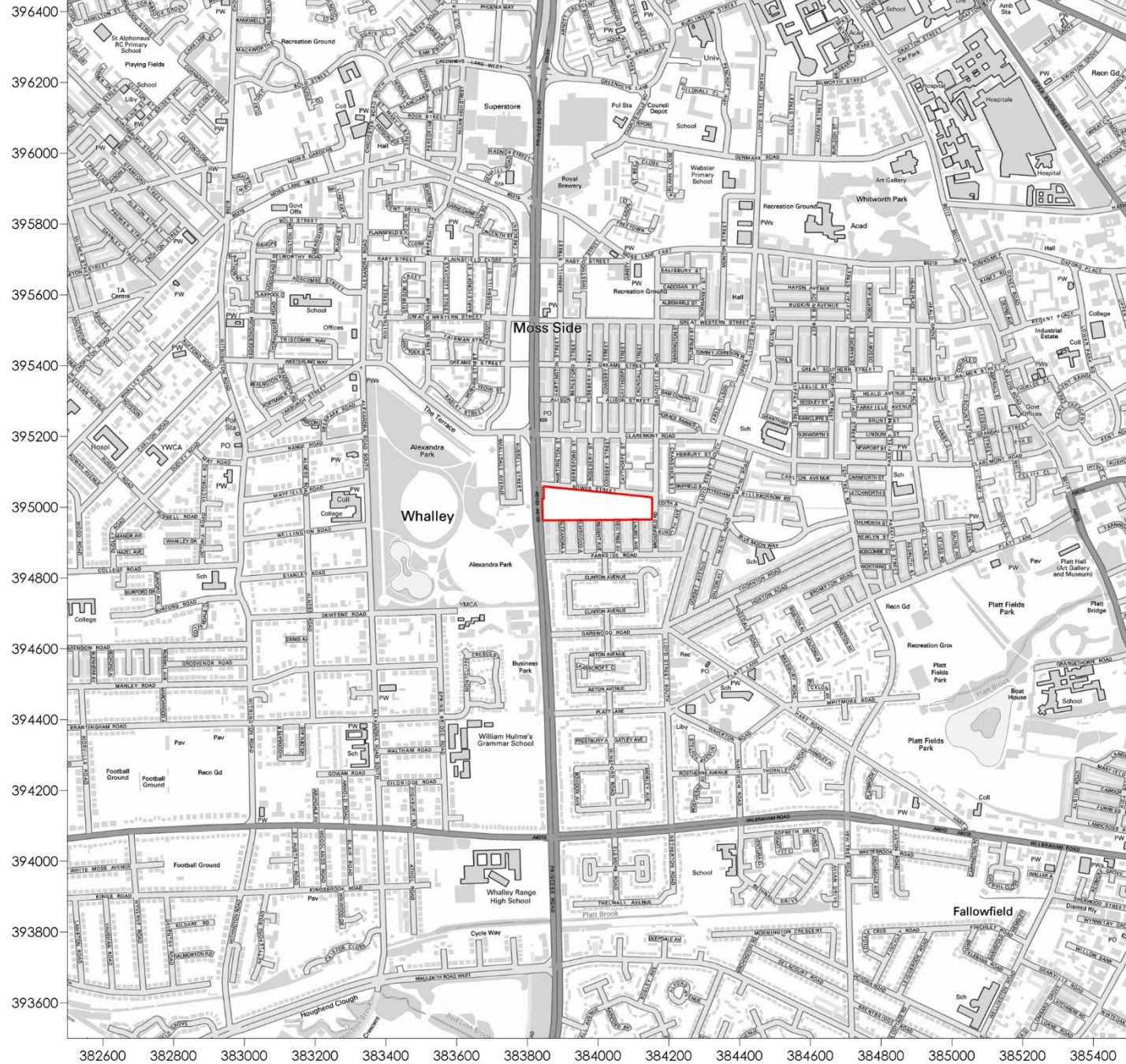
6.1.7 It is noted that predicted annual PM₁₀ and PM_{2.5} concentrations were below the relevant AQO and AQTV at all locations across the site.

6.1.8 Based on the assessment results, air quality issues are not considered a constraint to planning consent for the proposals, subject to the implementation of the specified mitigation.

7.0 **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
DM	Do-Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EU	European Union
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 1 - Site Location Plan

