Azymuth Acoustics UK

Professional Acoustic Services

Approved by Matthew Gibson
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Air Quality Assessment
Ref: AA0208

Proposed Residential Apartment Development

18-20 Rochdale Road
Manchester
M4 4HT

For

Gonshaw Associates
The Studio
3 Kendal Drive
Gatley
Cheshire
SK8 4QJ





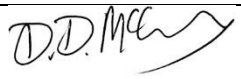
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1.0 INTRODUCTION

1.1 Background

1.1.1 Azymuth Acoustics UK was commissioned by Gonshaw Associates to undertake an Air Quality Assessment in support of a planning application for a residential development at 18 to 20 Rochdale Road, Manchester.

1.1.2 The development may lead to the exposure of future residents to poor air quality, as well as adverse impacts at sensitive locations. As such, an Air Quality Assessment was required in order to determine baseline conditions at the site, consider its suitability for the proposed end-use and assess potential impacts associated with the scheme.

1.2 Site Location and Context

1.2.1 The site is located at 18 to 20 Rochdale Road, Manchester, at approximate National Grid Reference (NGR): 384784, 399132. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise the conversion of the existing building to provide two duplex apartments across four storeys.

1.2.3 Manchester City Council (MCC) has declared an Air Quality Management Area (AQMA) due to exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO_2). The development is located within the AQMA. Subsequently, there are concerns that the proposals will introduce future residents to poor air quality. As such, concentrations at the site have been assessed in the following report in order to consider location suitability for the proposed end-use and define any requirement for mitigation. Potential impacts associated with the scheme have also been considered using standard screening methodologies.

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 1999/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for NO_2, oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- 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 Air Quality Target Values (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 2007[1]. 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 (µg/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 AQTV considered within this assessment.

Table 2 Air Quality Target Values

Pollutant	Air Quality Target Values	
	Concentration (µg/m^3)	Averaging Period
$PM_{2.5}$	25	Annual mean

2.2.5 Table 3 summarises the advice provided in DEFRA guidance[2] on where the AQOs and AQTV for pollutants considered within this report apply.

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

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

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 AQMA. For each AQMA the LA is required to produce an Air

Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 National Planning Policy

2.4.1 The revised National Planning Policy Framework[3] (NPPF) was published in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

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

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

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

> "Planning policies and decisions should contribute to and enhance the natural and local environment by:
>
> […]
>
> preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality […]"

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

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

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

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

2.5 National Planning Practice Guidance

2.5.1 The National Planning Practice Guidance (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?

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

2.5.3

2.6 Local Planning Policy

2.6.1 The Manchester Local Development Framework consists of a series of planning documents of which the Core Strategy[4] is central. This was adopted by MCC on 11th July 2012 and provides policies which guide the determination of planning applications within the city.

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

> "The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local effect of emissions from traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.
>
> When assessing the appropriateness of locations for new development the Council will consider the effects on air quality, alongside other plan objectives. This includes cumulative effects, particularly in Air Quality Management Areas."

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

[4] Core Strategy, MCC, 2012.

3.0 BASELINE

3.1 Introduction

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

3.2 Local Air Quality Management

3.2.1 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 NO_2 are above the AQO within the city. As such, a number of roads within Manchester have been included within the Greater Manchester Combined Authority (GMCA) AQMA. This is described as follows:

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

3.2.2 The development is 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.

3.2.3 MCC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

3.3 Air Quality Monitoring

3.3.1 Monitoring of pollutant concentrations is undertaken by MCC throughout their area of jurisdiction. Recent annual mean NO_2 results recorded in the vicinity of the development are shown in Table 4. Exceedences of the relevant AQO are shown in **bold.**

Table 4 Monitoring Results - NO_2

Monitoring Site		Monitored NO_2 Concentration (µg/m^3)		
		2016	2017	2018
88	Angel Street	**57.8**	**58.5**	**45.3**

3.3.2 As shown in Table 4, annual mean NO_2 concentrations were above the AQO at the 88 - Angel Street monitor during recent years. As this site is positioned at a roadside location within an AQMA, exceedences are to be expected. Reference should be made to Figure 2 for a map of the survey position.

3.3.3 Monitoring of PM_{10} and $PM_{2.5}$ concentrations is not undertaken within the vicinity of the site.

3.4 Background Pollutant Concentrations

3.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 384500, 399500. Data for this location was downloaded from the DEFRA website[5] for the purpose of the assessment and is summarised in Table 5.

Table 5 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m^3)		
	2018	2019	2021
NO_2	24.59	23.58	21.62
PM_{10}	12.04	11.89	11.67
$PM_{2.5}$	8.04	7.92	7.73

3.4.2 As shown in Table 5, predicted background NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant AQOs and AQTV at the development site.

[5] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017.

4.0 METHODOLOGY

4.1 Introduction

4.1.1 The proposed development has the potential to expose future residents to poor air quality and increase pollution levels as a result of operational phase vehicle exhaust emissions. These issues were considered in accordance with the following methodology.

4.2 Potential Exposure

4.2.1 Dispersion modelling was undertaken in order to predict NO_2, PM_{10} and $PM_{2.5}$ concentrations across the site using the ADMS-Roads dispersion model (version 4.1.1.0). 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.

4.2.2 Modelling was undertaken for 2018 to allow verification against recent monitoring results and 2021 to represent the development opening year.

4.2.3 The model requires input data that details the following parameters:

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

4.2.4 Additional options can also be selected within the ADMS-Roads interface to take account of site specific characteristics that may affect model output, such as canyons.

4.2.5 The relevant inputs are detailed in the following Sections.

Assessment Area

4.2.6 Ambient concentrations were predicted over the area NGR: 384710, 399050 to 384860, 399200. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

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

4.2.8 Reference should be made to Figure 3 for a graphical representation of the assessment grid extents.

Traffic Flow Data

4.2.9 Baseline traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as Heavy Duty Vehicle (HDV) proportion, was obtained from the Department for Transport (DfT)[6]. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 1999 to 2018. It should be noted that the DfT web tool is referenced in DEFRA guidance[7] 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.

