

Air Quality Assessment
Charlotte Street, Manchester

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Executive Summary

Redmore Environmental Ltd was commissioned by ARE Assets Limited to undertake an Air Quality Assessment in support of a planning application for the conversion of Fraser House, 36 Charlotte Street, Manchester, to provide a ground floor commercial unit with residential land use above.

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

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

The dispersion modelling assessment indicated that predicted pollutant levels were below the relevant criteria across the development. As such, the site is considered suitable for the proposed end-use from an air quality perspective.

During the operational phase of the development there is also the potential for air quality impacts as a result of traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against standard screening criteria. This indicated that impacts are not predicted to be significant due to the size and nature of the scheme.

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

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1.0 INTRODUCTION

1.1 Background

- 1.1.1 Redmore Environmental Ltd was commissioned by ARE Assets Limited to undertake an Air Quality Assessment in support of a planning application for the conversion of Fraser House, 36 Charlotte Street, Manchester, to provide a ground floor commercial unit with residential land use above.
- 1.1.2 The development may lead to the exposure of future residents to elevated pollution levels, as well as adverse air quality impacts at sensitive locations. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions at the site, consider site suitability for the proposed end-use and assess potential impacts as a result of the scheme.

1.2 Site Location and Context

- 1.2.1 Fraser House is located at 36 Charlotte Street, Manchester, at approximate National Grid Reference (NGR): 384253, 398004. 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 ground floor commercial uses with 14 residential apartments above.
- 1.2.3 Manchester City Council (MCC) has declared an Air Quality Management Area (AQMA) due to exceedences of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO₂). The development is located within the AQMA. The proposals may therefore introduce future residents into an area of 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 construction and operation of the scheme have also been considered as necessary.

2.0 LEGISLATION AND POLICY

2.1 Legislation

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

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

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

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007¹. The document contains standards, objectives and measures for improving ambient air quality, including a number of AQOs. These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 Table 1 presents the AQOs and AQLVs for pollutants considered within this assessment.

Table 1 Air Quality Objectives/Limit Values

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

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

Pollutant	Air Quality Objective/Limit Value	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Period
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
PM _{2.5}	20	Annual mean

2.1.5 The Environment Act (2021) was published on 9th November 2021 and makes provision for the setting of lower PM_{2.5} targets. However, the AQLV outlined in Table 1 remains the adopted air quality standard within the UK until further legislation is implemented.

2.1.6 Table 2 summarises the advice provided in DEFRA guidance² on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

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

² Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Air Quality Management

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

2.3 National Planning Policy

2.3.1 The revised National Planning Policy Framework³ (NPPF) was published in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

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

"c) An environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and

³ NPPF, Ministry of Housing, Communities and Local Government, 2021.

mitigating and adapting to climate change, including moving to a low carbon economy."

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

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

[...]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality [...]"

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

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

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

2.4 National Planning Practice Guidance

2.4.1 The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 and updated on 1st November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

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

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

2.5 Local Planning Policy

2.5.1 The Manchester Local Development Framework consist of a series of planning documents of which the Core Strategy⁵ is central. This was adopted by MCC on 11th July 2012 and provides policies which guide the determination of planning applications within the city.

2.5.2 A review of the Core Strategy indicated the following policy of relevance to this assessment:

"Policy EN 16

Air Quality

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

⁵ Core Strategy, MCC, 2012.

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."

"Policy DM1

Development Management

All development should have regard to the following specific issues for which more detailed guidance may be given within a supplementary planning document:

[...]

Effects on amenity, including privacy, light, noise, vibration, air quality, odours, little, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise."

- 2.5.3 MCC has also produced an 'Air Quality & Planning Technical Guidance' Supplementary Planning Document⁶ (SPD) which provides guidance on assessing the impact of proposed development on air quality. This was taken into consideration throughout the undertaking of the assessment.

⁶ Air Quality & Planning Technical Guidance, MCC, 2022.