Project

Air Quality Assessment
Bowes Street, Manchester

Project Reference

1338

Client

Rowlinson Constructions Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010



www.red-env.co.uk | 0161 7060075



Legend

Title
Figure 2 - Site Layout Plan

Project
Air Quality Assessment
Bowes Street, Manchester

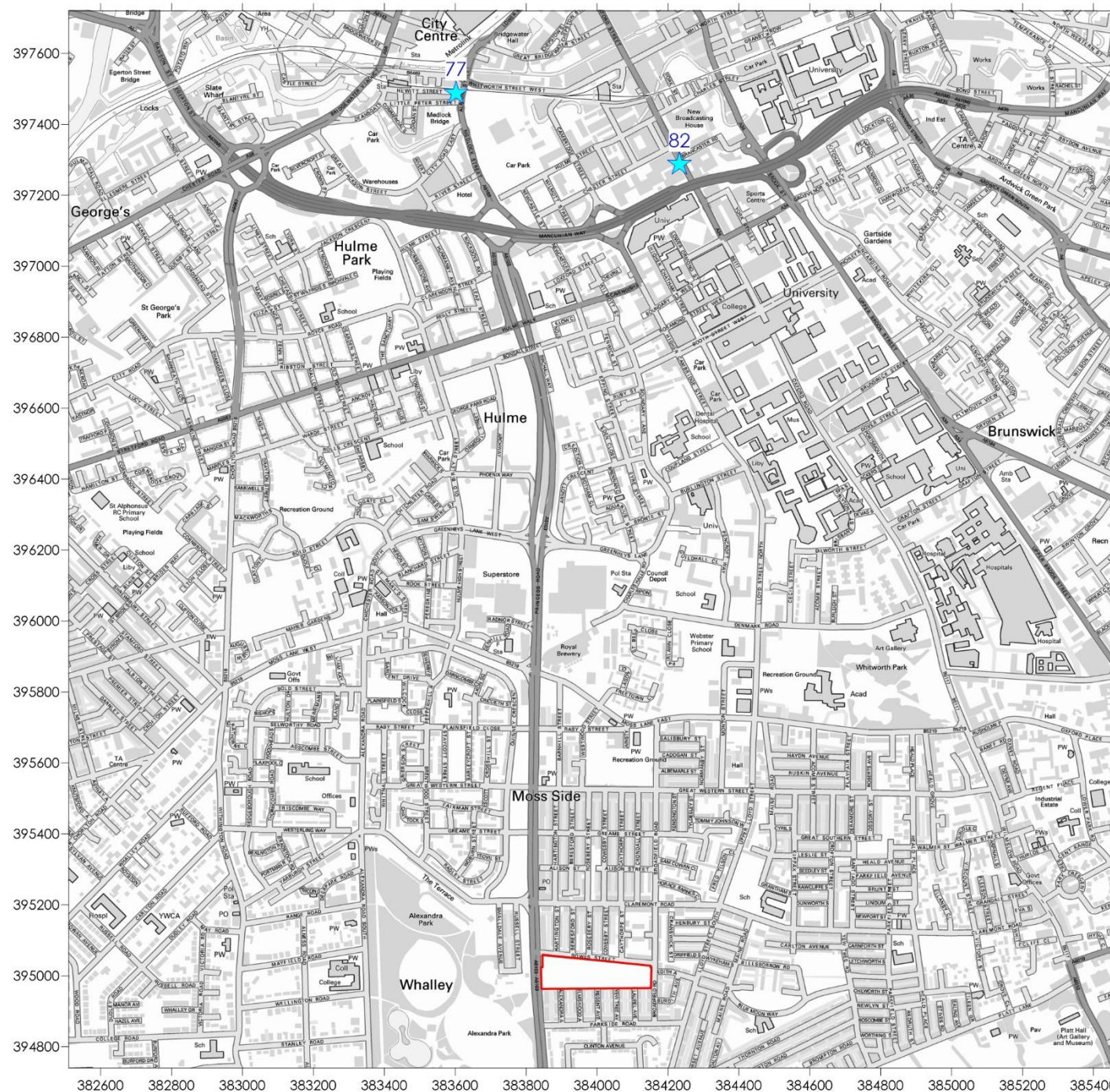
Project Reference
1338

Client
Rowlinson Constructions Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010



