

ENVIRONMENT

DTZ Investors Limited
58-66 King Street
Manchester
Air Quality Assessment

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DTZ Investors Limited
58-66 King Street
Manchester
Air Quality Assessment

Birmingham
Livery Place, 35 Livery Street, Colmore Business District
Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way
Leeds, LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street
Manchester, M1 3HU
T: 0161 233 4260

Nottingham
5th Floor, Waterfront House, Station Street
Nottingham, NG2 3DQ
T: 0115 924 1100

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1.0	27/06/2022	Issue	J. Hague BSc (Hons), AIAQM, AMIEEnvSc	F. Hoyle MSc, BSc, MIAQM, MIEEnvSc	C. Meddings MSc, BSc (Hons), CSci, MIAQM, MIEEnvSc

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EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by DTZ Investors Limited to undertake an air quality assessment for a change of use application at 58-66 King Street, Manchester. The application was submitted for the change of use of the building at 62 King Street from office use to residential use with external alterations to 58 – 66 King Street. Planning consent was granted for the development in January 2022 and a condition was attached to the consent requiring an air quality assessment to consider the suitability of the site for sensitive residential use.

The Site is located within the administrative area of Manchester City Council and lies within the existing Greater Manchester Air Quality Management Area, which was designated for the potential exceedance of the annual mean nitrogen dioxide air quality objective.

A qualitative construction phase dust assessment was undertaken in accordance with Institute of Air Quality Management guidance and measures were recommended for inclusion in a Dust Management Plan to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions was considered to be 'not significant' in accordance with Institute of Air Quality Management guidance.

The proposed development trip generation was screened using the Institute of Air Quality Management and Environmental Protection UK two stage screening process, to determine whether a detailed road traffic emissions impact assessment was required. The number of car parking spaces and residential dwellings proposed, did not exceed the relevant screening criteria. Therefore, the impact of the proposed development was considered to not be significant, and a detailed operational phase road traffic emissions impact assessment was not required in accordance with guidance.

To address the planning condition, a detailed road traffic emissions exposure assessment was undertaken to consider the suitability of the Site for the proposed residential use with regard to the current air quality objectives. Concentrations of nitrogen dioxide and particulate matter (PM₁₀ and PM_{2.5}) were predicted across the Site and compared to the current air quality objectives. The modelling assessment was undertaken in accordance with Defra Local Air Quality Technical Guidance, Institute of Air Quality Management & Environmental Protection UK guidance and the Manchester City Council Air Quality & Planning Technical Guidance.

Pollutant concentrations were predicted to be below the relevant air quality objectives and therefore, the Site was considered suitable for the proposed use with regard to the current air quality objectives. No mitigation measures were therefore proposed for the proposed development.

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1. INTRODUCTION

1.1 BWB Consulting Limited (BWB) was instructed by DTZ Investors Limited (the Client) to undertake an air quality assessment for a planning application at 58-66 King Street, Manchester ('the Site'). The development proposes the conversion of the upper floors of 62 King Street from office use to residential departments with external alterations to 58-66 King Street.

1.2 A planning application (planning reference 129850/FO/2021) was submitted to Manchester City Council (MCC) in May 2021 and planning permission was granted subject to the discharge of conditions. Condition 5 of the planning consent relates to air quality and states:

"5) a) Prior to commencement of the development mitigation measures to safeguard local air quality shall be submitted to and approved in writing by the City Council as local planning authority.

b) Prior to occupation of the development any agreed mitigation measures shall be implemented and verified as such in writing by the City Council as local planning authority and shall remain in situ whilst the use or development is in operation.

The application site is within Manchester's Air Quality Management Area (map available at: <https://uk-air.defra.gov.uk/aqma/maps>) and future residents may be exposed to air pollution. A clean air intake is therefore required.

Reason: To secure a reduction in air pollution from traffic or other sources in order to protect existing and future residents from air pollution, pursuant to policies EN16, SP1 and DM1 of the Core Strategy."

1.3 Therefore, an air quality assessment was undertaken which considers construction phase dust impacts and operational phase road traffic emissions. A qualitative construction phase dust assessment was undertaken in accordance with relevant guidance. An operational phase road traffic emissions screening assessment was undertaken to consider the requirement for a detailed assessment of additional vehicles generated by the proposed development. In addition, pollutant concentrations were predicted across the Site to determine the suitability of the Site for the proposed residential use with regard to the current air quality objectives.

1.4 This report is necessarily technical in nature so to assist the reader a glossary of air quality terminology can be found in **Appendix A**.

Site Setting

1.5 The Site is located at 58 - 66 King Street in Manchester and lies within the administrative area of MCC.

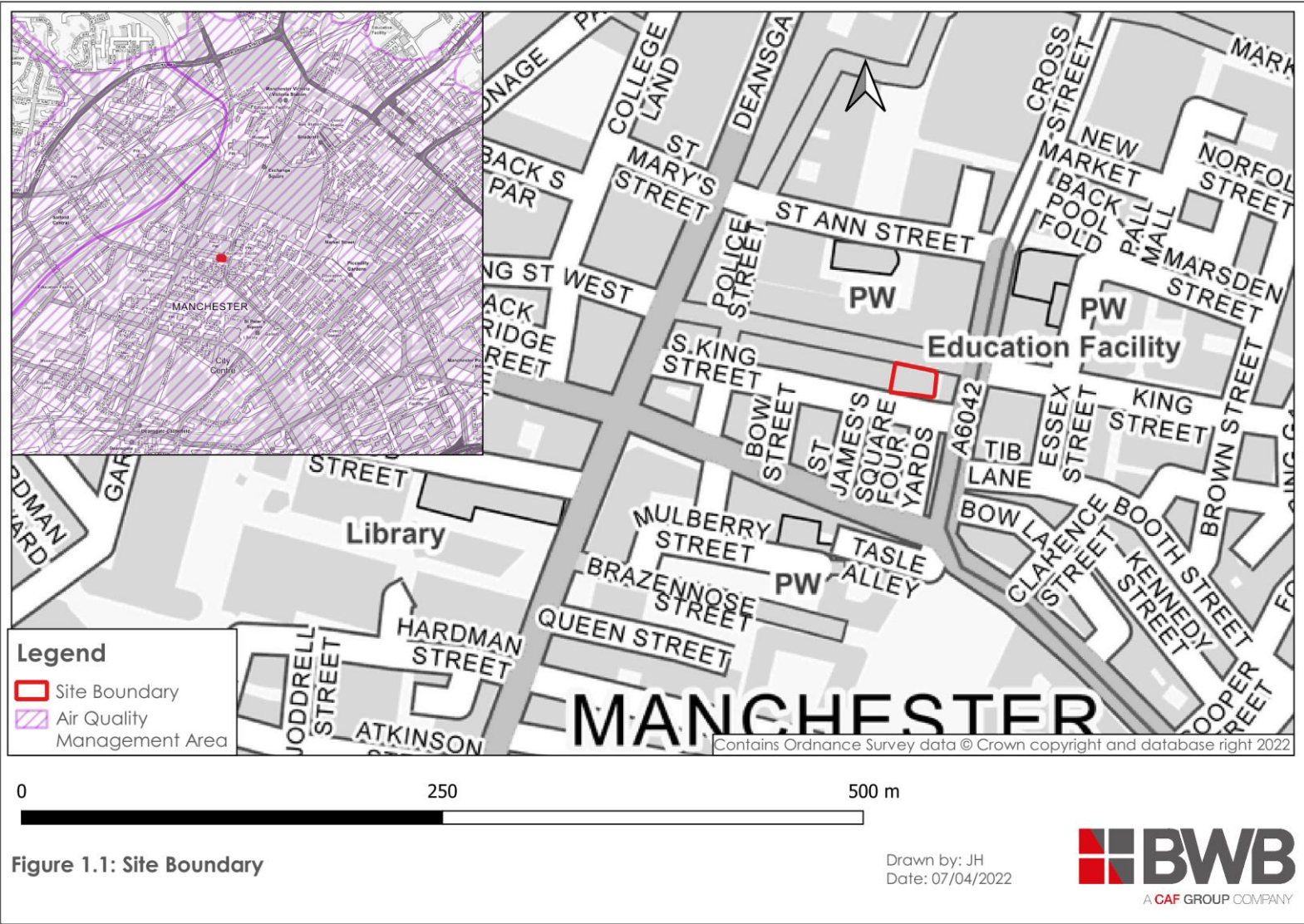
1.6 **Figure 1.1** details the location of the Site which currently comprises a mix of retail and office uses.