4.2.10 Traffic data for Sudell Street, Cross Keys Street, Chadderton Street and Marshall Street was not available from the DfT. It was considered necessary to include emissions from these roads within the model in order to provide a robust assessment. As such, based on experience of similar modelling areas, a nominal AADT flow of 500 was applied to the relevant links in lieu of other data sources. This is anticipated to overestimate traffic on the roads and provide worst-case pollutant concentrations.

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6 http://www.dft.gov.uk/traffic-counts/.

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

4.2.11 The baseline traffic data was converted to the opening year of the development utilising a factor obtained from TEMPro (Version 7.2). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

4.2.12 Road widths were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is provided in Table 6.

Table 6 Traffic Data

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		2018	2021			
L1	Cheetham Hill Road Slow	29,210	30,916	3.37	12.8	20
L2	Miller Street Slow	15,680	16,596	2.19	16.2	20
L3	Miller Street	15,680	16,596	2.19	14.5	40
L4	Miller Street Slow	15,680	16,596	2.19	22.4	20
L5	Corporation Street Slow	3,607	3,818	9.40	15.8	15
L6	Shudehill Slow	8,701	9,209	13.53	15	20
L7	Swan Street Slow	16,379	17,336	2.51	12.8	20
L8	Angel Street Slow	29,210	30,916	3.37	14.4	20
L9	Angel Street	29,210	30,916	3.37	9.1	30
L10	Angel Street Traffic Lights	29,210	30,916	3.37	9.2	15
L11	Angel Street	29,210	30,916	3.37	11.3	30
L12	Angel Street Slow Junction Rochdale Road	29,210	30,916	3.37	12.3	15
L13	Rochdale Road Northbound (NB) Slow	5,253	5,559	11.71	14.6	20
L14	Rochdale Road NB Slow	6,973	7,380	6.53	7.4	20
L15	Rochdale Road Southbound (SB) Slow	6,973	7,380	6.53	7.1	20

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		2018	2021			
L16	Rochdale Road SB Slow	5,253	5,559	11.71	10.5	20
L17	Addington Street	12,583	13,318	2.71	6.5	30
L18	Rochdale Road NB south of Sudell Street	6,973	7,380	6.53	7.4	45
L19	Rochdale Road SB south of Sudell Street	6,973	7,380	6.53	7.1	45
L20	Angel Street Canyon	29,210	30,916	3.37	11.3	15
L21	Angel Street	29,210	30,916	3.37	11.3	30
L22	Angel Street Canyon	29,210	30,916	3.37	11.3	30
L23	Swan Street from Great Ancoats	16,379	17,336	2.51	9.1	35
L24	Addington Street Slow	12,583	13,318	2.71	6.5	20
L25	Great Ancoats Street, Between Lever Street and Newton Street, NB	17,679	18,711	3.91	8.9	30
L26	Great Ancoats Street, Between Lever Street and Newton Street, SB	17,679	18,711	3.91	9.7	30
L27	Great Ancoats Street, Between Swan Street and Lever Street, NB	17,679	18,711	3.91	8.1	30
L28	Great Ancoats Street, Between Swan Street and Lever Street, SB	17,679	18,711	3.91	7.9	30
L29	Oldham Road, Westbound (WB), South of Addington Street	14,243	15,075	4.60	14.5	30
L30	Oldham Road, WB, North of Addington Street	9,701	10,268	5.93	9.7	40
L31	Oldham Road to Swan Street	3,436	3,636	4.60	7.8	25
L32	Oldham Road, Eastbound (EB), South of Addington Street	14,243	15,075	4.60	9.1	30
L33	Oldham Road, EB, North of Addington Street	9,701	10,268	5.93	9.1	40

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		2018	2021			
L34	Great Ancoats Street	35,357	37,422	3.91	22	30
L35	Newton Street Slow	11,659	12,340	3.47	8.1	30
L36	Lever Street Slow	3,778	3,999	19.22	8.5	20
L37	Lever Street	3,778	3,999	19.22	8.4	40
L38	Shudehill	8,701	9,209	13.53	10.6	40
L39	Church Street	8,701	9,209	13.53	15.38	30
L40	Swan Street Canyon 1	16,379	17,336	2.51	9.3	40
L41	Swan Street Canyon 2	16,379	17,336	2.51	9	40
L42	Swan Street Canyon 3	16,379	17,336	2.51	12.6	25
L43	Addington Street Canyon 1	12,583	13,318	2.71	6.5	30
L44	Addington Street Canyon 2	12,583	13,318	2.71	6.5	30
L45	Addington Street Canyon 3	12,583	13,318	2.71	8.8	30
L46	Marshall Street between Rochdale Road and Cross Keys Street	500	529	1.00	5.5	30
L47	Marshall Street between Cross Keys Street and Chadderton Street	500	529	1.00	5.5	30
L48	Marshall Street between Chadderton Street and Oldham Road	500	529	1.00	5.5	30
L49	Cross Keys Street	500	529	1.00	6.1	30
L50	Chadderton Street	500	529	1.00	6.1	30
L51	Rochdale Road NB at Sudell Street	6,973	7,380	6.53	7.4	45
L52	Rochdale Road NB north of Sudell Street	6,973	7,380	6.53	7.4	45
L53	Rochdale Road SB at Sudell Street	6,973	7,380	6.53	7.4	45
L54	Rochdale Road SB north of Sudell Street	6,973	7,380	6.53	7.4	45

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		2018	2021			
L55	Sudell Street approach to Rochdale Road	500	529	1.00	11.4	35
L56	Sudell Street adjacent to site	500	529	1.00	5.0	35
L57	Sudell Street	500	529	1.00	4.4	35

4.2.13 Reference should be made to Figure 3 for a graphical representation of the road link locations.

Street Canyons

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

4.2.15 The release of ADMS-Roads version 4.0.1.0 in December 2015 incorporated a number of new features including an advanced street canyon module, which have been retained in version 4.1.1.0. Advanced street canyon modelling allows a number of parameters to be included in the dispersion model in order to predict pollutant dispersion patterns which better reflect air flow within complex urban geometries.