www.red-env.co.uk | 0161 7060075



Legend

 Site Boundary

 Monitor

Title

Figure 3 - Monitoring Locations

Project

Air Quality Assessment
Bowes Street, Manchester

Project Reference

1338

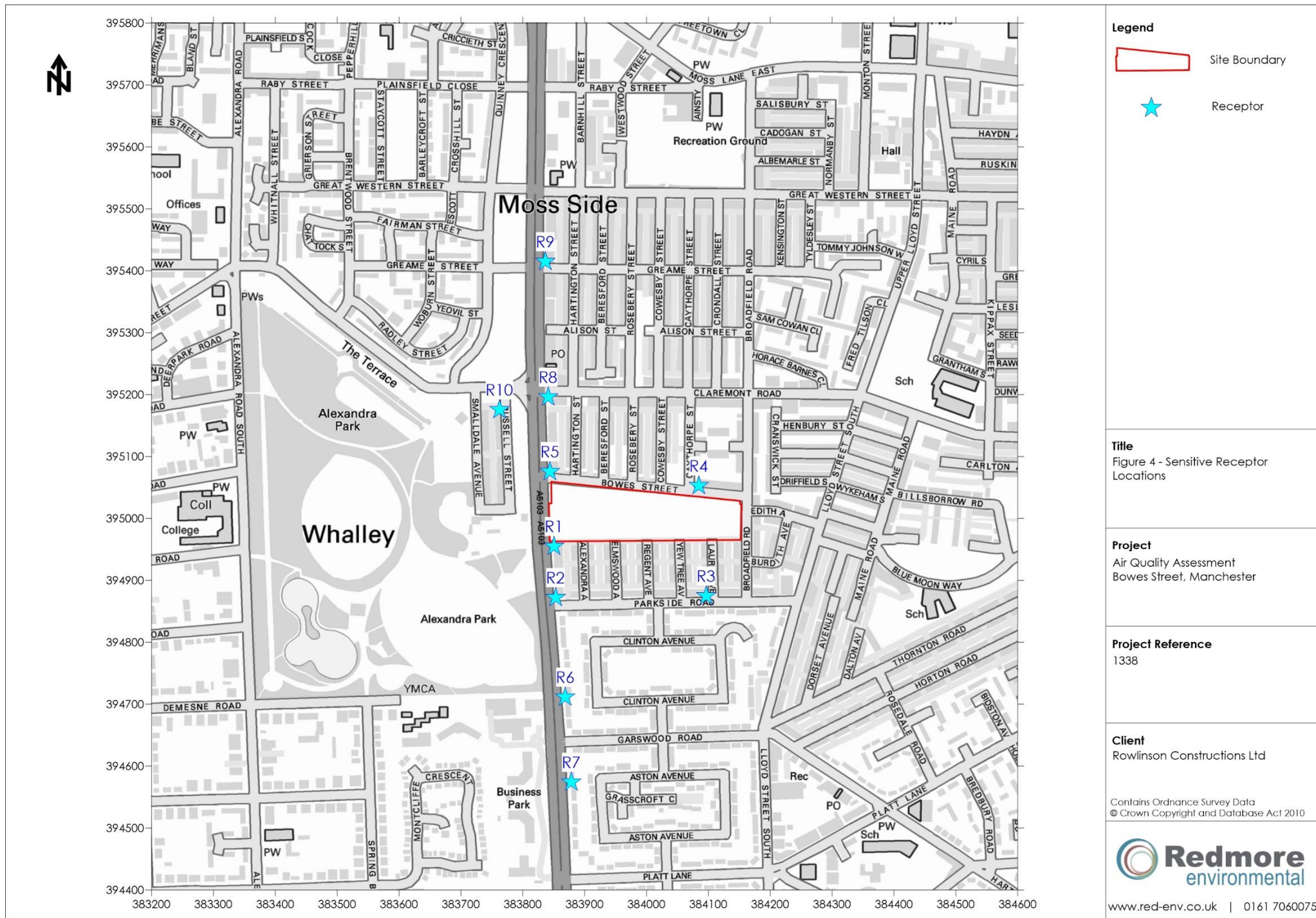
Client

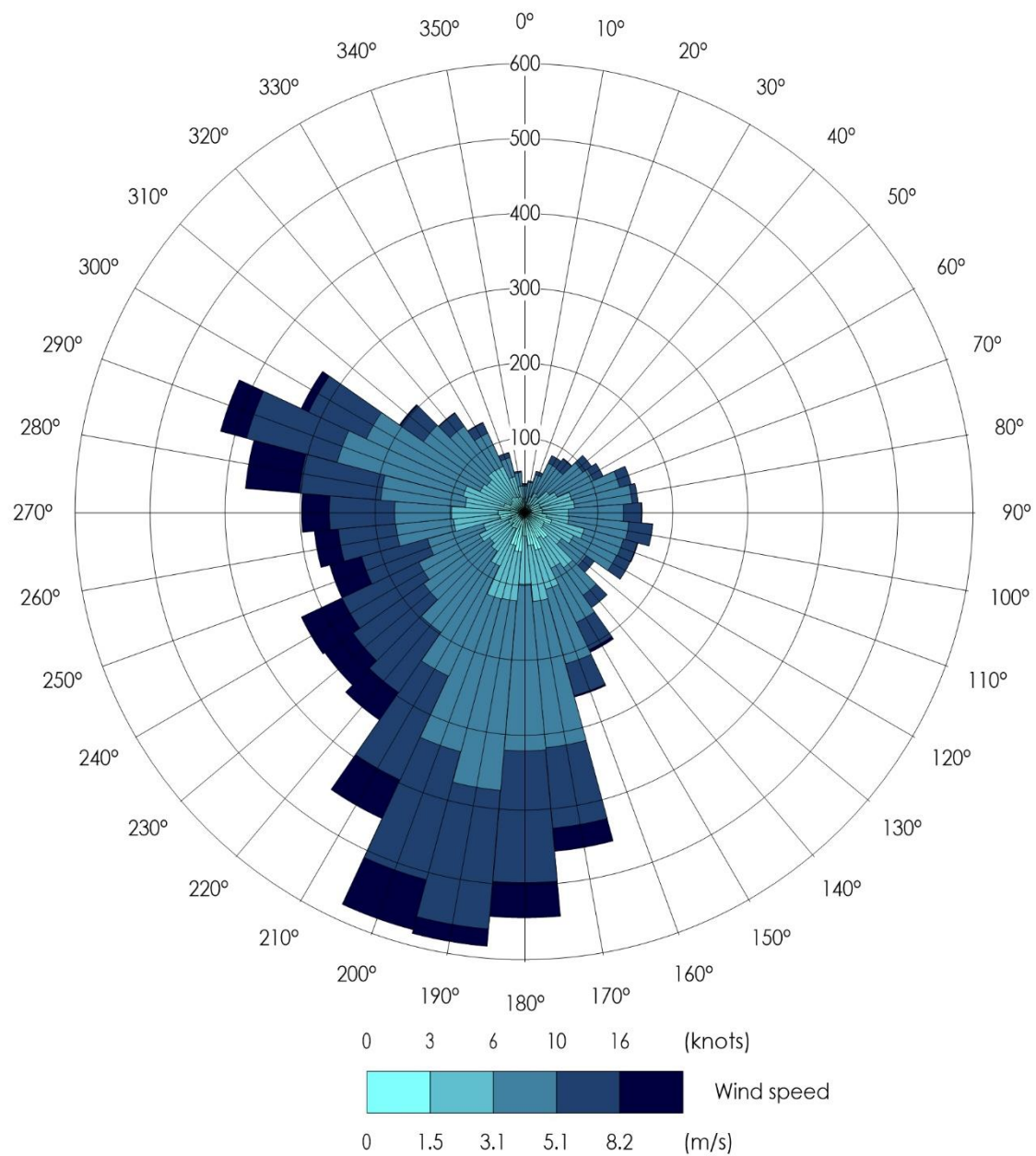
Rowlinson Constructions Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010



www.red-env.co.uk | 0161 7060075





Legend

Title

Figure 5 - Wind Rose of 2015
Manchester Airport
Meteorological Data

Project

Air Quality Assessment
Bowes Street, Manchester

Project Reference

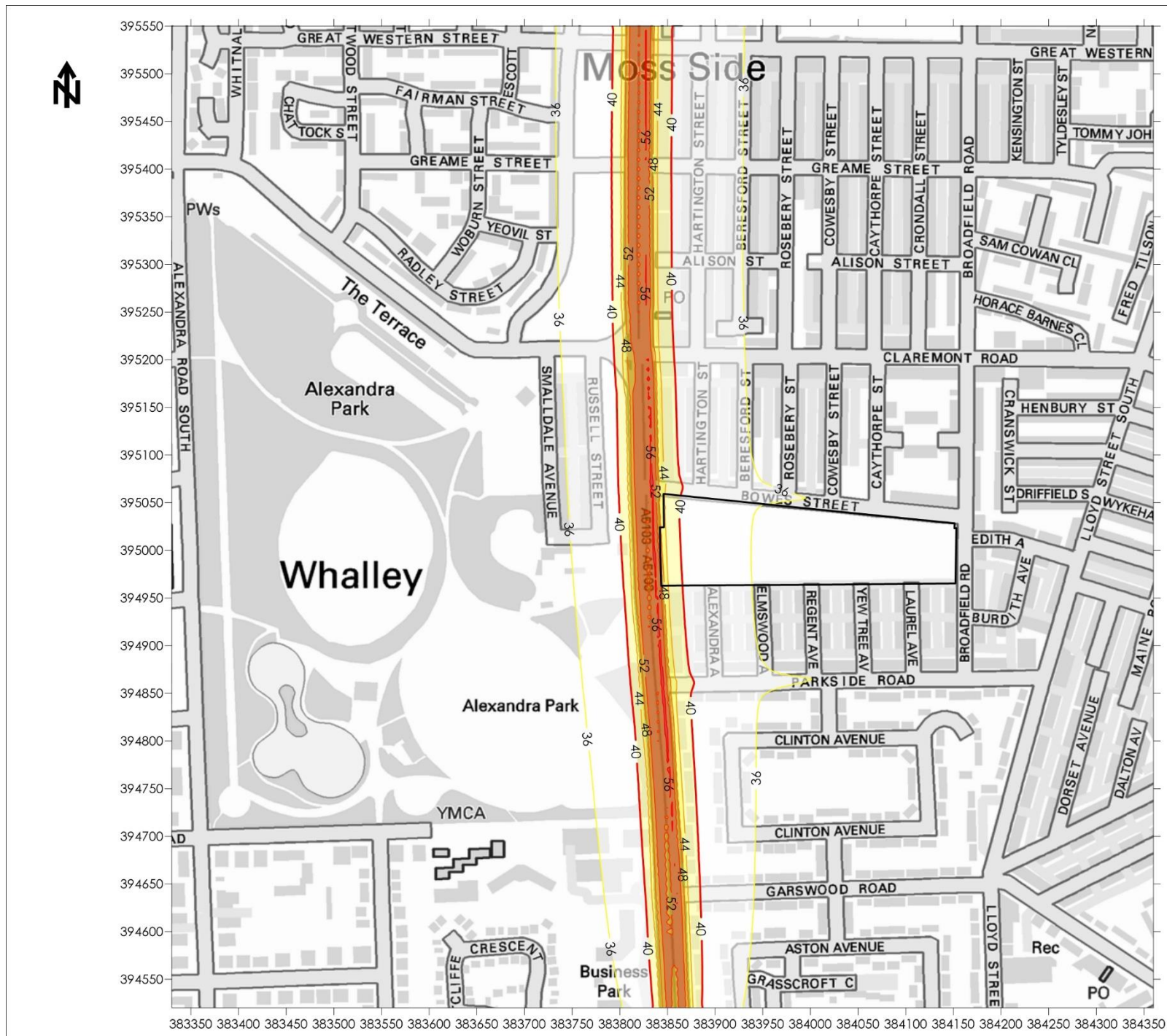
1338

Client

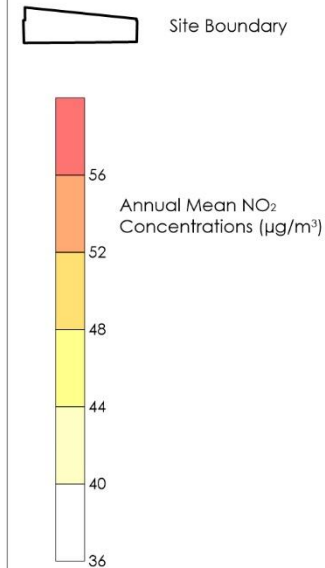
Rowlinson Constructions Ltd



www.red-env.co.uk | 0161 7060075



Legend



Title

Figure 6 - Predicted Annual Mean NO₂ Concentrations (µg/m³) Do-Minimum Ground Floor