- 1.7 The Site is located within Manchester city centre with a mix of commercial, office and residential uses surrounding the Site. North of the Site is the pedestrianised King Street, with Cross Street and South King Street located to the east and south of the Site, respectively. In addition, John Dalton Street and the A56 Deansgate are located beyond to the south and west, respectively.
- 1.8 Principal air pollution sources in the vicinity of the Site are likely to comprise road traffic emissions. The Site is located within the Manchester Air Quality Management Area (AQMA), which was declared by the Greater Manchester Combined Authority (GMCA) for the potential exceedance of the annual mean nitrogen dioxide (NO₂) air quality objective.

Proposed Development

- 1.9 The proposed development comprises the conversion of the upper floors of 62 King Street to 7 no. apartments with external alterations to 58-66 King Street, and associated works. The proposed development masterplan is detailed in **Appendix B**.

Figure 1.1: Site Location



2. LEGISLATION, PLANNING POLICY & GUIDANCE

National Legislation and Planning Policy

2.1 The following national legislation and planning policy is relevant to air quality and was considered in the undertaking of the assessment. A summary of the relevant national legislation and planning policy is provided in **Appendix C**:

- European Parliament, EU 2008 ambient Air Quality Directive (2008)¹;
- HMSO, Air Quality (England) Regulations (2000)²;
- HMSO, Environment Act (1995)³;
- HMSO, Environment Act (2021)⁴;
- Department for Environment, Air Quality Strategy (1997)⁵;
- Department for the Environment, Food and Rural Affairs, Air Quality Strategy (2007)⁶;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework (NPPF) (2021)⁷; and
- Ministry for Housing, Communities and Local Government, Planning Practice Guidance (PPG) for air quality (2019)⁸.

Local Planning Policy

2.2 The following local planning policy was considered in the undertaking of the assessment and a summary is provided in **Appendix C**:

- Manchester City Council, Manchester's Local Development Framework: Core Strategy Development Plan Document (2012)⁹.

Air Quality Assessment Guidance

2.3 The following guidance was utilised in the air quality assessment:

- Defra, Local Air Quality Management Technical Guidance (LAQM.TG(16)) (2021)¹⁰;
- Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction (2014)¹¹;
- Institute of Air Quality Management and Environmental Protection UK, Land-Use Planning and Development Control: Planning for Air Quality (2017)¹²; and

¹ European Parliament (2008) Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe

² HMSO (2000) Statutory Instrument 2000 No. 928, The Air Quality (England) Regulations 2000 (as amended), London: HMSO

³ HMSO (1995) The Environment Act 1995, London: TSO

⁴ HMSO (2021) The Environment Act 2021, London: TSO

⁵ Department of the Environment (DoE) (1997) The UK National Air Quality Strategy, London: HMSO

⁶ Department of the Environment, Food and Rural Affairs (Defra) (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, London: HMSO

⁷ Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, HMSO London

⁸ Ministry for Housing, Communities and Local Government (2019) Planning Practice Guidance Air Quality

⁹ Manchester City Council, (2012) Manchester's Local Development Framework: Core Strategy Development Plan Document

¹⁰ Defra (2021) Local Air Quality Management Technical Guidance LAQM.TG(16)

¹¹ Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London

¹² Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality

- Manchester City Council, Air Quality & Planning Technical Guidance (2022)¹³

¹³ Manchester City Council, (2022) Air Quality & Planning Technical Guidance

3. METHODOLOGY

Consultation with Manchester City Council

- 3.1 Consultation was undertaken with the Environmental Health and Protection Department at MCC in which the proposed assessment methodology was provided via email on the 6th April 2022¹⁴. A response was received on the 11th April 2022 confirming acceptance of the proposed methodology.
- 3.2 The agreed assessment methodology is detailed below:
- Construction Phase - A construction phase dust assessment was undertaken and relevant measures to mitigate construction phase dust emissions were recommended. The assessment was undertaken in accordance with guidance provided by the Institute of Air Quality Management (IAQM)¹¹.
 - Operational Phase Road Traffic Emissions Impact Screening Assessment – An operational phase road traffic emissions screening assessment was undertaken in accordance with IAQM and Environmental Protection UK (EPUK) guidance¹². Consideration was also given to the MCC Air Quality & Planning Technical Guidance¹³.
 - Operational Phase Road Traffic Emissions Exposure Assessment – A detailed operational phase road traffic emissions exposure assessment was undertaken to consider the suitability of the Site for the proposed use with regard to air quality, to address the requirements of Condition 5. The dispersion model ADMS-Roads was used to model concentrations of oxides of nitrogen (NOx) and particulate matter (PM₁₀ and PM_{2.5}) across the Site. The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance (LAQM.TG16)¹⁰.
- 3.3 Full details of the methodology used in the assessment, as agreed with MCC, are provided below.

Construction Phase Dust Assessment

- 3.4 An assessment of the potential impacts arising from the construction of the proposed development was undertaken in accordance with IAQM Guidance¹¹. The full assessment methodology is not reproduced within this report but a summary of the assessment steps are provided below:
- Step 1 – screen the requirement for a more detailed assessment. No assessment is required if there are no receptors within a certain distance of the works.
 - Step 2 – assess the risk of dust impacts separately for each of the four activities considered (demolition, earthworks, construction and trackout).
 - Step 2A – determine the potential dust emission magnitude for each of the four activities;
 - Step 2B – determine the sensitivity of the area;
 - Step 2C – determine the risk of dust impacts by combining the findings of steps 2A and 2B.

¹⁴ Consultation undertaken with MCC on 06/12/2021 and a response was received on 09/12/2021

- Step 3 – determine the site-specific mitigation for each of the four activities; and
- Step 4 – examine the residual effects and determine significance.

Operational Phase Road Traffic Emissions – Screening Assessment

- 3.5 Guidance published by the IAQM and EPUK in 2017¹² provides a two-stage approach, to determine the level of assessment required, in the consideration of the impact of development-generated road traffic emissions on local air quality.

Stage 1

- 3.6 The Stage 1 criteria requires that the assessment progress to Stage 2 if any of the following apply:
- The development comprises:
 - 10 or more residential units or a site area of more than 0.5ha; or
 - More than 1,000m² of floor space for all other uses or a site area greater than 1ha;
 - Coupled with any of the following:
 - The development has more than 10 parking spaces; or
 - The development will have a centralised energy facility or other centralised combustion process.