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

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

4.2.17 The combined modelling of these effects will result in concentration patterns unique to each canyon. The parameters used in the assessment are outlined in Table 7. It should be noted that where buildings are only present on one side of the road, parameters were purposely included at 0m.

Table 7 Canyon Parameters

Link	Parameter (m)							
	Canyon Width to Left	Average Height of Buildings to Left	Canyon Length Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Canyon Length Right	Building Length Right
L20	0.0	0.0	0.0	0.0	9.2	7.0	21.3	21.3
L22	0.0	0.0	0.0	0.0	9.7	19.0	58.2	58.2
L40	8.0	15.5	82.3	65.6	7.9	17.0	82.3	82.3
L41	8.1	16.0	67.4	60.4	8.5	19.8	67.4	37.3
L42	10.9	23.0	81.3	53.0	12.3	16.5	81.3	81.3
L44	0.0	0.0	0.0	0.0	5.0	8.5	43.5	43.5
L17	5.2	7.0	47.1	47.1	0.0	0.0	0.0	0.0
L24	5.8	9.0	43.6	43.6	5.0	14.0	43.6	8.9
L46	3.5	31.5	142.4	87.7	7.6	9.5	142.4	55.7
L49	4.4	6.5	17.5	17.5	0.0	0.0	0.0	0.0
L43	5.2	28.5	43.8	43.8	0.0	0.0	0.0	0.0
L50	6.6	18.0	27.1	27.1	3.7	5.0	11.4	11.4
L48	4.0	27.0	51.9	51.9	0.0	0.0	0.0	0.0
L47	0.0	0.0	0.0	0.0	8.7	22.5	45.6	45.6
L53	0.0	0.0	0.0	0.0	6.2	7.7	24.5	24.5
L56	4.8	7.7	30.9	30.9	0.0	0.0	0.0	0.0

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

Emission Factors

4.2.19 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 9.0). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

4.2.20 There is current uncertainty over NO_2 concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2018 emission factors were utilised in preference to the development opening year in order to provide robust concentration predictions. As predictions for 2018 were verified, it is considered the results are an indication of worst-case concentrations during the operation of the proposals.

Meteorological Data

4.2.21 Meteorological data used in the assessment was taken from Manchester Airport meteorological station over the period 1st January 2018 to 31st December 2018 (inclusive). Manchester Airport is located at NGR: 381792, 384116, which is approximately 15.3km 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.

4.2.22 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 4 for a wind rose of the utilised meteorological data.

Roughness Length

4.2.23 The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1.0m was used to describe the modelling extents. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cities and woodlands'.

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 and is suggested within ADMS-Roads as being suitable for 'agricultural areas (min)'.

Monin-Obukhov Length

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

Background Concentrations

4.2.25 Background concentrations provided by DEFRA for the grid square containing the site were used in the assessment to represent annual mean NO_2, PM_{10} and $PM_{2.5}$ levels in the vicinity of the development. In order to avoid 'double-counting' of road vehicle exhaust emissions, the proportion of the relevant background concentrations from primary A roads and minor roads within the grid square were removed in accordance with the methodology outlined in DEFRA guidance[8]. These sectors were considered to be most representative of those being modelled

[8] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

within ADMS-Roads. Background concentrations before and after adjustment are shown in Table 8.

Table 8 Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m^3)	
	Total Predicted 2018 Background	Predicted Background with Sectors Removed
NO_2	24.59	21.67
PM_{10}	12.04	11.81
$PM_{2.5}$	8.04	7.90

4.2.26 Similarly to emission factors, background concentrations from 2018 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO_2 Conversion

4.2.27 Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 7.1) provided by DEFRA, which is the method detailed within DEFRA guidance[9].

Verification

4.2.28 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.

[9] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

4.2.29 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.

4.2.30 For the purpose of the assessment model verification was undertaken for 2018 using traffic data, meteorological data and monitoring results from this year.

4.2.31 Monitoring of NO_2 concentrations was undertaken at one location within the vicinity of roads included within the model in 2018. The result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance[10]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration is summarised in Table 9.

Table 9 Verification - Monitoring Result

Monitoring Location		Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Road NO_x Concentration ($\mu g/m^3$)
88	Angel Street	45.3	51.93

4.2.32 The annual mean road NO_x concentration predicted from the dispersion model and the calculated 2018 road NO_x monitoring result is summarised in Table 10.

Table 10 Verification - Modelling Result

Monitoring Location		Calculated Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)
88	Angel Street	51.93	64.88

4.2.33 The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 0.8004 was required to be applied to all modelling results.

[10] Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

4.2.34 Monitoring of PM_{10} and $PM_{2.5}$ concentrations is not undertaken within the vicinity of roads included in the assessment. The NO_x verification factor was therefore used to adjust model predictions of these species in accordance with DEFRA guidance[11].

4.3 Potential Development Impacts

4.3.1 The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'[12] guidance document to determine the potential for trips generated by the development to affect local air quality.

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

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

4.3.3 Should these criteria not be met, then the IAQM guidance[13] considers air quality impacts associated with a scheme to be **negligible** and no further assessment is required.

4.3.4 Should screening of the relevant data indicate that any of the above criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the change in pollutant concentrations as a result of the proposed development. The significance of predicted impacts can then be determined in accordance with the methodology outlined in the IAQM guidance[14].