Project

Air Quality Assessment
Bowes Street, Manchester

Project Reference

1338

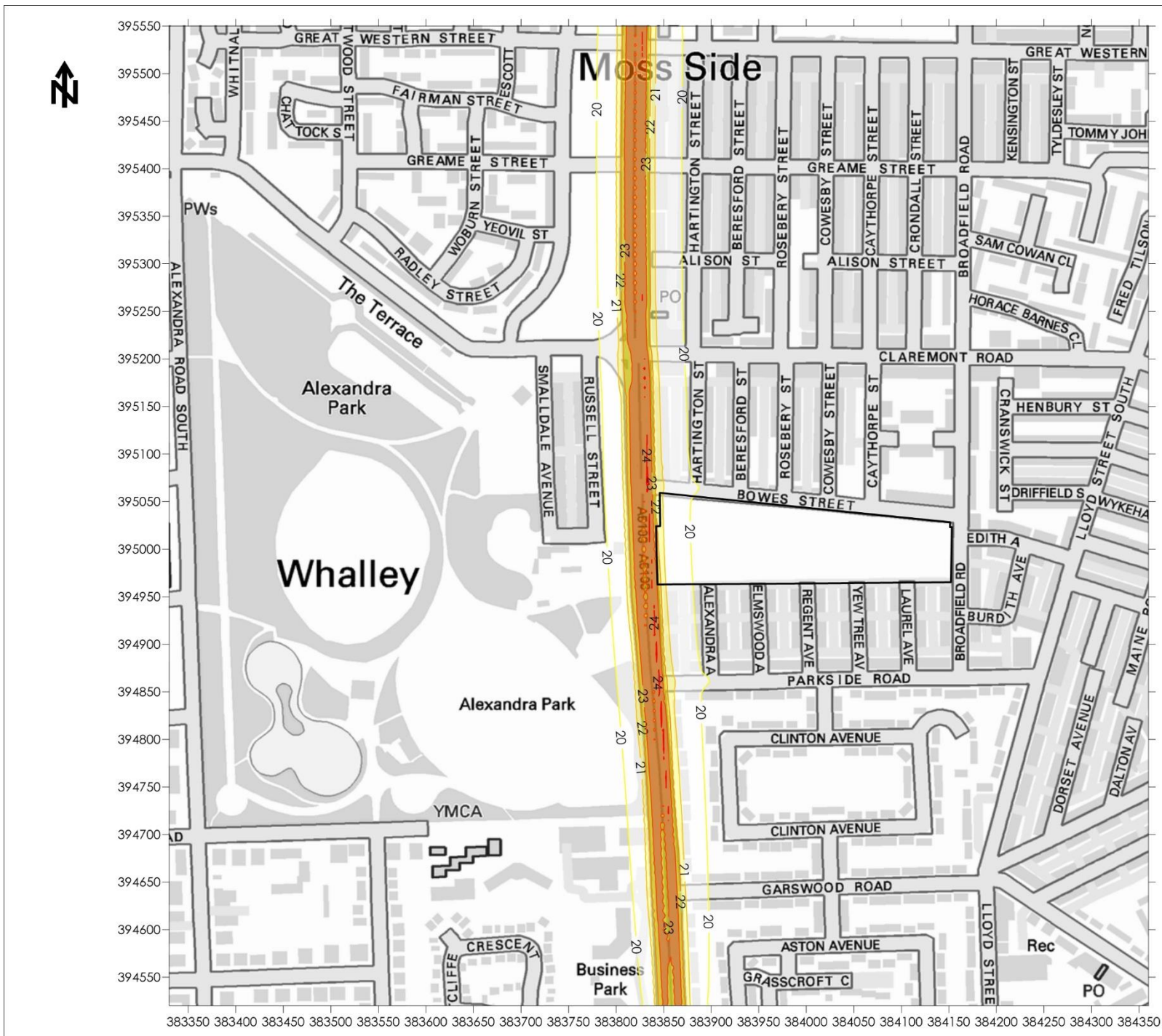
Client

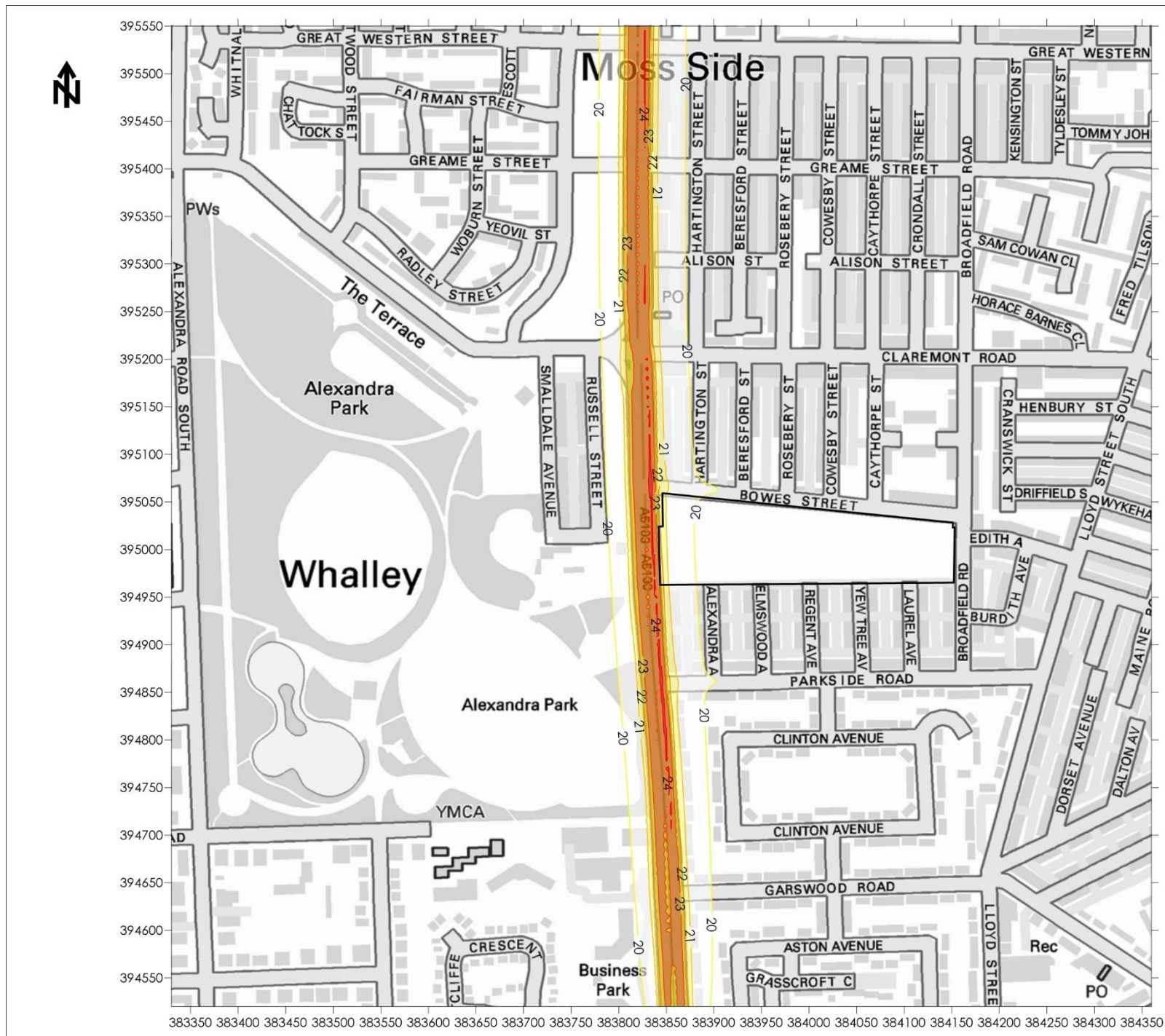
Rowlinson Constructions Ltd