Note: Consideration should be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Stage 2

- 3.7 The IAQM and EPUK guidance¹² provides the following indicative criteria to determine whether a detailed road traffic emissions assessment is required for a proposed development.
- 3.8 The Stage 2 criteria relevant to the Proposed Development are:
- A change in Light Duty Vehicles (LDV) of more than 100 vehicles as a 24 hour Annual Average Daily Traffic (AADT) flow within an AQMA; and
 - A change in HDV flow of more than 25 vehicles as a 24 hour AADT flow within an AQMA.

Operational Phase Road Traffic Emissions – Detailed Assessment

Air Dispersion Modelling

- 3.9 The air dispersion model ADMS-Roads, version 5.0.1.3 was utilised in the assessment to predict concentrations of NO_x, PM₁₀ and PM_{2.5} across the Site.
- 3.10 The assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance¹⁰, Institute of Air Quality Management and

Environmental Protection UK guidance¹² and MCC Air Quality & Planning Technical Guidance¹³.

Assessment Scenarios and Traffic Data

3.11 The following scenarios were considered in the air dispersion modelling:

- Scenario 1: 2019 Verification Year; and
- Scenario 4: 2023 Opening Year, with development.

3.12 Traffic data were obtained from Caneparo Associates, the Transport Consultants for the project. 24-hour Annual Average Daily Traffic Data (AADT) and Heavy Duty Vehicle (HDV) proportions were provided for the following roads for use in the assessment:

- A34 Bridge Street;
- A34 Brook Street;
- A34 Upper Brook Street;
- A56 Deansgate;
- A57(M)/A635(M) Mancunian Way;
- A5103;
- B5117 Oxford Road;
- Cross Street;
- John Dalton Street;
- Princess Street; and
- Cambridge Street.

3.13 Consideration was given to the speeds at which vehicles are likely to travel within the study area. Free-flowing traffic conditions were modelled at the relevant speed limit. Queuing sections were modelled in accordance with the principles set out in Defra guidance¹⁰.

3.14 Traffic data used in the air dispersion modelling are provided in **Appendix D** and the road network modelled is illustrated in **Figure D1**.

ADMS-Roads Model Inputs

3.15 The following model inputs were utilised in the assessment:

- Emission Factors – emission factors were utilised from the Defra Emission Factor Toolkit¹⁵ (EFT), version 11.0, for the years of assessment (2019 and 2023).
- Conversion of oxides of nitrogen – concentrations of NO_x were predicted using the ADMS-Roads dispersion model. These concentrations were converted to nitrogen dioxide (NO₂) using the Defra NO_x to NO₂ calculator¹⁶, version 8.1.

¹⁵ Defra (2021) Emission Factor Toolkit [<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>]

¹⁶ Defra (2020) NO_x to NO₂ Calculator [<https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc>]

- Meteorological Data – hourly sequential meteorological data for the verification year of assessment (2019) were obtained for the Manchester Airport recording station. This is the closest, most representative recording station in the vicinity of the site, due to the location of the Site and the recording station relative to urban areas. The wind rose for 2019 is provided in **Appendix E**.
- Surface roughness and Monin-Obukhov length (MO) – Site – a surface roughness of 1.0m and an MO length of 100m were utilised in the air dispersion model to represent the urban conditions at the Site and within the study area.
- Surface roughness and Monin-Obukhov length (MO) – Meteorological Station – a surface roughness of 0.5m and an MO length of 30m were utilised to represent an average of the mixed urban/industrial conditions to the north of the Manchester Airport meteorological recording station and the rural conditions located to the south.
- Background pollutant concentrations – 2019 background NO₂ concentrations from the monitoring location MA26ANO were utilised in the assessment and adjusted for future years in accordance with Defra guidance¹⁰. As no background NO_x, PM₁₀ and PM_{2.5} monitoring is undertaken in the vicinity of the Site, background NO_x, PM₁₀ and PM_{2.5} concentrations were obtained from the pollutant concentrations maps¹⁷ provided by Defra as a 1km x 1km grid of the UK, for the years of assessment (2019 and 2023).
- Model verification – model verification was undertaken using MCC monitoring data available for the study area. Full details of the verification procedure are provided in **Appendix F**.
- Calculation of short term PM₁₀ concentrations – the following calculation, as detailed in Defra guidance¹⁰, was utilised to calculate the number of exceedances of the 24-hour mean PM₁₀ air quality objective:

$$\text{Number of 24-Hour Mean Exceedance} = -18.5 + 0.00145 * \text{Annual Mean}^3 + (206 / \text{Annual Mean})$$

- The IAQM released a position statement¹⁸ in July 2018 regarding dealing with the uncertainty in vehicle NO_x emissions within air quality assessments. The position statement recommended that sensitivity analyses be undertaken to consider the scenario where NO_x emissions do not reduce as rapidly in future years as predicted within the EFT¹⁵. The IAQM position statement was withdrawn in July 2021 following extensive research which identified that EFT v8.1 and onwards were considered to more accurately represent real world NO_x emissions. No sensitivity analysis was therefore undertaken as part of the air quality assessment.

Receptor Locations

Proposed Receptor Locations

- 3.16 The proposed development proposes sensitive uses within an AQMA and therefore pollutant concentrations were predicted across the Site to consider the suitability of the proposed development with regard to the current air quality objectives. Pollutant concentrations were predicted across the Site for Scenario 2: 2023 Opening Year with development. A Cartesian grid was modelled at a height of 1.5m to represent average breathing height at ground floor. The grid was modelled to cover the following grid references: minimum 383731, 398178 to maximum 383889, 398366.

¹⁷ Defra (2020) background pollutant concentration maps [<https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>]

¹⁸ Institute of Air Quality Management (2018) Position Statement: Dealing with Uncertainty in Vehicle NO_x Emissions within Air Quality Assessments, Version 1.1

Limitations and Assumptions

- 3.17 There are uncertainties associated with both measured and predicted pollutant concentrations. The model (ADMS-Roads) used in this assessment relies on input data, which are also subject to uncertainty. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not take into account.
- 3.18 The assessment is based on traffic data provided by Caneparo Associates, the transport consultants for the project. As such any assumptions made by the transport consultants may also influence the air quality assessment.
- 3.19 In future year scenarios, uncertainty relates to the projection of vehicle emissions and, in particular the rate at which emissions per vehicle will improve over time. This assessment utilised the most recent version of the Defra EFT¹⁵ to provide the most up to date estimate of current and future emission projections.

Assessment Criteria

- 3.20 Predicted pollutant concentrations were compared to the relevant air quality objectives⁵. The current relevant air quality standards and objectives are detailed in **Table 3.1**.

Table 3.1: Air Quality Standards and Objectives (England)

Pollutant	Averaging Period	Air Quality Objective ($\mu\text{g.m}^{-3}$)	Date to Achieve by
NO ₂	Annual Mean	40	31 December 2005
	1-hour mean not to be exceeded more than 18 times per year	200	31 December 2005
PM ₁₀	Annual Mean	40	31 December 2004
	24-hour mean not to be exceeded more than 35 times per year	50	31 December 2004
PM _{2.5}	Annual mean target (15% cut in annual mean (urban background exposure)	25	2010 - 2020

4. BASELINE CONDITIONS

Local Air Quality Management

- 4.1 The Site is located within the Greater Manchester AQMA, which was designated for the potential exceedance of the annual mean NO₂ air quality objective.