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

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

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

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

5.0 ASSESSMENT

5.1 Introduction

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

5.2 Potential Exposure

5.2.1 The proposed development has the potential to cause exposure of future users to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Section 4.0 to quantify air quality conditions at the site. Reference should be made to Figure 5, 6, and 7 for graphical representations of the results.

5.2.2 As shown in Figure 5, annual mean NO_2 concentrations were predicted to be below the AQO of 40µg/m^3 across the site. The maximum level at the development boundary was 28.35µg/m^3. As such, future residents are not predicted to be exposed to NO_2 concentrations above the AQO.

5.2.3 As shown in Figure 6, annual mean PM_{10} concentrations were predicted to be below the AQO of 40µg/m^3 across the site. The maximum level at the development boundary was 13.01µg/m^3. As such, future residents are not predicted to be exposed to PM_{10} concentrations above the AQO.

5.2.4 As shown in Figure 7, annual mean $PM_{2.5}$ concentrations were predicted to be below the AQTV of 25µg/m^3 across the site. The maximum level at the development boundary was 8.06µg/m^3. As such, future residents are not predicted to be exposed to $PM_{2.5}$ concentrations above the AQTV.

5.2.5 It should be noted that pollutant levels decrease with distance from pollutant sources, such as roads. As annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be below the relevant AQOs and AQTV at ground floor level, further assessment above this height was not considered necessary.

5.2.6 Based on the assessment results, the site is considered suitable for the proposed end use from an air quality perspective

5.3 Potential Development Impacts

5.3.1 Any additional vehicle movements associated with the development will generate exhaust emissions on the local and regional road networks. However, the proposals do not include any car parking spaces. As such, it is unlikely that the development will result in significant traffic generation on the local road network.

5.3.2 Based on the provided information, the proposals are not anticipated to result in an increase of LDV flows of more than 100 AADT on any individual road link within the AQMA, include significant highway realignment or the introduction of a junction and there will not be a requirement for more than 25 HDV deliveries per day. As such, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **negligible**, in accordance with the IAQM[15] screening criteria shown in Section 4.3.

5.4 Mitigation

5.4.1 As exposure of future residents to exceedances of the AQOs was not predicted, further mitigation to control effects is not considered necessary. However, a number of additional measures have been included within the development in accordance with the requirements of the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[16] to encourage the use of sustainable transport modes, manage vehicle flow and reduce pollution around the site. Table 11 describes the good practice principles detailed in the IAQM guidance along with how each has been addressed with regards to the proposals.

Table 11 Good Practice Design Principles

Phase	Principle	Action
Design Phase	New developments should not contravene the Council's Air Quality Action Plan[17], or render any of the measures unworkable	It is confirmed that the proposals will not contravene MCC's Air Quality Action Plan, or render any of the measures unworkable

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

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

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

Phase	Principle	Action
	Wherever possible, new developments should not create a new "street canyon", or a building configuration that inhibits effective pollution dispersion	The proposals 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 close proximity to local bus routes
	New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads, or directing combustion generated pollutants through or chimney stacks	As shown previously, exposure of future residents to exceedences of the relevant AQOs and AQTV was not predicted
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 proposals do not include provision of car parking spaces and therefore EV charging points are not considered necessary
	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 may be prepared in support of the development, should it be requested by MCC

Phase	Principle	Action
	All gas-fired boilers to meet a minimum standard of <40mgNO_x/kWh. All gas-fired CHP plant to meet a minimum emissions standard of: Spark ignition engine: 250mgNO_x/Nm^3; Compression ignition engine: 400mgNO_x/Nm^3; Gas turbine: 50mgNO_x/Nm^3. 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/Nm^3 and 25mgPM/Nm^3	Any boilers to be included in the development will be provisioned in accordance with the relevant requirements

5.4.2 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.

6.0 CONCLUSION

6.1.1 Azymuth Acoustics UK were commissioned by Gonshaw Associates to undertake an Air Quality Assessment in support of a planning application for a residential development at 18 to 20 Rochdale Road, Manchester.

6.1.2 The development may lead to the exposure of future residents to elevated pollution levels, as well as adverse air quality effects at sensitive locations. As such, an Air Quality Assessment was required in order to determine baseline conditions, consider site suitability for the proposed end-use and assess potential impacts as a result of the scheme.

6.1.3 Dispersion modelling was undertaken in order to predict pollutant concentrations across the proposed development site as a result of emissions from the local highway network. Outputs were subsequently verified using local monitoring data obtained from MCC.

6.1.4 The results of the dispersion modelling assessment indicated that predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations were below the relevant AQOs and AQTV at all locations across the development. The site is therefore considered suitable for the proposed end use from an air quality perspective.

6.1.5 Potential impacts during the operational phase of the proposed development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against the screening criteria provided within the IAQM[18] guidance document. As the proposals do not include the provision of any car parking spaces, road traffic impacts were predicted to be **negligible**.

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

[18] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
AAP	Area Action Plan
ADM	Atmospheric Dispersion Modelling
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
DfT	Department for Transport
EB	Eastbound
EU	European Union
GMCA	Greater Manchester Combined Authority
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
MCC	Manchester City Council
NB	Northbound
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
SB	Southbound
WB	Westbound
z_0	Roughness length