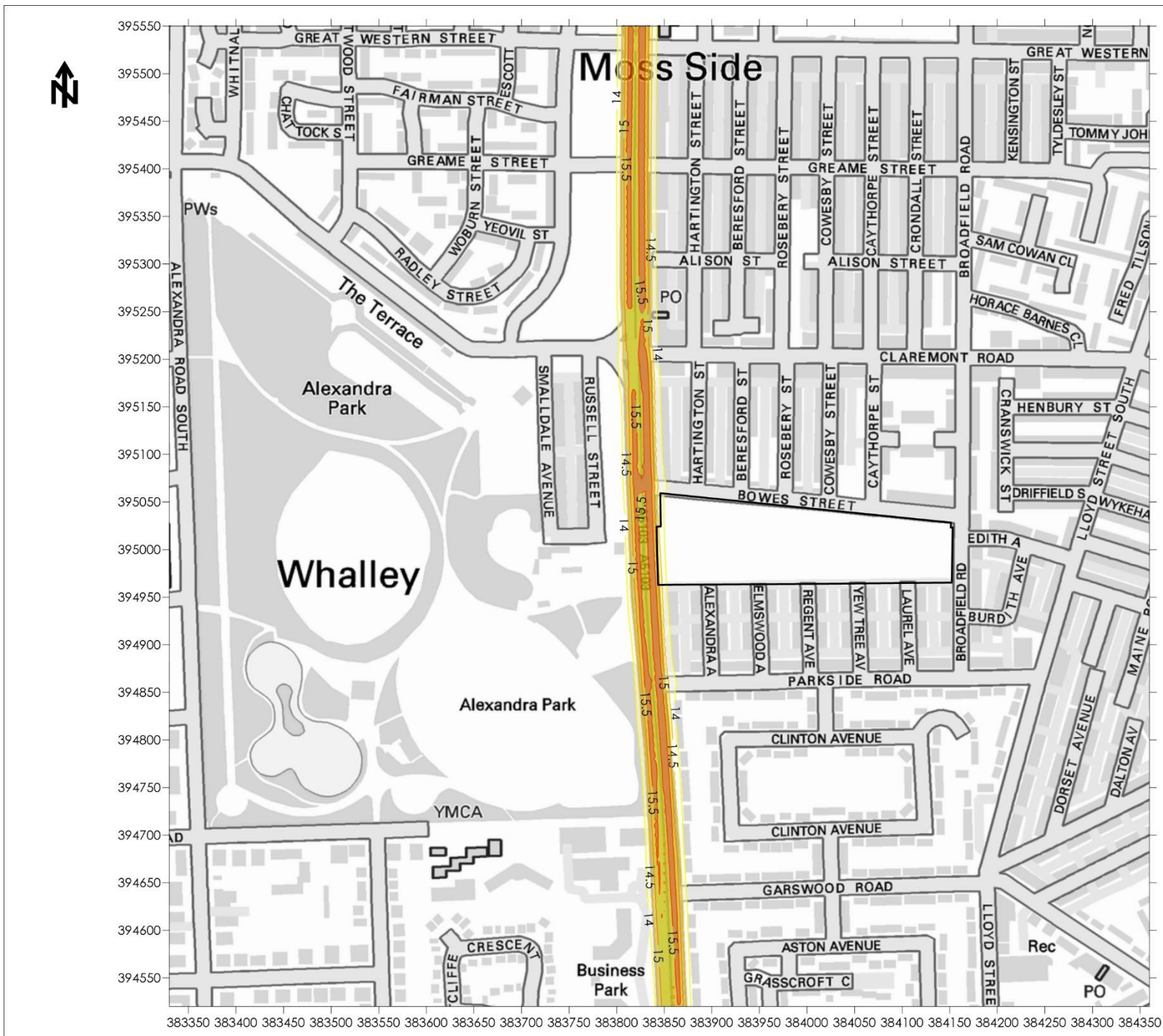
Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010

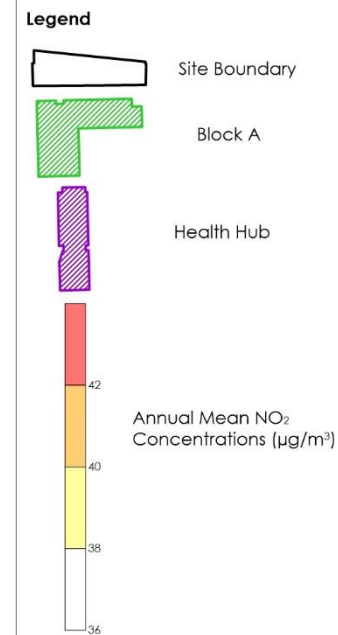
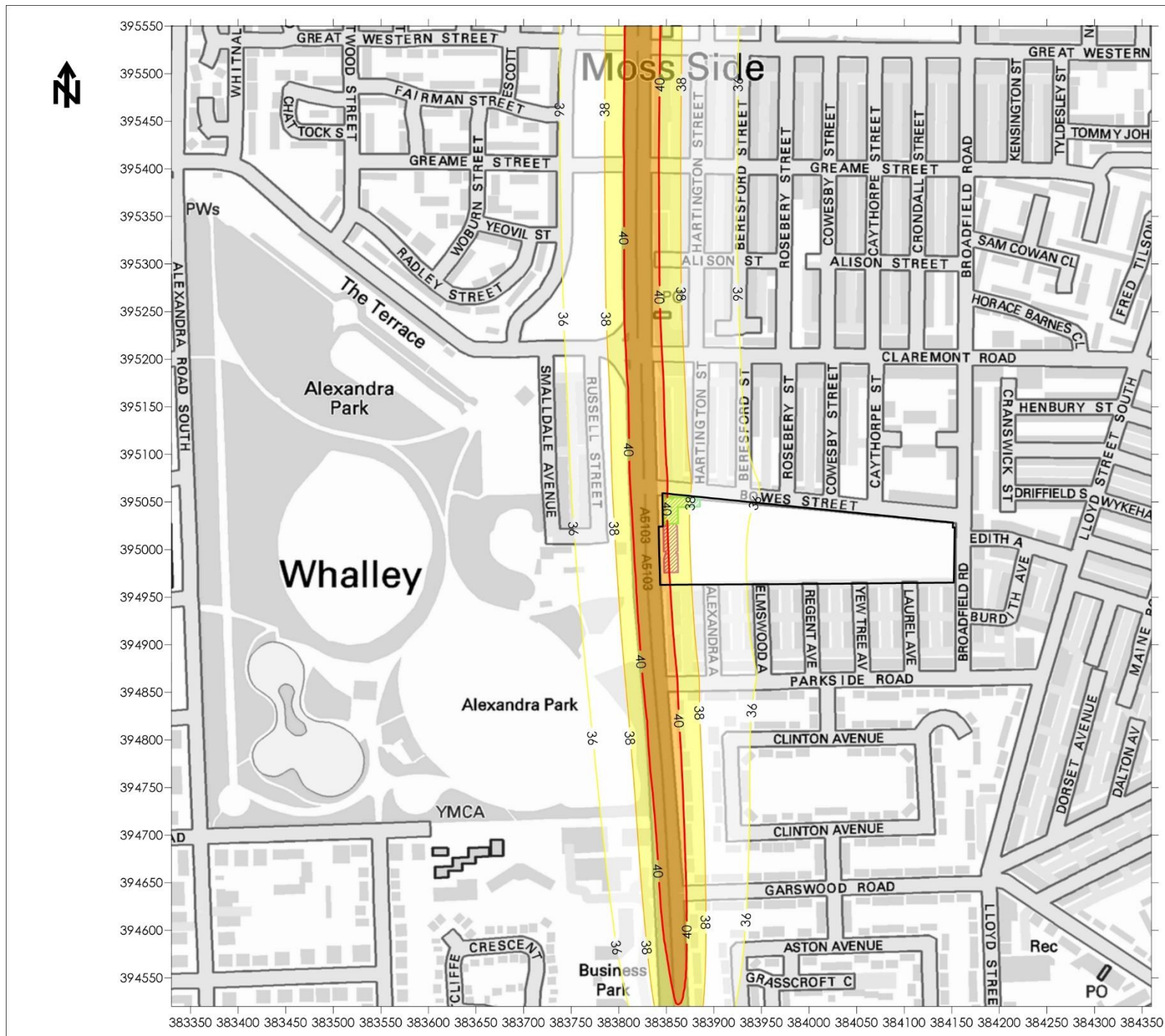