Local Air Quality Monitoring

Nitrogen Dioxide (NO₂)

- 4.2 MCC undertakes NO₂ monitoring within its administrative boundary using a network of automatic monitors and passive diffusion tubes. The closest monitoring location to the proposed development is located on Princess Street (MA24NO), approximately 250m south east of the Site.
- 4.3 Bias adjusted NO₂ monitoring results, for the locations in the vicinity of the proposed development Site, are detailed in **Table 4.1**. Exceedances of the annual mean NO₂ objective are highlighted in bold and potential exceedance of 1-hour mean objective are highlighted in bold and underlined.
- 4.4 Although monitoring data for 2020 was available for review, due to the COVID-19 pandemic and associated national lockdowns in place during the 2020 calendar year, monitoring results for 2020 were not considered to be representative of normal conditions, given the significant decrease in traffic levels.
- 4.5 The IAQM released a position statement¹⁹ in August 2021 with regards to the use of 2020 and 2021 monitoring data and the COVID-19 pandemic. Until the impact of the pandemic on air quality is fully understood, the IAQM advice is to use 2019 monitoring data as the last typical year for monitoring data.

Table 4.1: Council abbreviation NO₂ Monitoring Data in 2015 – 2020

Location and Reference	Grid Reference		Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration (µg.m ⁻³)					
					2015	2016	2017	2018	2019	2020
MA24NO, Princess Street	383968	398070	Kerbside	250m south east	55	45	45	40	41	27
MA29ANO, Oxford Street	384119	397503	Roadside	800m south east	56	<u>66</u>	58	59	55	39

¹⁹ IAQM (2021) Use of 2020 and 2021 Monitoring Datasets

Location and Reference	Grid Reference		Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration ($\mu\text{g.m}^{-3}$)					
					2015	2016	2017	2018	2019	2020
MA59NO, MA60NO, MA61NO, Piccadilly Gardens	384310	398337	Urban Centre	500m east	36	41	36	32	33	22
MA77NO, Hewitt Street	383576	397489	Urban Background	800m south	38	44	39	41	44	27
MA82NO, MA83NO, MA84NO, Manchester Oxford Road	384239	397276	Roadside	1km south east	<u>61</u>	<u>60</u>	56	54	52	34
MA26ANO, Chethams School	383973	398874	Urban Background	600m north	35	37	36	33	33	23
MAN1, Manchester Oxford Road	384233	397287	Urban Traffic	1km south east	<u>66</u>	<u>66</u>	<u>65</u>	<u>62</u>	59	36
MAN3, Manchester Piccadilly	384310	398337	Urban Centre	500m east	39	40	36	35	36	27

- 4.6 Monitored annual mean NO_2 concentrations between 2015 and 2019 exceeded the objective of $40\mu\text{g.m}^{-3}$ at all monitoring locations detailed in **Table 4.1**, with the exception of monitoring location MA26ANO which is classified as an urban background diffusion tube. All the monitoring locations detailed in **Table 4.1** are situated within the Manchester AQMA. In addition, the majority of monitoring locations are surrounded by high rise buildings which may affect dispersal of pollutants and are located adjacent to roads which experience significant congestion and/or are heavily trafficked by buses. Therefore, elevated pollutant concentrations are anticipated.
- 4.7 Monitored NO_2 concentrations at monitoring locations detailed in **Table 4.1** fluctuated between 2016 and 2019, with an overall downward trend evident. All monitoring locations experienced a significant decrease between 2019 and 2020 which was likely to be a result of lockdown restrictions influencing traffic levels during the COVID-19 pandemic in 2020.
- 4.8 A number of monitoring locations detailed in **Table 4.1** are classified as kerbside, urban background, urban centre monitoring locations or were located adjacent to Oxford Road which is heavily trafficked by buses. Therefore, the monitoring locations detailed in **Table 4.1** were not considered representative of the pollutant conditions across the Site.

- 4.9 Monitoring location MA26ANO was considered representative of background pollutant conditions at the Site, as it is located in close proximity to the Site and situated away from any major roads. Therefore, monitoring location MA26ANO was utilised as the background NO₂ concentration within the assessment, as detailed in paragraph 4.16 and agreed with MCC.
- 4.10 Monitoring location MA24NO is a kerbside monitoring location and was excluded from model verification, in accordance with Defra guidance¹⁰. In addition, the monitoring locations located at Manchester Piccadilly are urban centre monitoring locations and are located approximately 36m from the nearest road. Therefore, these monitoring locations were not considered representative of roadside conditions and were excluded from model verification.
- 4.11 Monitoring locations MA29ANO, MA82NO, MA83NO, MA84NO and MAN1 are roadside monitoring locations and in accordance with Defra guidance they are suitable for model verification. Monitoring locations MA29ANO, MA82NO, MA83NO, MA84NO and MAN1 were therefore utilised in the model verification of NO₂ concentrations, as detailed in **Appendix F**.

Particulate Matter (PM₁₀ and PM_{2.5})

- 4.12 MCC undertakes particulate matter (PM₁₀) monitoring at both the Oxford Road and Piccadilly automatic monitor and also PM_{2.5} monitoring at the Manchester Piccadilly automatic monitor. The monitored particulate matter concentrations are detailed in **Table 4.2**.

Table 4.2: MCC PM₁₀ and PM_{2.5} Monitoring Data in 2015 – 2020

Location and Reference	Grid Reference		Site Monitoring Type	Distance from and direction to Site boundary	Monitored Annual Average Concentration (µg.m ⁻³)					
					2015	2016	2017	2018	2019	2020
Monitored PM ₁₀ concentrations										
MAN1, Manchester Oxford Road	384233	397287	Urban Traffic	1km south east	28	27	27	30	26	18
MAN3, Manchester Piccadilly	384310	398337	Urban Centre	500m east	20	20	20	21	20	15
Monitored PM _{2.5} concentrations										
MAN3, Manchester Piccadilly	384310	398337	Urban Centre	500m east	10	10	8	11	12	8

- 4.13 Monitored annual mean PM₁₀ and PM_{2.5} concentrations between 2015 and 2020 were below the relevant air quality objectives at the monitoring locations detailed in **Table 4.2**.
- 4.14 Monitored PM₁₀ concentrations at both monitoring locations detailed in **Table 4.2** fluctuated between 2015 and 2019, with no clear trend evident. In addition, monitored PM_{2.5} concentrations at the Piccadilly automatic monitor fluctuated between 2015 and 2019, with a slight increasing trend evident. The monitoring locations experienced a significant decrease in PM₁₀ and PM_{2.5} concentrations between 2019 and 2020, which was likely to be a result of lockdown restrictions influencing traffic levels during the COVID-19 pandemic in 2020.
- 4.15 The Manchester Piccadilly automatic monitor is an urban centre monitoring location and the nearest road located to the automatic monitor is approximately 36m away. The Manchester Piccadilly automatic monitor was not considered representative of roadside conditions and was excluded from model verification. Monitoring location MAN1 was utilised in the model verification of PM₁₀ pollutant concentrations. Given that the monitoring location MAN1 does not monitor PM_{2.5}, the model verification process utilised for PM₁₀ was applied to PM_{2.5}, as detailed in **Appendix F**.

Background Pollutant Concentrations

- 4.16 MCC undertakes background NO₂ monitoring at monitoring location MA26ANO, located approximately 600m north of the Site. The 2019 monitored annual mean NO₂ concentration at MA26ANO was utilised as the background NO₂ concentration for all verification locations and across the proposed development Site. The 2019 monitored concentration at MA26ANO was processed in accordance with Defra guidance¹⁰ to derive a 2023 background NO₂ concentration for future assessment years.
- 4.17 No background NO_x, PM₁₀ or PM_{2.5} monitoring is undertaken by MCC within the study area. Background NO_x, PM₁₀ and PM_{2.5} concentrations were therefore obtained from the latest Defra background concentration maps¹⁷, which are provided for the UK as a 1km x 1km grid network. The latest maps are based on 2018 monitoring and meteorological data. Background concentrations of NO_x, PM₁₀ and PM_{2.5} were obtained for the grid squares covering the study area for the years of assessment (2019 and 2023). The background concentrations used in the assessment are detailed in **Table 4.3**. As monitored NO_x concentrations were available for the MAN1 automatic monitor, background NO_x concentrations were also obtained for MAN1. Background NO_x concentrations were not obtained for any other monitoring locations or proposed receptor.