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 NO₂ concentrations are above the AQO within the city. As such, a number of roads within Manchester have been included within the Greater Manchester Combined Authority (GMCA) AQMA. This is described as follows:

"This is the part of the GMCA 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 elevated pollution levels and vehicles travelling to and from the site to increase pollution concentrations in this sensitive area. This has 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 AQMA's have been designated.

3.3 Air Quality Monitoring

- 3.3.1 Monitoring of pollutant levels is undertaken by MCC throughout their area of jurisdiction. Recent NO₂ concentrations recorded in the vicinity of the development are shown in Table 3.

Table 3 Monitoring Results - NO₂

Monitoring Site		Annual Mean NO ₂ Concentration (µg/m ³)		
		2018	2019	2020
MA24NO	Princess Street	40.3	40.8	26.8
MA59NO, MA60NO, MA61NO	Manchester Piccadilly	31.6	33.1	22.3
Manchester Piccadilly	Manchester Piccadilly	35	36	27

3.3.2 As shown in Table 3, annual mean NO₂ concentrations were above the relevant AQO at MA24NO - Princess Street in recent years. As this site is positioned at a roadside location within an AQMA, elevated concentrations would be expected. Concentrations at all remaining locations were below the AQO in recent years.

3.3.3 Recent annual mean PM₁₀ concentrations recorded in the vicinity of the development are shown in Table 4.

Table 4 Monitoring Results - PM₁₀

Monitoring Site	Annual Mean PM ₁₀ Concentration (µg/m ³)		
	2018	2019	2020
Manchester Piccadilly	21	20	15

3.3.4 As shown in Table 4, PM₁₀ concentrations were below the AQO of 40µg/m³ at Manchester Piccadilly in recent years.

3.3.5 MCC does not undertake monitoring of PM_{2.5} concentration within the vicinity of the site.

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

3.3.7 Reference should be made to Figure 2 for a map of the survey locations.

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, 398500. Data for this location was downloaded from the DEFRA website⁷ 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)		
	2019	2022	2024
NO ₂	29.31	26.25	24.77
PM ₁₀	13.60	13.01	12.80
PM _{2.5}	8.78	8.38	8.20

3.4.2 As shown in Table 5, predicted background NO₂, PM₁₀ and PM_{2.5} concentrations are below the relevant AQOs and AQLV at the development site.

⁷ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

4.0 METHODOLOGY

4.1 Introduction

- 4.1.1 The proposed development has the potential to expose future residents to elevated pollution levels, as well as cause air quality impacts during the operational phase. These factors have been assessed in accordance with the following methodology, which was agreed with Laura Miller, Environmental Protection Officer at MCC, on 8th November 2022.

4.2 Potential Future Exposure

Dispersion Model

- 4.2.1 Dispersion modelling was undertaken in order to predict NO₂, PM₁₀ and PM_{2.5} concentrations across the site using the ADMS-Roads dispersion model (version 5.0.1.3). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.
- 4.2.2 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.
- 4.2.3 The relevant inputs are detailed in the following Sections.

Assessment Area

- 4.2.4 The assessment area was defined based on the location of the development and roads likely to impact pollutant levels across the site. Ambient concentrations were predicted over NGR: 384200, 39790 to 384300, 398060. One Cartesian grid at first floor height to represent the future residential unit locations was used within the model to produce data suitable for contour plotting using the Surfer software package. It should be noted that although the grid only covered the proposed site, source geometries were extended in order to ensure the impact of all relevant emissions in the vicinity of the scheme were considered.
- 4.2.5 Reference should be made to Figure 7 for a graphical representation of the assessment grid extents.

Traffic Flow Data

- 4.2.6 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)⁸. 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 2020. It should be noted that the DfT web tool is referenced in DEFRA guidance⁹ 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.
- 4.2.7 The baseline traffic data was converted to the site opening year 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.
- 4.2.8 Road widths and vehicle speeds 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.

⁸ <https://roadtraffic.dft.gov.uk/#16/51.4518/-0.9760/basemap-countpoints>.

⁹ Local Air Quality Management (TG22) Technical Guidance, DEFRA, 2022.