Figures



Legend

Site Boundary

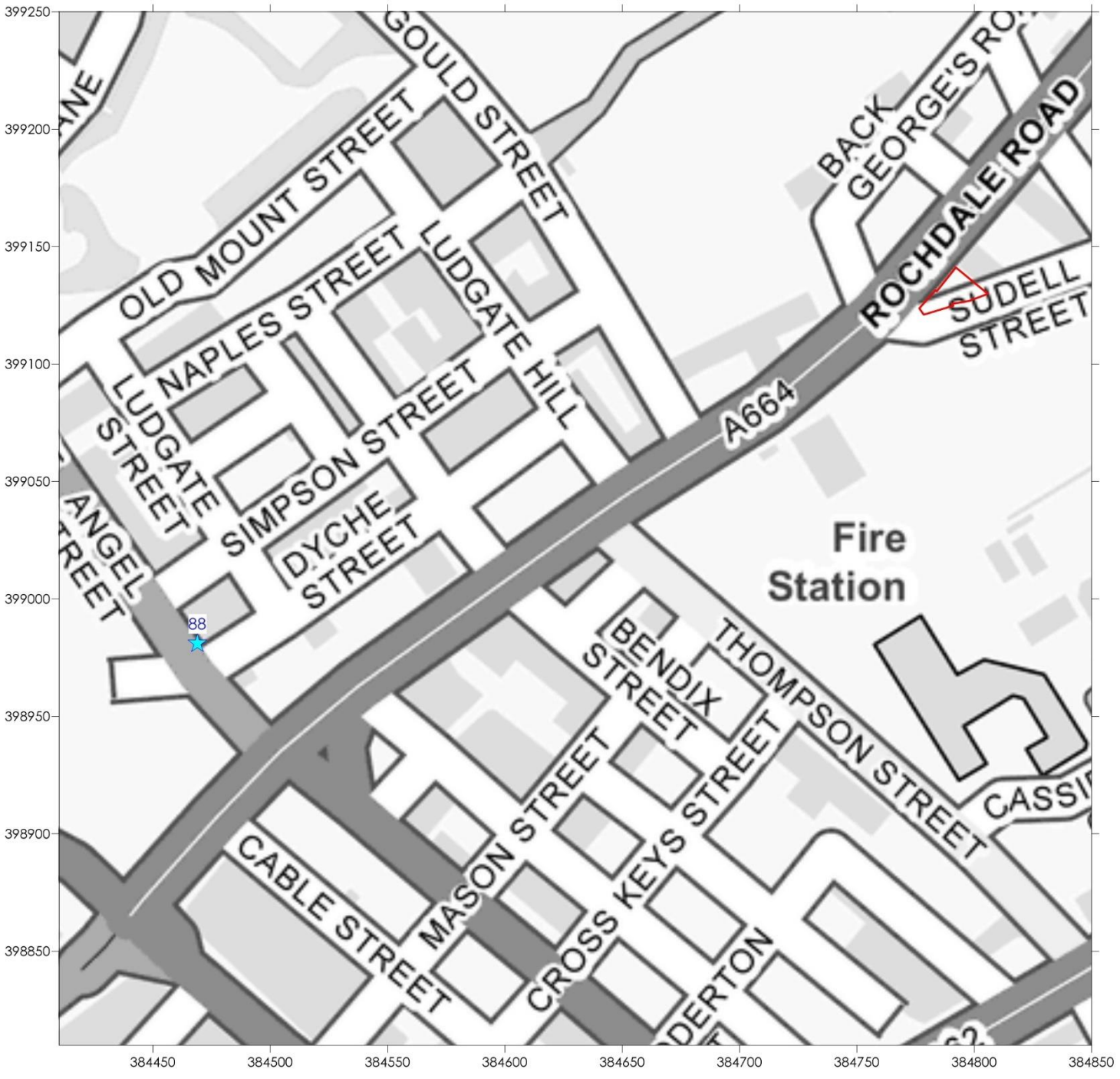
Title

Figure 1 - Site Location

Project

Air Quality Assessment
Rochdale Road, Manchester

Contains Ordnance Survey Data
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Legend