Table 4.3: Background Pollutant Concentrations used in the Assessment

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m ⁻³)	
			2019	2023
Monitoring Locations Used in Verification				
NO ₂	384500, 397500		28.2	Data not required for this scenario

Pollutant	Grid Square	Monitoring Locations / Receptors	Concentration (µg.m ⁻³)	
			2019	2023
NOx		MA29ANO, MA82NO, MA83NO, MA84NO and MAN1	44.5	
PM ₁₀			14.4	
Receptors				
NO ₂	383500, 398500	Proposed Receptor Cartesian Grid	Data not required for this scenario	28.7
PM ₁₀				12.4
PM _{2.5}				8.0

4.18 2019 and 2023 background concentrations are below the relevant annual mean air quality objectives for NO₂, PM₁₀ and PM_{2.5}.

5. CONSTRUCTION PHASE DUST ASSESSMENT

- 5.1 The construction phase of the proposed development will involve a number of activities which have the potential to impact on local air quality. These include emissions of dust generated through demolition, excavation, construction, earthworks and trackout activities, exhaust pollutant emissions from construction traffic on the local highways network, and exhaust emissions from non-road mobile machinery (NRMM) within the construction site itself.
- 5.2 The location of sensitive receptors in relation to construction activities will affect the potential for such construction activities to cause dust soiling, nuisance and local air quality impacts. Meteorological conditions and the use of control measures will also contribute to the effects experienced.

Step 1: Screen the Need for a Detailed Assessment

- 5.3 Step 1 of the IAQM guidance¹¹ involves a screening assessment to consider whether a more detailed construction phase dust assessment is required.
- 5.4 In accordance with the guidance, a detailed assessment is required if:
- Human receptors are located within 350m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances; or
 - Ecological receptors are located within 50m of the boundary of the site or 50m of routes used by construction vehicles on the public highways, up to 500m from the site entrances.
- 5.5 From a review of the Multi Agency Geographic Information for the Countryside (MAGIC) website²⁰, no ecological designations were identified within the above screening distance and therefore the impact on ecological designations was not considered further. However human receptors are located within the above screening distances, with the closest of these receptors located off King Street. A construction phase assessment was therefore undertaken.

Step 2: Assess the Risk of Dust Impacts

Step 2A: Define the Potential Dust Emission Magnitude

- 5.6 The dust emission magnitudes for the construction activities were defined using the criteria detailed in the IAQM guidance¹¹ as detailed in **Table 5.1**. The proposed development proposes the conversion of the upper floors of 62 King Street to residential departments with external alterations to 58-66 King Street. Therefore, no demolition or earthworks are proposed as part of the development and therefore were not considered further in the assessment.

²⁰ Defra, Multi Agency Geographic Information for the Countryside (MAGIC) [<http://magic.defra.gov.uk/>]

Table 5.1: Dust Emission Magnitude Criteria and Definition

Activity	IAQM Dust Emission Magnitude	IAQM Dust Emission Magnitude Criteria
Construction	Large	Total building volume >100,000m ³ , on site concrete batching, sandblasting.
	Medium	Total building volume 25,000m ³ – 100,000m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching.
	Small	Total building volume <25,000m ³ , construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout	Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m.
	Medium	10 - 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m.
	Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

5.7 The following dust emissions magnitudes were defined for the proposed development:

- Construction – The proposed development proposes external alterations to 58 – 66 King Street, such as cutting down windows and replacing with glazing units and the addition of wood-effect cladding. There are limited construction works associated with these alterations and therefore, the dust emission magnitude for construction was defined as **Small**.
- Trackout – There is anticipated to be less than 10 HDV outward movements in any one day during the construction phase and therefore the dust emissions magnitude for trackout was defined as **Small**.

5.8 A summary of the defined dust emissions magnitudes for the development are provided in **Table 5.2**.

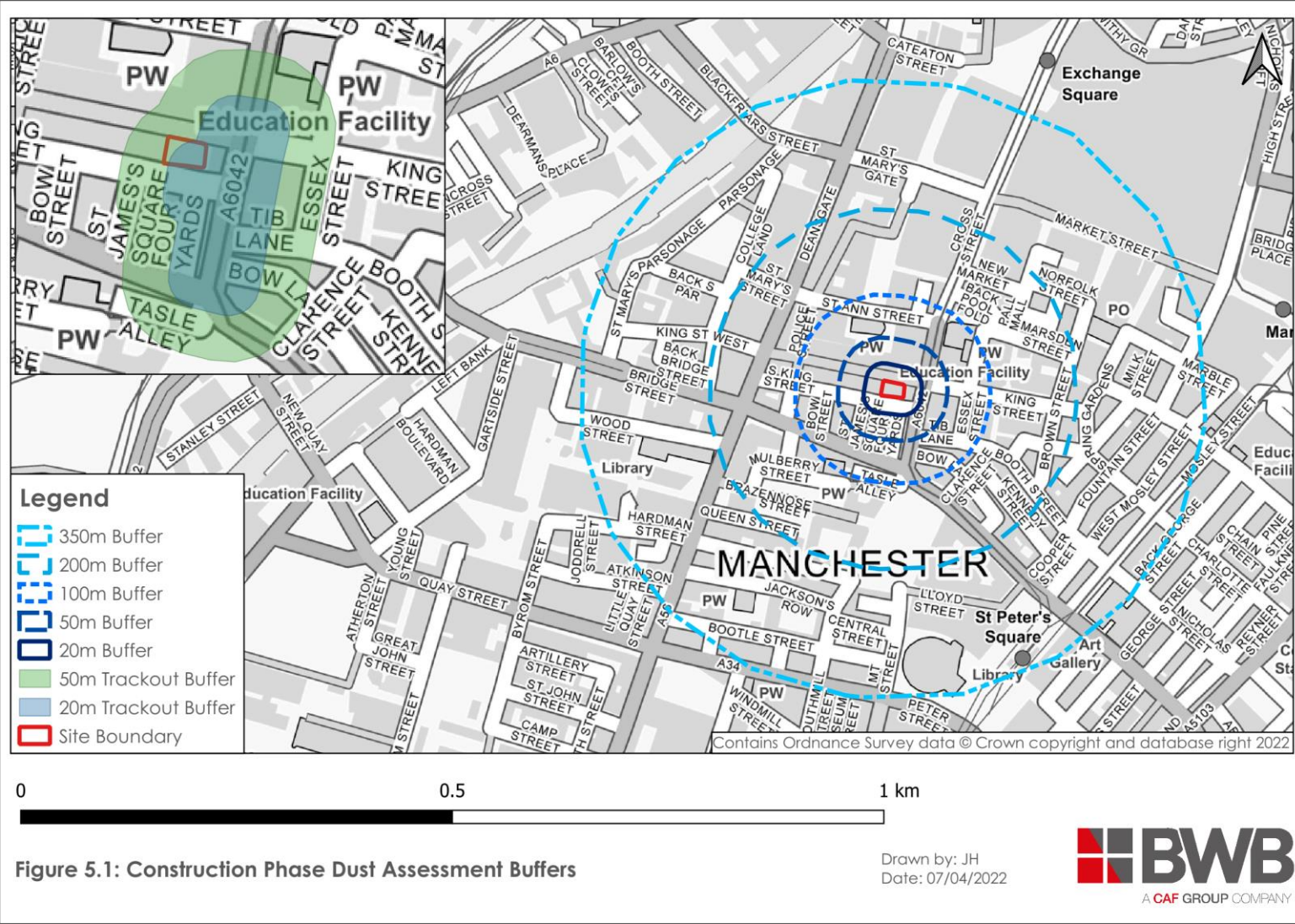
Table 5.2: Summary of Project Defined Dust Emissions Magnitudes