Table 6 Traffic Data

Link		24-hour AADT Flow		%HDV	Road Width (m)	Avg. Vehicle Speed (km/h)
		2019	2024			
L1	Charlotte Street	2,905	3,218	19.4	6.0	20
L2	Portland Street North	14,338	15,551	21.3	17.3	25
L3	Portland Street Central	14,338	15,551	21.3	12.5	25
L4	Portland Street South	14,338	15,551	21.3	12.4	25
L5	Princess Street	8,209	8,903	5.7	9.1	20

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

Canyons

4.2.10 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 undertaken dispersion modelling.

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

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

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

4.2.13 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.

Table 7 Canyon Parameters

Link	Parameter (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L1	5.4	22.5	86.0	8.7	32.5	96.6
L2	12.0	30.0	57.0	11.5	35.0	80.0
L3	14.6	70.0	55.8	10.1	17.5	71.4
L4	15.3	45.0	105.7	9.7	15.0	72.3
L5	5.6	20.0	245.0	10.1	20.0	289.3

Emission Factors

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

Meteorological Data

4.2.15 Meteorological data used in the assessment was taken from Manchester Airport meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Manchester Airport meteorological station is located at NGR: 381792, 384116 which is approximately 14km south-east 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.

4.2.16 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

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

4.2.18 A z_0 of 0.2m was used to describe the meteorological site. This value 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

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

Background Concentrations

4.2.20 Background annual mean background concentrations for use in the assessment were taken from the grid square containing the site, as shown in Table 5.

NO_x to NO₂ Conversion

4.2.21 Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance¹⁰.

Verification

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

¹⁰ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

- 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.

4.2.23 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.

4.2.24 For the purpose of the assessment, model verification was undertaken for 2019 using traffic data, meteorological data and monitoring results from this year. The choice of 2019 as the verification year aligns with the IAQM position statement 'Use of 2020 and 2021 Monitoring Datasets'¹¹, which states:

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

4.2.25 MCC undertook monitoring of NO₂ concentrations at one location within the modelling extents during 2019. The result was obtained and the road contribution to total NO_x concentrations calculated following the methodology contained within DEFRA guidance¹². The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table 8.

Table 8 NO_x Verification - Monitoring Result

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
MA24NO	Princess Street	40.8	23.38

4.2.26 The annual mean road NO_x concentration predicted from the dispersion model and the 2019 road NO_x concentration calculated from the monitoring result are summarised in Table 9.

¹¹ Use of 2020 and 2021 Monitoring Datasets, IAQM, 2021.

¹² Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Table 9 NO_x Verification - Modelling Result

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
MA24NO	Princess Street	23.38	26.26

4.2.27 The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 0.8902 was required to be applied to all modelling results.

4.2.28 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 model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance¹³.

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 Institute of Air Quality Management (IAQM) 'Land-Use Planning & Development Control: Planning for Air Quality'¹⁴ guidance to determine the potential for trips generated by the scheme 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. If any of the following apply:

- 10 or more residential units or a site of more than 0.5ha; or,
- More than 1,000m² of the floor space of all other uses or a site greater than 1ha.

B. Coupled with any of the following:

- The development has more than 10 parking spaces; or,

¹³ Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

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

- The development will have a centralised energy facility or other centralised combustion process.

4.3.3 Should these criteria not be met, then the IAQM guidance¹⁵ considers air quality impacts associated with a scheme to be **not significant** and no further assessment is required.

4.3.4 Should screening of the relevant data indicate that 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 guidance¹⁶.

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

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

5.0 ASSESSMENT

5.1 Introduction

- 5.1.1 The proposal has the potential to expose future residents to elevated pollution levels, as well as cause adverse air quality impacts at sensitive locations. These factors are assessed in the following Sections.