www.red-env.co.uk | 0161 7060075









Title
Figure 12 - Predicted Annual Mean NO₂ Concentrations (µg/m³) Do-Something First Floor

Project
Air Quality Assessment
Bowes Street, Manchester

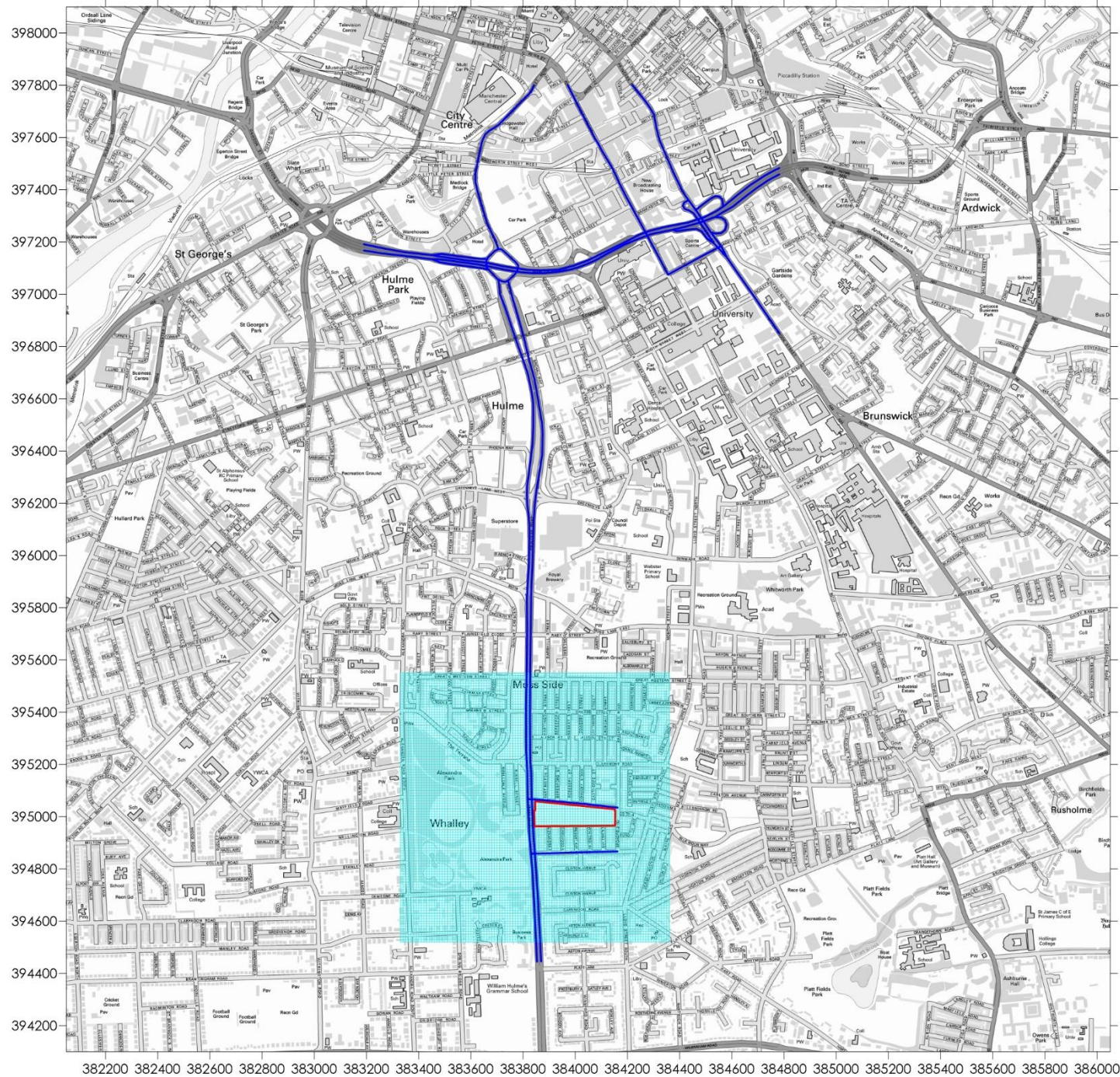
Project Reference
1338

Client
Rowlinson Constructions Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010

Redmore
environmental

www.red-env.co.uk | 0161 7060075



Legend

-  Site Boundary
-  Output Grid
-  Road Link

Title

Figure 14 - ADMS-Roads Inputs

Project

Air Quality Assessment
Bowes Street, Manchester

Project Reference

1338

Client

Rowlinson Constructions Ltd

Contains Ordnance Survey Data
© Crown Copyright and Database Act 2010



www.red-env.co.uk | 0161 7060075

Appendix 1 - Assessment Input Data

Introduction

The proposed development has the potential to expose future residents to elevated pollution levels and cause air quality impacts as a result of vehicles travelling to and from the site. In order to assess pollutant concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.0.1.0). 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; and,
- Monin-Obukhov length.

These are detailed in the following Sections.

Traffic Flow Data

Baseline traffic data and predicted development trip generation for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as HDV proportion, were obtained from CAPITA Property and Infrastructure, the Transport Consultants for the project.

Traffic data for Princess Road, Medlock Street, Oxford Street, Upper Brook Street and Mancunian Way was not available from the Transport Consultants and was therefore supplemented with

information from the Department for Transport (DfT)²⁰. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network in Great Britain for the years 1999 to 2015. It should be noted that the DfT is referenced in DEFRA guidance²¹ as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

Baseline traffic data was converted to 2018 flows utilising factors obtained from TEMPro. This software package has been developed by the DfT to calculate traffic growth throughout the UK.