Activity	Dust Emissions Magnitude
Construction	Small
Trackout	Small

Step 2B: Define the Sensitivity of the Area

5.9 The assessment requires the determination of the sensitivity of the area for the purposes of dust soiling, human health and ecological impacts. The sensitivity of the study area takes into account the specific receptors in the vicinity of the Site, the proximity and number of those receptors, the local background concentration of PM₁₀ and site-specific factors. **Figure 5.1** was utilised to determine the number of receptors located within the distance bands provided in the IAQM guidance¹¹ for determining receptor sensitivity.

Figure 5.1: Construction Phase Assessment Dust Distance Buffers



5.10 The sensitivity of the area is defined below, in accordance with IAQM criteria¹¹ and summarised in **Table 5.3**.

- Dust Soiling – There are between 10 and 100 highly sensitive residential receptors located within 20m of the proposed Site boundary. Therefore, the sensitivity of the area to dust soiling is defined as '**High**'.
- Human Health – There are between 10 and 100 highly sensitive residential receptors located within 20m of the proposed Site boundary and the 2022 background concentration of PM₁₀ is less than 24µg.m⁻³. Therefore, the sensitivity of the area to human health effects is defined as '**Low**'

Table 5.3: Determination of the Sensitivity of the Area

Potential Impact	Sensitivity	
	Construction	Trackout
Dust Soiling	High	High
Human Health	Low	Low

Step 2C: Define the Risk of Impacts

5.11 The dust emission magnitude determined in Step 2A is then combined with the sensitivity of the area determined in Step 2B to define the risk of dust impacts with no mitigation applied. The results of this assessment are detailed in **Table 5.4**.

Table 5.4: Summary Dust Risk Table to Define Site Specific Risk

Activity	Step 2A: Dust Emission Magnitude	Step 2B: Sensitivity of the Area	Step 2C: Risk of Dust Impacts
Dust Soiling Effects on People and Property			
Construction	Small	High	Low Risk
Trackout	Small	High	Low Risk
Human Health Impacts			
Construction	Small	Low	Negligible
Trackout	Small	Low	Negligible

Step 3: Site-Specific Mitigation

5.12 The risk of dust impacts, defined in Step 2C of the assessment, is used to determine the mitigation measures required to minimise the emission of dust during construction phase activities. The IAQM guidance¹¹ provides details of highly recommended and desirable mitigation measures which are commensurate with the risk of dust impacts defined in

Step 2C for demolition, construction, earthworks and trackout activities. Where the mitigation measures are general in nature, the highest risk category was applied in accordance with the guidance¹¹. The highest risk category identified was 'Low Risk' and the recommended mitigation taken from the IAQM guidance¹¹ is detailed in **Table 5.5** and **Table 5.6**.

Table 5.5: Mitigation Measures for a Low Risk Site

Category	Mitigation Measures for a Low Risk Site	
	Highly Recommended	Desirable
Communication	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environmental manager/engineer or the site manager.	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.
	Display the head or regional office contact information.	
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.	None
	Make the complaints log available to the local authority when asked.	
	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspections results, and make an inspection log available to the local authority when asked.	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided as necessary.
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	
Preparing and maintaining the site	Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Keep site fencing, barriers and scaffolding clean using wet methods.
	Avoid site runoff of water or mud.	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used

Category	Mitigation Measures for a Low Risk Site	
	Highly Recommended	Desirable
		on site. If they are being re-used on-site cover as described below.
		Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicle/ machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas.
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	
		Ensure equipment is readily available on site to clean any dry spillages - cleaning up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	None
	Ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	
	Use enclosed chutes and conveyors and covered skips.	
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	
Waste Management	Avoid bonfires and burning of waste materials.	None

Table 5.6: Mitigation Measures Specific to Construction and Trackout

Category	Mitigation Measures	
	Highly Recommended	Desirable
Construction (Low Risk Site)	None	Avoid scabbling (roughening of concrete surfaces) if possible.
		Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Trackout (Low Risk Site)	None	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any materials tracked out of the site. This may require the sweeper being continuously in use.
		Avoid dry sweeping of large areas.

Category	Mitigation Measures	
	Highly Recommended	Desirable
		Ensure vehicles entering and leaving the sites are covered to prevent escape of materials during transport.
		Record all inspections of haul routes and any subsequent action in a site log book.
		Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Step 4: Determine Significant Effects

- 5.13 In accordance with IAQM guidance¹¹, with the implementation of the mitigation measures detailed in Step 3, the residual impacts from the construction phase are considered to be 'not significant'.

6. OPERATIONAL PHASE ROAD TRAFFIC EMISSIONS ASSESSMENT

Screening Assessment

- 6.1 The trip generation for the proposed development was screened using IAQM and EPUK Stage 1 and Stage 2 criteria¹² to determine whether a detailed air quality assessment was required.

Stage 1

- 6.2 The proposed development comprises less than 10 residential units and doesn't propose any car parking spaces. Therefore, in accordance with IAQM and EPUK guidance¹² the impact on local air quality was considered to be insignificant and a detailed air quality impact assessment was not undertaken.

Site Suitability Assessment

- 6.3 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted across the proposed development Site to determine the suitability of the Site for the proposed residential use with regard to the current air quality objectives.
- 6.4 A Cartesian grid was modelled covering the area between the following grid references: minimum 383731, 398178 to maximum 383889, 398366. The Cartesian grid was modelled over the Site and the surrounding area, to capture Cross Street and John Dalton Street as the primary emission source in the vicinity of the Site. The grid was run at a height of 1.5m to represent the average breathing height at ground floor level across the proposed development Site for Scenario 2: 2023 Opening Year with development. **Figures 6.1 – 6.3** illustrate annual mean pollutant concentration contours for NO₂, PM₁₀ and PM_{2.5} respectively across the Site.