5.2 Potential Future Exposure

- 5.2.1 The proposed development has the potential to expose future residents to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Section 4.2 to quantify air quality conditions at the site. Reference should be made to Figures 4, 5 and 6 for graphical representations of predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations.
- 5.2.2 As shown in Figure 4, annual mean NO₂ concentrations were predicted to be below the AQO of 40µg/m³ across the site.
- 5.2.3 As shown in Figure 5, annual mean PM₁₀ concentrations were predicted to be below the AQO of 40µg/m³ across the site.
- 5.2.4 As shown in Figure 6, annual mean PM_{2.5} concentrations were predicted to be below the AQLV of 20µg/m³ across the site.
- 5.2.5 Based on the assessment results, future residents are not predicted to be exposed to pollutant concentrations above the relevant AQOs and AQLV. As such, the site is considered suitable for the proposed use from an air quality perspective.

5.3 Potential Development Impacts

- 5.3.1 Any vehicle movements associated with the development will generate exhaust emissions on the local and regional road networks. However, the proposals do not include any parking spaces. As such, potential air quality impacts associated with operational

phase road vehicle exhaust emissions are predicted to be **not significant**, in accordance with the IAQM screening criteria shown in Section 4.3.

5.4 **Mitigation**

- 5.4.1 As air quality impacts associated with the proposals were predicted to be **not significant**, mitigation to control effects is not considered necessary. However, a number of measures have been included within the scheme 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 10 describes the good practice principles detailed in the IAQM guidance along with how each has been addressed with regards to the proposals.

Table 10 Good Practice Design Principles for Operational Phase Air Quality Impacts

Phase	Principle	Action
Design Phase	New development should not contravene the Council's AQAP ¹⁸ , or render any of the measures unworkable	It is confirmed that the proposals will not contravene MMCs AQAP, or render any of the measures unworkable
	Wherever possible, new developments should not create a new "street canyon", or a building configuration that inhibits 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 proximity to bus services and amenities
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 proposal does not include any car parking spaces. Therefore, there is not a requirement for EV charging points

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

¹⁸ Greater Manchester AQAP 2016-2021, GCMA, 2016.

Phase	Principle	Action
	Where development generates significant additional traffic, provision of a detailed Travel Plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety	A Travel Plan can be secured via condition if required by MCC.
	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	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 scheme. Specific mitigation suited to the proposals may be stipulated as a planning condition if deemed necessary by the LA.