A summary of the traffic data is provided in Table A1.1.

Table A1.1 Traffic Data

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2018 DM	2018 DS			
L1	Parkside Road	1,104	1,129	1,270	0.00	7.7	30
L2	Parkside Road Approach to Princess Road	1,104	1,129	1,270	0.00	7.7	30
L3	Bowes Street	1,005	1,028	2,000	0.00	7.9	30
L4	Bowes Street Approach to Princess Road	1,005	1,028	2,000	0.00	10.2	30
L5	Princess Road Northbound (NB) between Platt Lane and Claremont Road Junction	20,036	21,437	21,715	3.38	7.5	45
L6	Princess Road NB Approach to Claremont Road Junction	20,036	21,437	21,715	3.38	15.6	45
L7	Princess Road NB Exit from Claremont Road Junction	20,036	21,437	21,715	3.38	11.5	45
L8	Princess Road NB between Claremont Road Junction and Mancunian Way Roundabout	20,036	21,437	21,715	3.38	7.4	45
L9	Princess Road NB Approach to Mancunian Way	20,036	21,437	21,715	3.38	10.4	25

²⁰ <http://www.dft.gov.uk/traffic-counts/>.

²¹ Local Air Quality Management (TG16), DEFRA, 2016.

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2018 DM	2018 DS			
L10	Princess Road Southbound (SB) between Platt Lane and Claremont Road Junction	20,036	21,437	21,715	3.38	6.5	45
L11	Princess Road SB Exit from Claremont Road Junction	20,036	21,437	21,715	3.38	7	45
L12	Princess Road SB Approach to Claremont Road Junction	20,036	21,437	21,715	3.38	10.4	45
L13	Princess Road SB between Claremont Road and Mancunian Way Roundabout	20,036	21,437	21,715	3.38	6.7	45
L14	Princess Road SB Exit from Mancunian Way Roundabout	20,036	21,437	21,715	3.38	8.2	25
L15	Medlock Street Approach to Mancunian Way Roundabout	16,631	17,794	17,794	4.28	15.4	25
L16	Medlock Street	16,631	17,794	17,794	4.28	16.9	30
L17	Albion Street leading to Lower Mosley Street	16,631	17,794	17,794	4.28	17.7	30
L18	Oxford Street between Portland Street and Whitworth Street Junction	12,187	13,039	13,039	24.54	26.6	30
L19	Oxford Street Approach to Whitworth Street Junction	12,187	13,039	13,039	24.54	26.6	20
L20	Oxford Street Exit from Whitworth Street Junction	12,187	13,039	13,039	24.54	26.6	20
L21	Oxford Street between Whitworth Street and Charles Street Junction	12,187	13,039	13,039	24.54	26.6	20
L22	Oxford Street Approach to Charles Street Junction	12,187	13,039	13,039	24.54	26.6	10
L23	Oxford Street Exit from Charles Street Junction	12,187	13,039	13,039	24.54	26.6	10
L24	Oxford Street between Charles Street Junction and York Street	12,187	13,039	13,039	24.54	26.6	20
L25	Upper Brook Street south of Oxford Street	20,021	21,420	21,420	3.11	16.3	40
L26	Upper Brook Street NB between Oxford Street and Brook Street	10,011	10,710	10,710	3.11	6.9	25

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif.	2018 DM	2018 DS			
L27	Brook Street NB	10,011	10,710	10,710	3.11	7	30
L28	Upper Brook Street SB between Oxford Road and Slip road to Mancunian Way	10,011	10,710	10,710	3.11	9.9	30
L29	Brook Street between Charles Street and Grosvenor Street	7,939	8,494	8,494	5.16	9.4	40
L30	Mancunian Way Westbound (WB) east of Brook Street	44,264	47,358	47,358	3.85	10.1	65
L31	Mancunian Way WB between Upper Brook Street and Medlock Street	44,264	47,358	47,358	3.85	8.3	65
L32	Mancunian Way WB west of Medlock Street	44,264	47,358	47,358	3.85	8.2	65
L33	Mancunian Way Eastbound (EB) west of Medlock Street	44,264	47,358	47,358	3.85	7.9	65
L34	Mancunian Way EB between Medlock Street and Upper Brook Street	44,264	47,358	47,358	3.85	8.5	65
L35	Mancunian Way EB east of Upper Brook Street	44,264	47,358	47,358	3.85	7.6	65
L36	Slip Road from Brook Street to Mancunian Way EB	11,066	11,840	11,840	3.85	7.3	25
L37	Slip Road from Brook Street to Mancunian Way WB	11,066	11,840	11,840	3.85	7.2	25
L38	Slip Road from Upper Brook Street to Mancunian Way WB	11,066	11,840	11,840	3.85	6.3	25
L39	Slip Road from Mancunian Way EB to Mancunian Way Roundabout	11,066	11,840	11,840	3.85	8.3	25
L40	Slip Road from Mancunian Way Roundabout to Mancunian Way WB	11,066	11,840	11,840	3.85	6.2	25
L41	Princess Street	7,939	8,494	8,494	5.16	9.4	40
L42	Oxford Street between York Street and Upper Brook Street	12,187	13,039	13,039	24.54	12.5	20
R1	Mancunian Way Roundabout	22,590	24,169	24,354	3.85	11.8	20

Some of the roads within the assessment extents are flanked by buildings on either side. These locations were included as street canyons within the model in order to provide consideration of reduced pollutant dispersion in these areas.

Reference should be made to Figure 13 for a graphical representation of the road link locations.

It should be noted that L30, L31, L32, L33, L35 and L35 represented a stretch of the motorway that is raised above ground level. As such, these road links were elevated in the model by a height of 7m.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 7.0). This has been produced by DEFRA and incorporates updated COPERT4v11 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, 2015 emission factors were utilised in preference to the development opening year in order to provide robust model outputs. As predictions for 2015 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 2015 to 31st December 2015 (inclusive). Manchester Airport is located at NGR: 381792, 384116, which is approximately 11.1km 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 roughness length (z_0) of 0.5m 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 'parkland, open suburbia'.

A z_0 of 0.2m 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 (min)'.

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

Background Concentrations

A review of DEFRA data was undertaken in order to identify an appropriate background value for use in the assessment. This indicated the annual mean NO₂, PM₁₀ and PM_{2.5} concentrations predicted at the 82 - Manchester Oxford Road automatic monitor during 2015 were higher than the DEFRA background for the site, as shown in Table 13. As such, this data was used to provide a representation of pollution levels without the contribution from road vehicles in order to provide worst-case predictions. The background concentrations used in the assessment are shown in Table A1.2

Table A1.2 DEFRA 2015 Background Concentrations - 82-Manchester Oxford Road

Pollutant	Background Concentration ($\mu\text{g}/\text{m}^3$)
NO ₂	33.94
PM ₁₀	19.15
PM _{2.5}	12.88

Similarly to emission factors, the background pollutant concentrations from 2015 were utilised in preference to future year background concentrations. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 5.1) 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 2015 using traffic data, meteorological data and monitoring results from this year.