Figure 6.1: Predicted Annual Mean NO₂ Concentrations across the Site

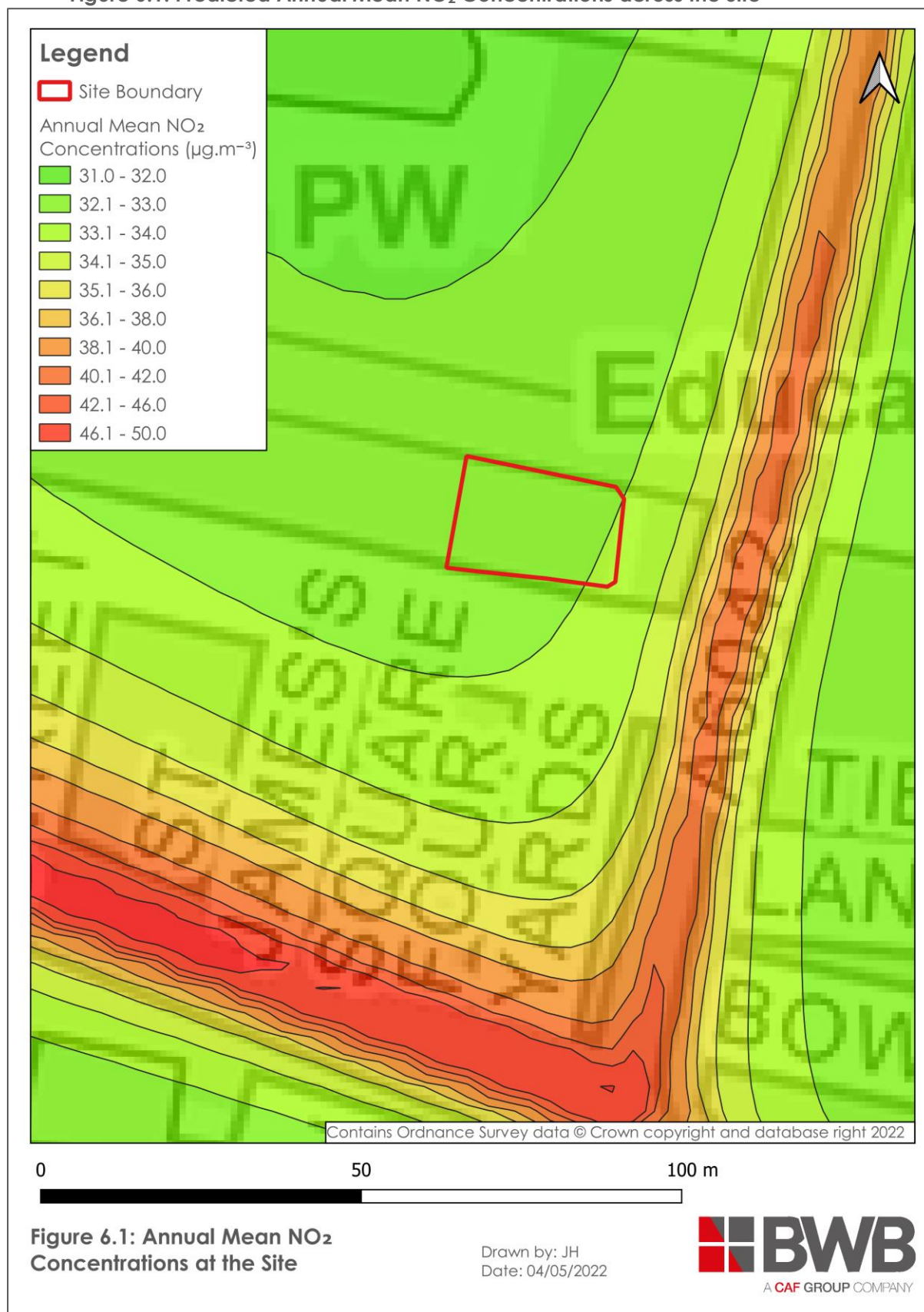


Figure 6.2: Predicted Annual Mean PM₁₀ Concentrations across the Site

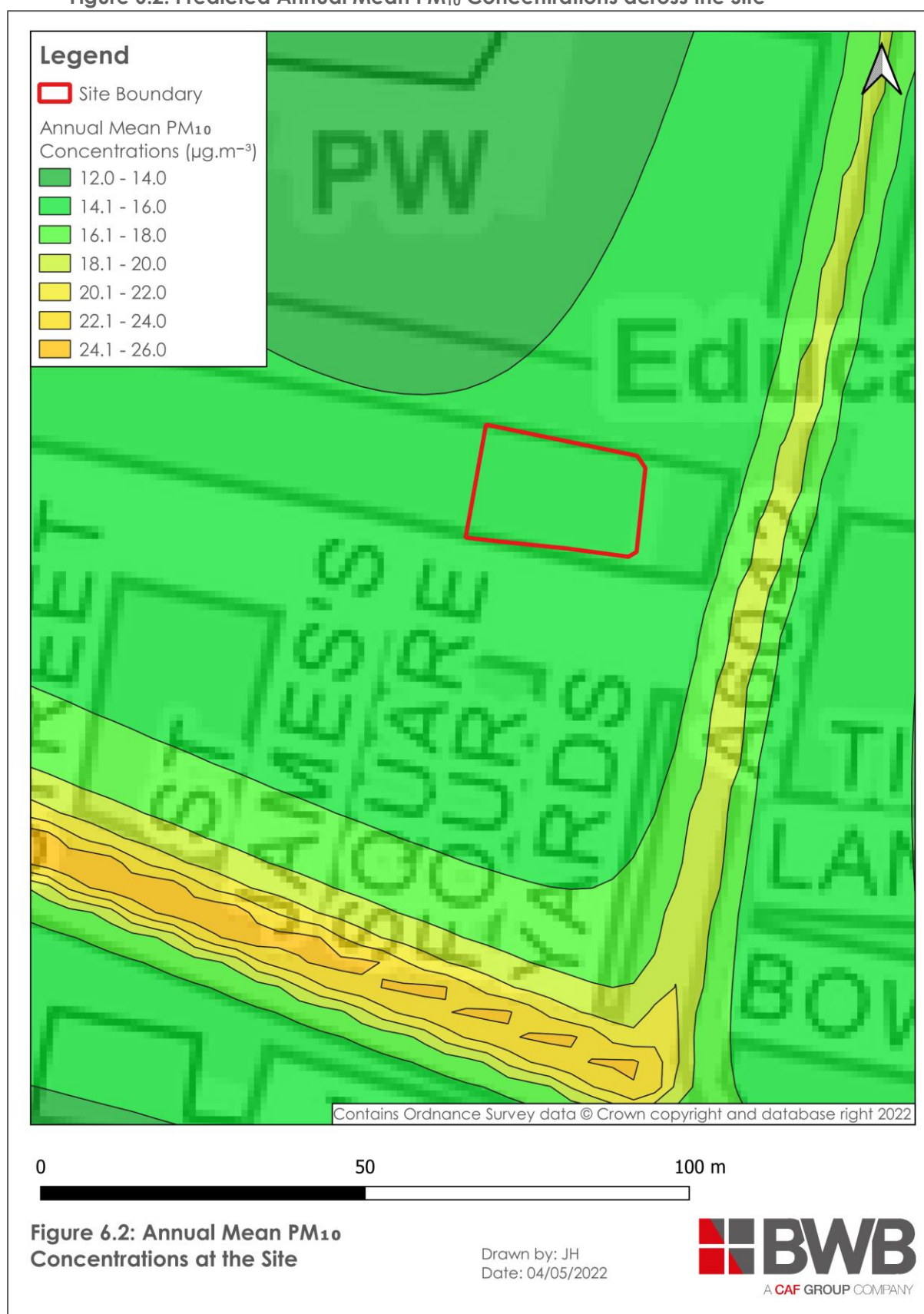
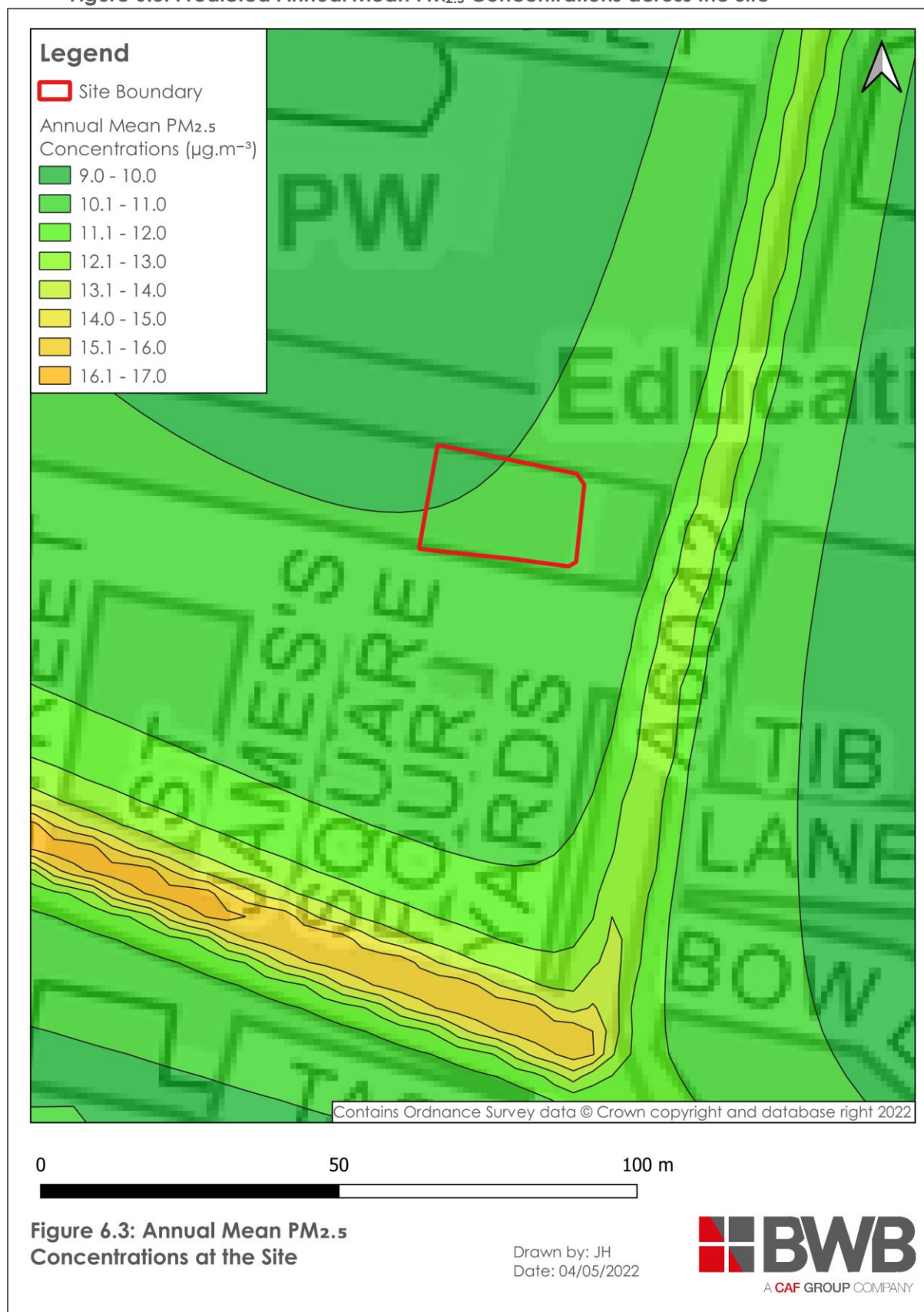