6.0 CONCLUSION

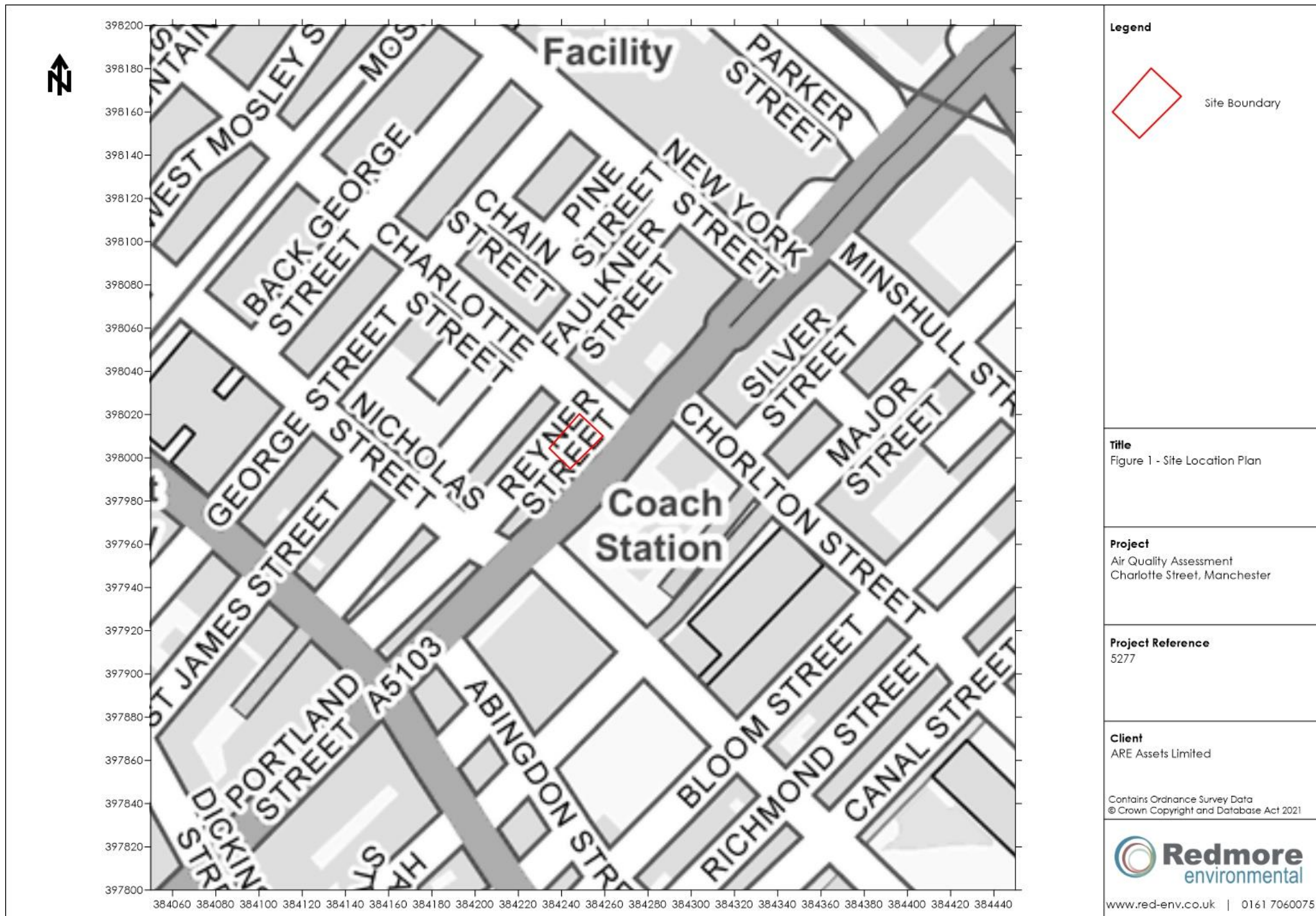
- 6.1.1 Redmore Environmental Ltd was commissioned by ARE Assets Limited to undertake an Air Quality Assessment in support of a planning application for the conversion of Fraser House, 36 Charlotte Street, Manchester, to provide a ground floor commercial unit with residential land use above.
- 6.1.2 The development may lead to the exposure of future residents to elevated pollution concentrations, as well as adverse air quality impacts at sensitive locations during the operational phase. As such, an Air Quality Assessment was undertaken 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 The proposals have the potential to expose future residents to elevated pollution levels. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict concentrations as a result of emissions from the local highway network. Results were subsequently verified using monitoring data collected by MCC.
- 6.1.4 The results of the dispersion modelling assessment indicated that predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations were below the relevant AQOs and AQLV across the development. The site is therefore considered suitable for the proposed 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 IAQM¹⁹ guidance document. Due to the size and nature of the scheme, traffic exhaust emission impacts were predicted to be **not significant**.
- 6.1.6 Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