Site Boundary

Monitor

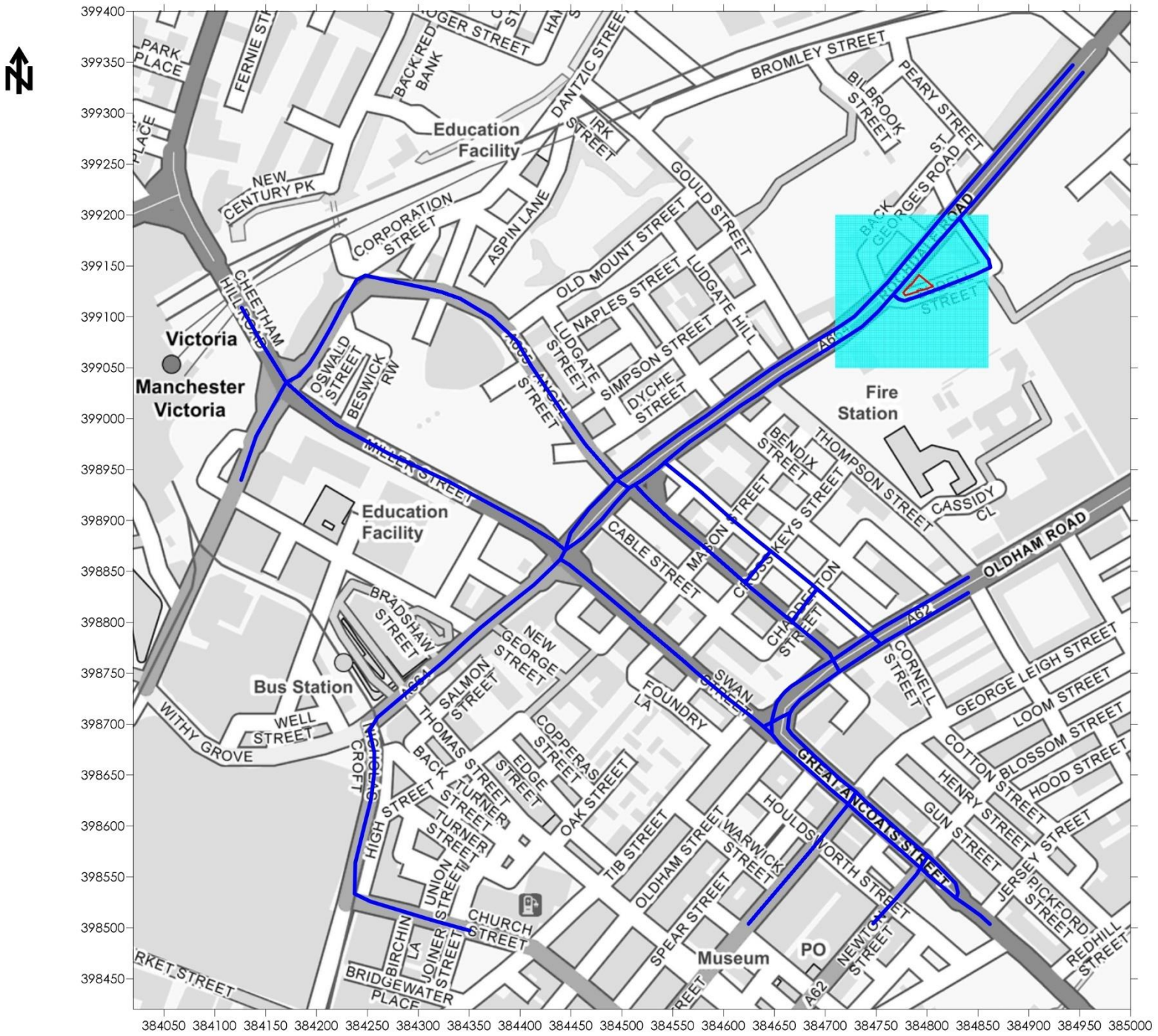
Title

Figure 2 - Monitoring Locations

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Site Boundary

Output Grid

Road Link

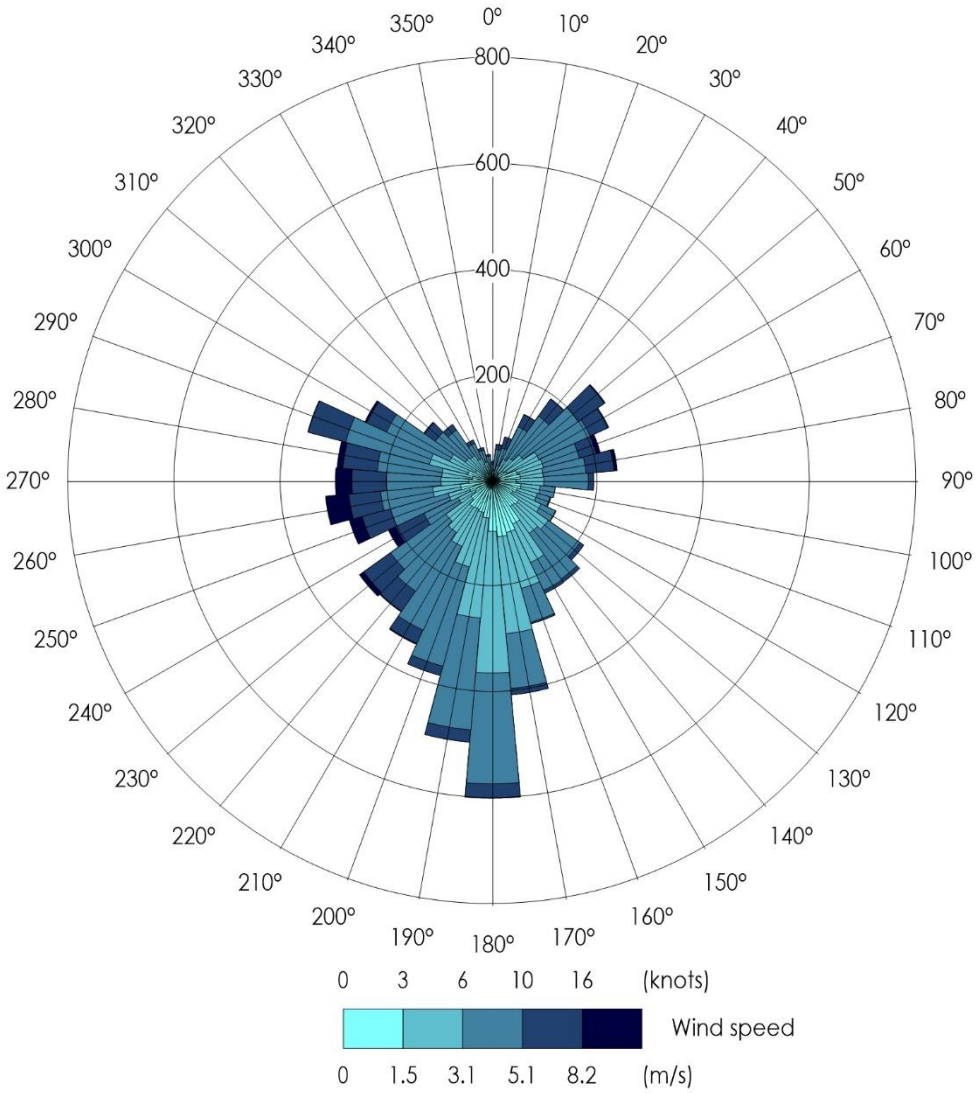
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Figure 3 - ADMS-Roads Inputs