MCC undertook monitoring of NO₂ concentrations at two locations within the modelling extents during 2015. Results were obtained and the road contributions to total NO_x concentrations calculated following the methodology contained within DEFRA guidance²³. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table A1.3.

²² Local Air Quality Management (TG16), DEFRA, 2016.

²³ Local Air Quality Management (TG16), DEFRA, 2016.

Table A1.3 Verification - Monitoring Results

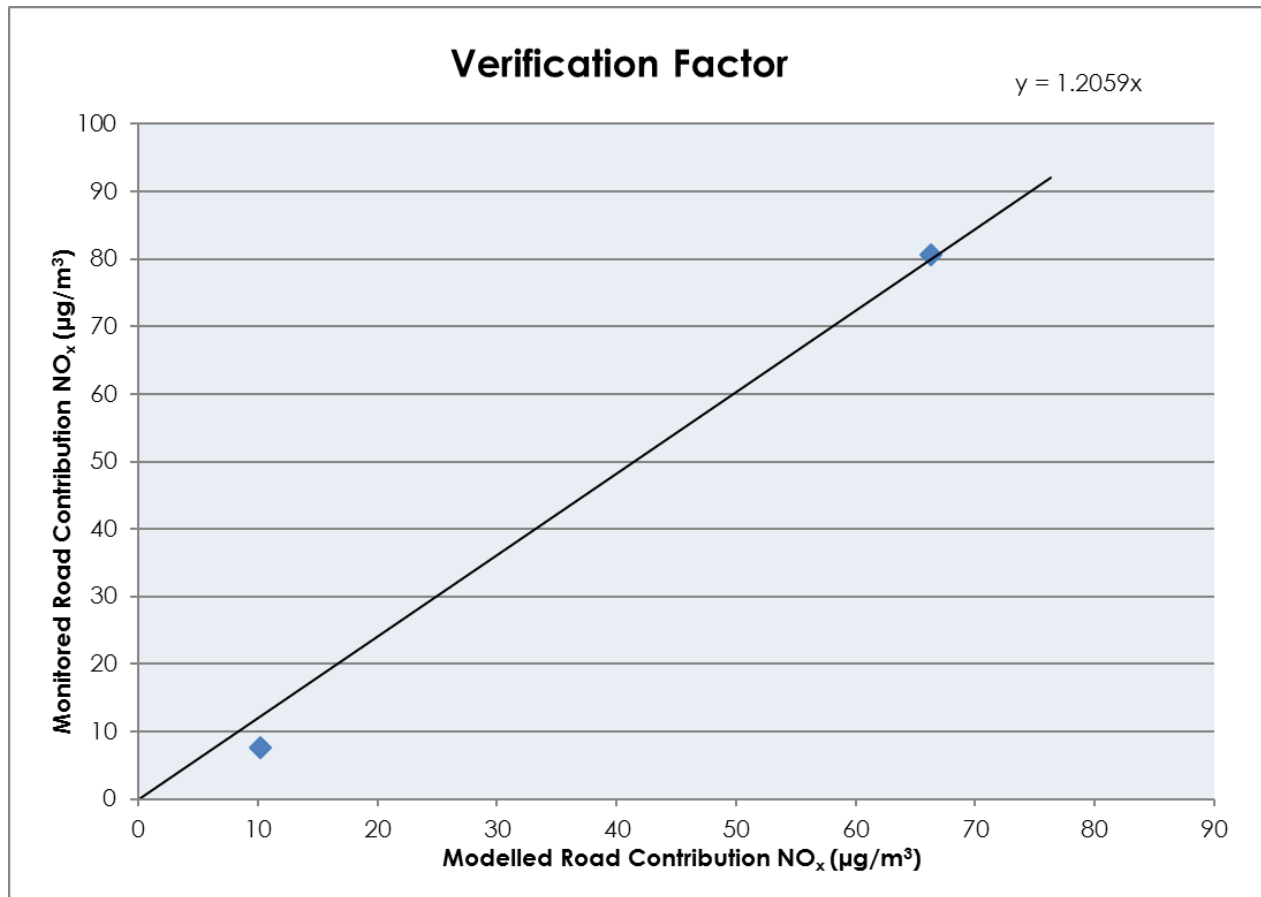
Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
82	Manchester Oxford Road	65.92	80.66
77	Hewitt Road	37.33	7.70

The annual mean road NO_x concentrations predicted from the dispersion model and the 2015 road NO_x concentrations calculated from the monitoring results are summarised in Table A1.4.

Table A1.4 Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
82	Manchester Oxford Road	80.66	66.30
77	Hewitt Road	7.70	10.22

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 1.2059 was required to be applied to all modelling results, as shown in Graph 1.

Graph 1 Verification Factor

Monitoring of PM₁₀ and PM_{2.5} concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust PM₁₀ and PM_{2.5} model predictions in lieu of more accurate data in accordance with DEFRA guidance²⁴.

²⁴ Local Air Quality Management (TG16), DEFRA, 2016.

Date: 11th October 2016

Ref: 1338

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.

EMILY PEARS-RYDING

Graduate Air Quality Consultant



BSc (Hons), GradIEMA

Tel: 0161 706 0075 | Email: emily.pears-ryding@red-env.co.uk

KEY EXPERIENCE:

Emily 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.
- 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.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.

SELECT PROJECTS SUMMARY:

Station Road, West Drayton

Air Quality Assessment for a change of use from office units to a hotel in an Air Quality Management Area (AQMA). Concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions and an adjacent petrol station. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM₁₀ and NO₂ concentrations across the site. Results revealed that pollution levels were below the air quality standards across the development. A qualitative assessment of benzene emissions took place to assess the potential effects of the petrol station. A screening process indicated that due to the change of use of the existing building into a hotel, future occupants would not be exposed for periods long enough to affect human health.

Holloway Lane, Harmondsworth

Air Quality Assessment in support of a mineral extraction site located within an AQMA. The proposals involved a processing and concrete plant which had the potential to cause air quality impacts as a result of fugitive dust emissions. An assessment was undertaken and revealed that the use of good practice control measures would provide suitable mitigation for the development.

Dulcote Quarry, Wells

Air Quality Assessment for the redevelopment of Dulcote Quarry to provide a Food Manufacturing Campus. An assessment of road traffic emissions, fugitive dust emissions and odour was undertaken. Impacts of road traffic emissions and fugitive dust on sensitive receptors were negligible at all locations. The risk of potential odour effects was also determined to be negligible.

Queens Road, London

Air Quality and Odour Assessments in support of residential development in an AQMA. Dispersion modelling took place at several different heights reflective of residential units within the development. Predicted concentrations of NO₂ were found to exceed air quality criteria from ground to second floor level. As such, mitigation was specified for the affected units to ensure future residents would not be exposed to poor air quality.

Anerley Road, Penge

Air Quality Assessment for a residential scheme located in an AQMA. Due to the location of the site at the foot of a hill, detailed calculations took place to take account of the gradient which would increase the amount of emissions produced by road traffic. Results revealed that NO₂ concentrations exceeded air quality criteria across part of the development fronting Anerley Road. Mechanical ventilation was specified in the appropriate units within the development as a form of mitigation.

The Crescent, Salford

Air Quality Assessment for the redevelopment of the former Salford Police Headquarters to residential properties. 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.