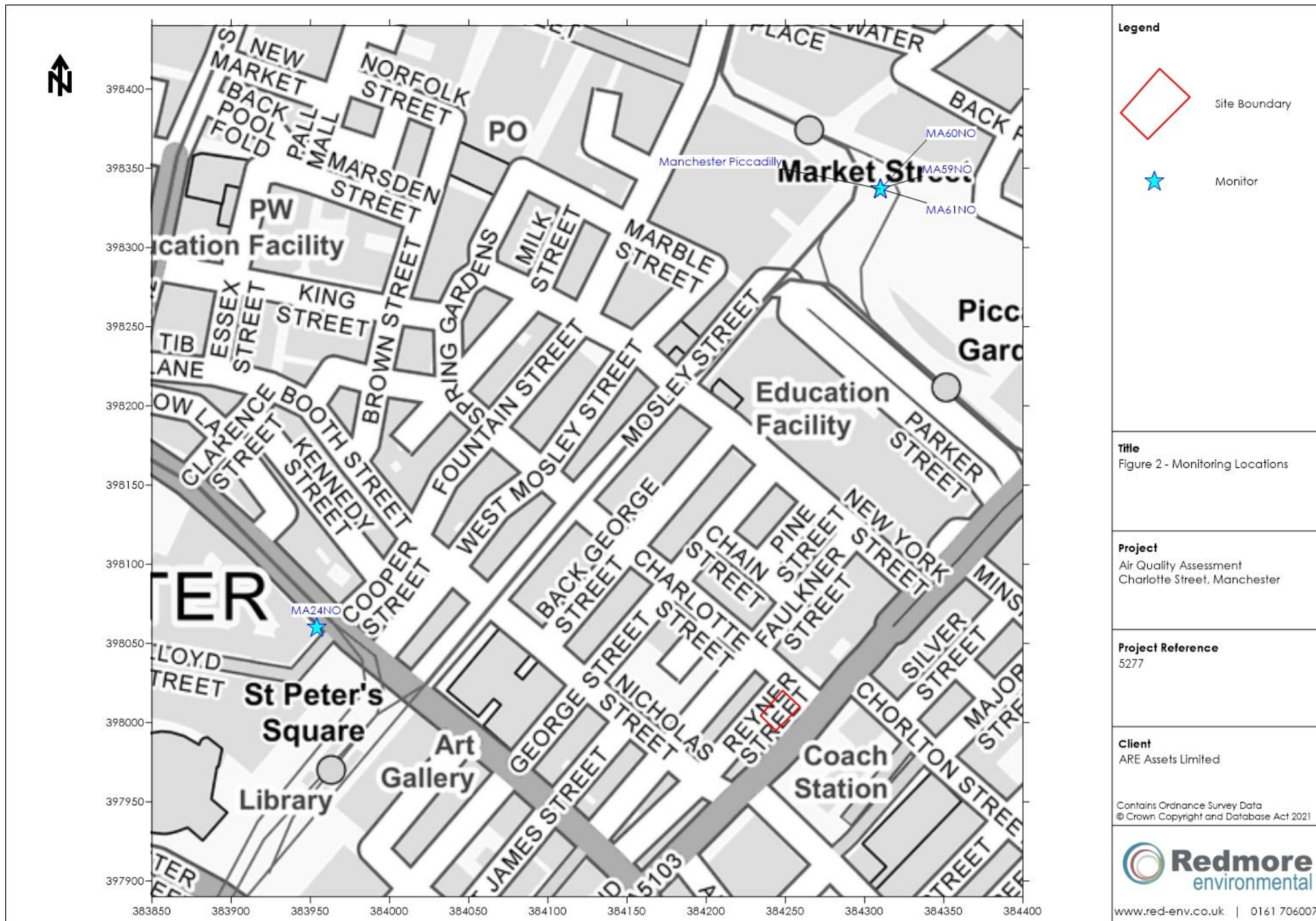
¹⁹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