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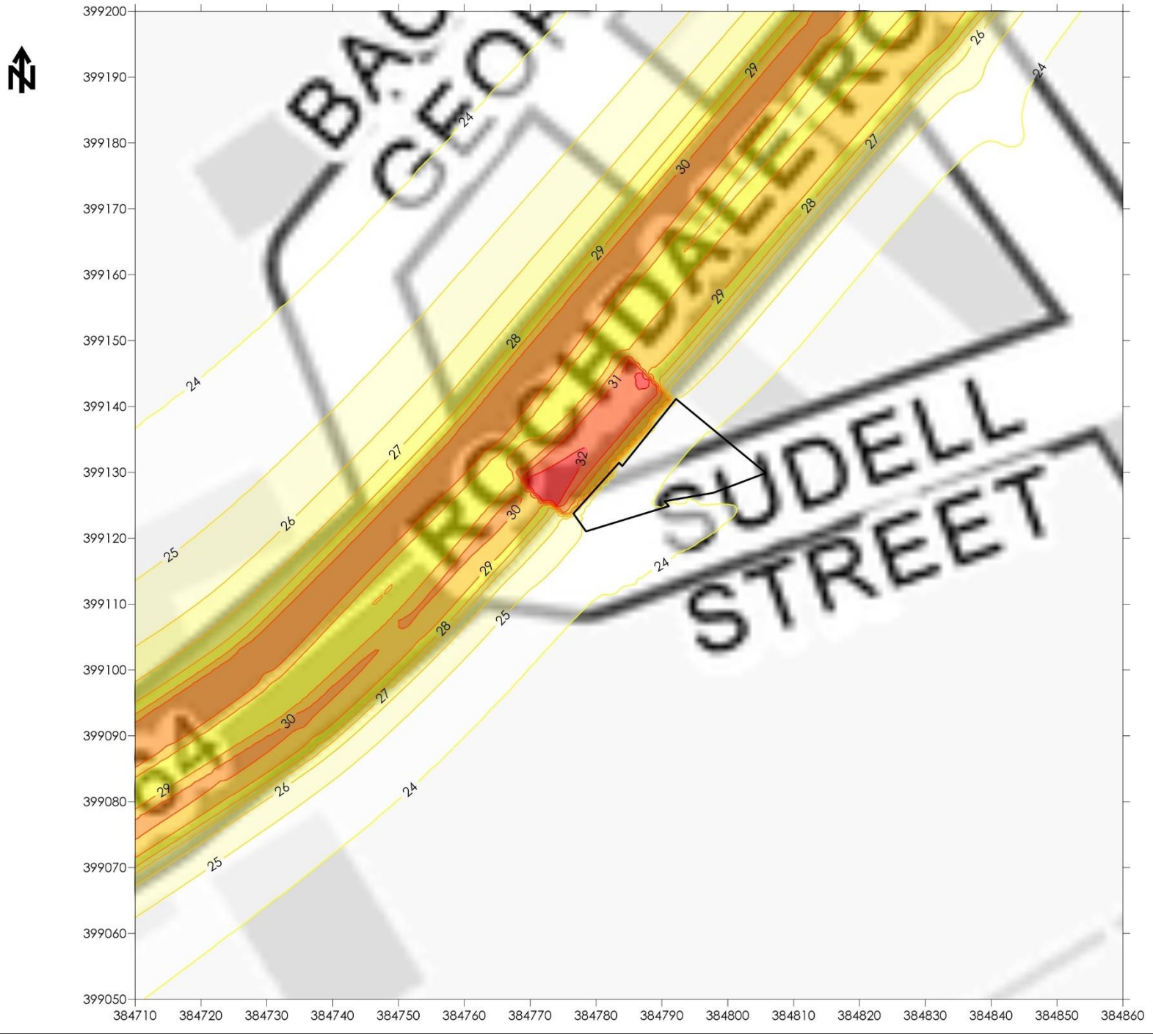
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Figure 4 - Wind Rose of 2018
Manchester Airport Meteorological Data

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Legend

Site Boundary

Annual Mean NO_2 Concentrations ($\mu g/m^3$)