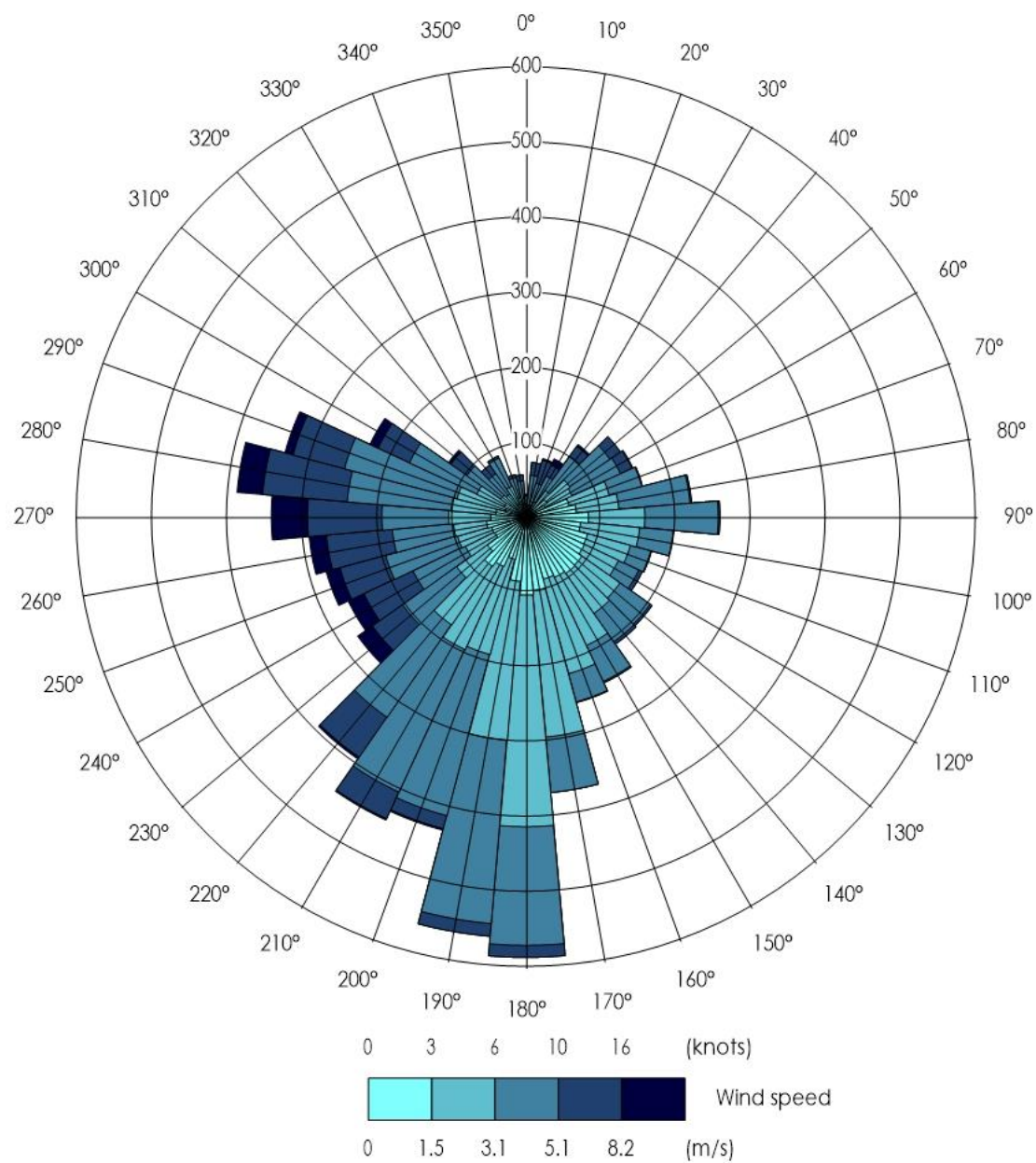
7.0 **ABBREVIATIONS**

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EV	Electric Vehicle
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
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
Z ₀	Roughness length

Figures







Legend

Title

Figure 3 - Wind Rose of 2019
Manchester Airport
Meteorological Data

Project

Air Quality Assessment
Charlotte Street, Manchester

Project Reference

5277

Client

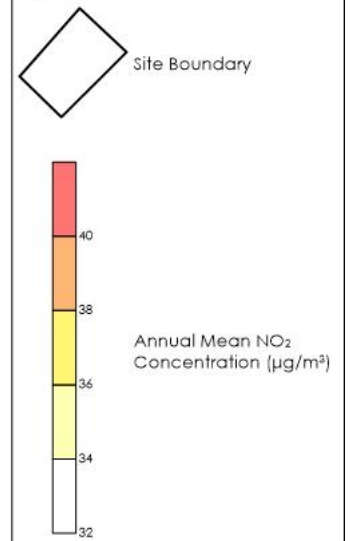
ARE Assets Limited



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Legend



Title

Figure 4 - Predicted Annual Mean NO₂ Concentrations (µg/m³) at First Floor

Project

Air Quality Assessment
Charlotte Street, Manchester

Project Reference

5277

Client

ARE Assets Limited

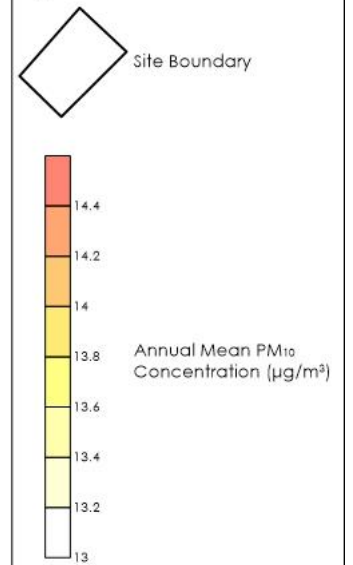
Contains Ordnance Survey Data
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Figure 5 - Predicted Annual Mean PM₁₀ Concentrations (µg/m³) at First Floor

Project

Air Quality Assessment
Charlotte Street, Manchester

Project Reference

5277

Client

ARE Assets Limited

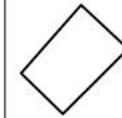
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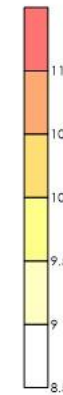
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Site Boundary



Annual Mean PM_{2.5}
Concentration (µg/m³)

Title

Figure 6 - Predicted Annual Mean
PM_{2.5} Concentrations (µg/m³)
at First Floor

Project

Air Quality Assessment
Charlotte Street, Manchester

Project Reference

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Appendix 1 - 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.

KEY EXPERIENCE:

Michael is an Environmental Consultant with specialist experience in the air quality sector. His key capabilities include:

- Production of Air Quality Assessments in accordance with DEFRA methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads and ADMS-5. Studies have included impact assessment of ground level pollutant concentrations and assessment of suitability of development sites for proposed end-use.
- Advanced Canyon Modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Assessment of construction dust impacts from a range of development sizes.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Assessment of industrial emissions using ADMS-5 software to determine impacts on sensitive human and ecological receptors in accordance with IAQM and EA guidance.

SELECT PROJECTS SUMMARY:

High Street, Staines

Air Quality Assessment in support of a residential-led development at the former Debenhams Store, on land off High Street, Staines-upon-Thames. The proposals comprised demolition of the Debenhams Store and construction of 226 dwellings together with commercial units and other associated infrastructure. The development had the potential to cause air quality impacts at sensitive locations due to fugitive dust emissions during construction and road traffic exhaust emissions during operation. High pollutant concentrations were predicted across the building façade fronting Thames Street from ground to second floor levels. As such, mitigation was specified for the affected units.

Union Street, Plymouth

Production of an Air Quality Assessment in support of a mixed-use development on land off Union Street, Plymouth, located within an AQMA. Dispersion modelling was undertaken in order to quantify pollutant concentrations at several heights of the proposed buildings. The exposure assessment focused on pollutant levels at the residential units, which were located at first floor level and above, as offices and commercial space occupied the lower levels. The results indicated that future occupants were not predicted to be exposed to NO₂ or PM₁₀ concentrations above the relevant criteria.

Long Acres Road, Neston

Air Quality Assessment in support of an Environmental Permit Application for a flexible generation facility on land off Long Acres Road, Neston. Dispersion modelling was undertaken using ADMS-5 in order to predict NO₂ and NO_x concentrations, as well as nitrogen and acid deposition, at sensitive locations. The results indicated that operation of the facility was not predicted to result in exceedances of the relevant criteria at any location within the vicinity of the installation.

Biomass Boilers, Bawtry

Air Quality Assessment in support of a planning application for four biomass boilers across two sites in Bawtry, Doncaster. Dispersion modelling was undertaken to quantify changes in pollution levels due to atmospheric emissions from the boilers at identified human receptor locations. The effects of buildings on pollution dispersion were considered. The results indicated that impacts were not significant in accordance with IAQM guidance.

Park Road, Pontefract

Air Quality Assessment in support of a residential development on land off Common Lane, Knottingley. The proposals comprised construction of 311 residential units alongside associated landscaping and infrastructure. In accordance with the West Yorkshire Low Emissions Strategy, a damage cost assessment was undertaken to calculate the monetary value of predicted emissions from the proposals and to detail appropriate mitigation measures.