32
31
30
29
28
27
26
25
24

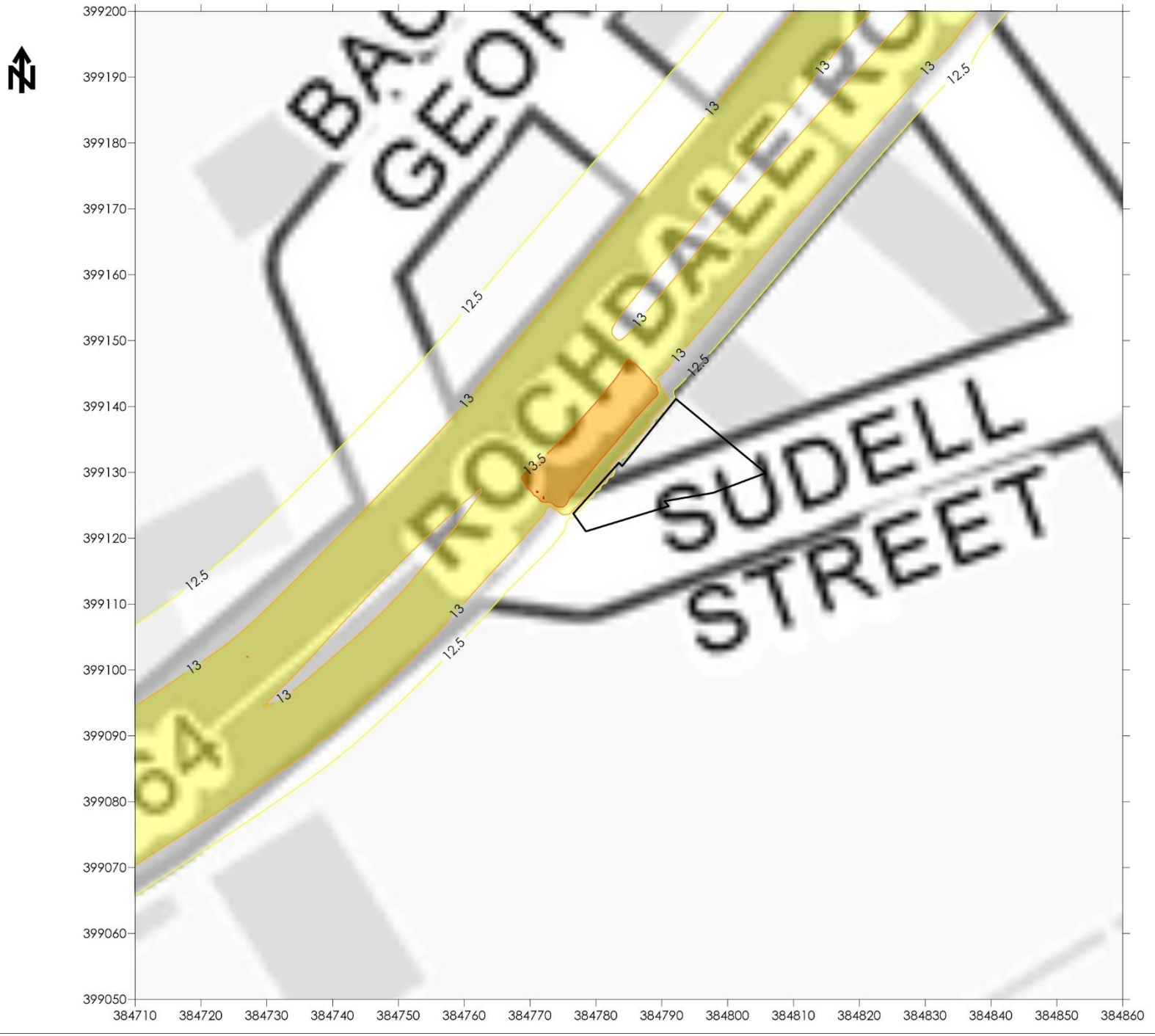
Title

Figure 5 - Predicted Annual Mean NO_2 Concentrations ($\mu g/m^3$)

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Site Boundary

14
13.5
13
12.5

Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

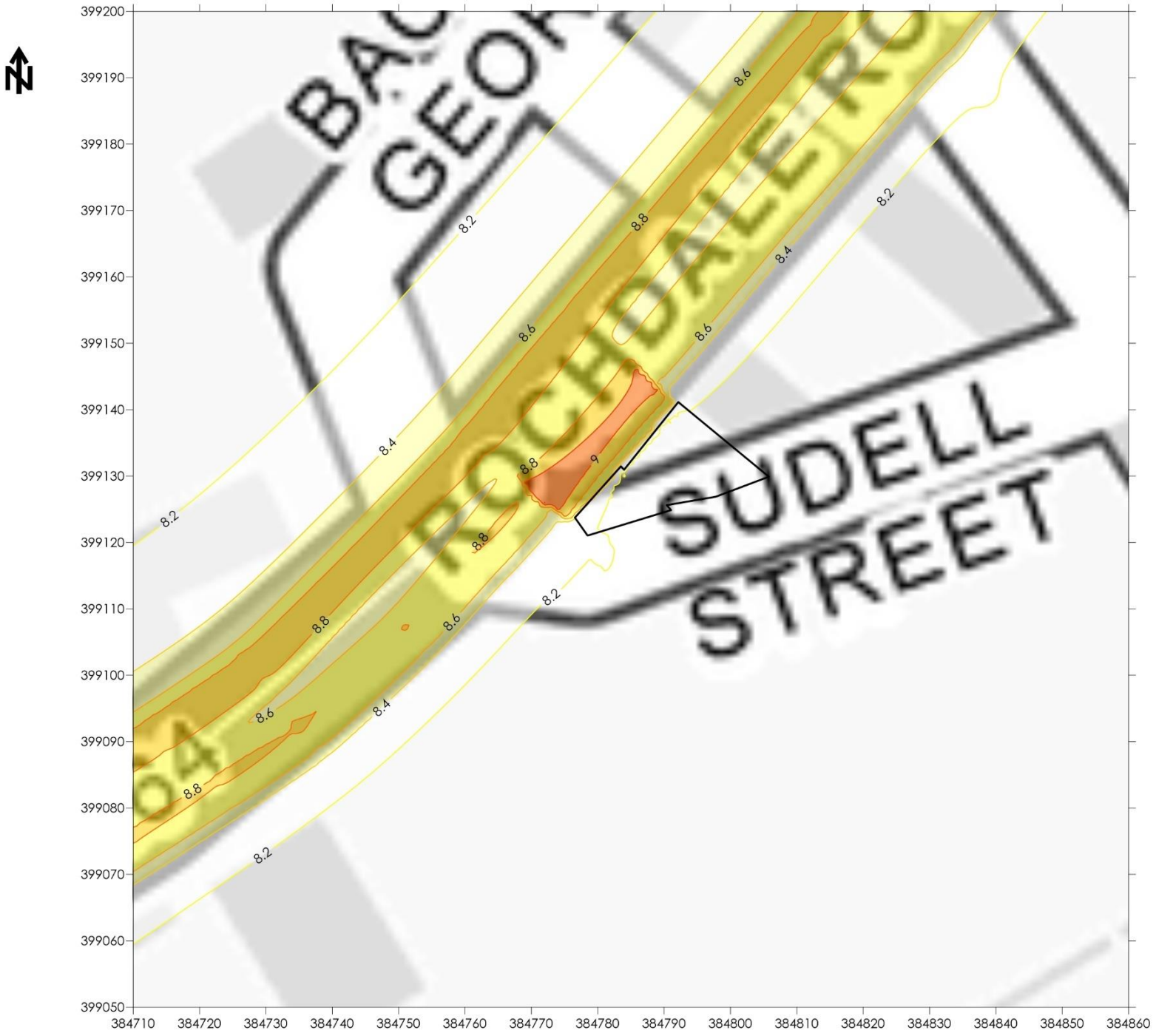
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Figure 6 - Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$)

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Site Boundary

Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)

9.2
9
8.8
8.6
8.4
8.2

Title

Figure 7 - Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$)

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Rochdale Road, Manchester

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