Figure 6.3: Predicted Annual Mean PM_{2.5} Concentrations across the Site



- 6.5 The predicted NO₂, PM₁₀ and PM_{2.5} concentrations for Scenario 2: 2023 Opening Year with development, indicate that pollutant concentrations at the proposed residential development will be below the respective air quality objectives in 2023 with the development in place.
- 6.6 With regard to short term air quality objectives for NO₂ and PM₁₀ at the residential development, the predicted annual mean NO₂ concentrations are less than 60µg.m⁻³ and therefore in accordance with Defra guidance¹⁰ it may be assumed that exceedances of the 1-hour mean NO₂ objective are unlikely. The calculation detailed in paragraph 3.15 was used to determine potential exceedance of the 24-hour PM₁₀ short term objective; no exceedances were predicted.

Mitigation

- 6.7 No exceedances of the relevant air quality objectives were predicted at the Site. Therefore, no mitigation is proposed to minimise the exposure of future residents to poor air quality.

7. CONCLUSION

- 7.1 An air quality assessment was undertaken for the proposed change of use at 58-66 King Street, Manchester. The air quality assessment was undertaken to address condition 5 of the planning consent associated with the planning application for the Site.
- 7.2 A qualitative construction phase assessment was undertaken and measures were recommended for inclusion in a DMP to minimise emissions during construction activities. With the implementation of these mitigation measures the impact of construction phase dust emissions is considered to be 'not significant' in accordance with IAQM guidance¹¹.
- 7.3 An air quality screening assessment was undertaken in accordance with IAQM and EPUK guidance¹² to determine the requirement for a detailed road traffic emissions impact assessment. The proposals were compared to the criteria detailed in the guidance. The proposed development did not exceed any of the Stage 1 criteria and therefore the impact was considered to be 'insignificant' in accordance with IAQM and EPUK guidance¹². A detailed air quality impact assessment was therefore not undertaken.
- 7.4 Concentrations of NO₂, PM₁₀ and PM_{2.5} were predicted across the proposed development Site, using the air dispersion model ADMS-Roads, to consider the suitability of the Site for the proposed residential use. The modelling assessment was undertaken in accordance with Defra Local Air Quality Management Technical Guidance¹⁰. Concentrations of NO₂, PM₁₀ and PM_{2.5} across the Site were predicted to be below the relevant air quality objectives. Therefore, the Site was considered to be suitable for the proposed residential use with regard to the current air quality objectives and no mitigation measures were proposed.

APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Term	Definition
AADT	Annual Average Daily Traffic flow.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between two years, which is useful for pollutants that have higher concentrations during the winter months.
AQAP	Air Quality Action Plan.
AQMA	Air Quality Management Area.
AQS	Air Quality Strategy.
Defra	Department for Environment, Food and Rural Affairs.
EPUK	Environmental Protection UK.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV	Heavy Duty Vehicles (HGVs + buses and coaches)
HGV	Heavy Goods Vehicles.
IAQM	Institute of Air Quality Management.
LAQM	Local Air Quality Management.
LDV	Light Duty Vehicles (motorbikes, cars, vans and small trucks)
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO ₂	Nitrogen dioxide.
NO _x	Nitrogen oxides.
Percentile	The percentage of results below a given value.
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
micrograms per cubic metre (µg.m ⁻³)	A measure of concentration in terms of mass per unit volume. A concentration of 1 µg.m ⁻³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

APPENDIX B: PROPOSED DEVELOPMENT MASTERPLAN

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NOTES

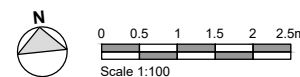
AEWTP029C

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences.
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
- This drawing shall not be reproduced without express written permission from AEW.
- Title overlay drawings and ownership boundaries are produced using all reasonable endeavors. AEW cannot be responsible for the accuracy or scale discrepancy of base plans supplied to them.
- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

CDM 2015

Client notified of duties: 04/11/2020
Principal Designer: AEW Architects

Unless noted below, all known hazards have been highlighted on the drawing:



KEY PLAN



58-60 King Street

Apartment nos. 6, 13-14, 20-21, 23-24, already approved as part of Permission references: 122835/P3OPA/2019 128211/NMC/2020 Therefore, the delivery of these residential units does not form part of this application

62 King Street

64-66 King Street

Apartment nos. 1-3, 8-10, 15-17, 22, already approved as part of Permission references: 122836/P3OPA/2019 128116/NMC/2020 Therefore, the delivery of these residential units does not form part of this application

P5	31/03/2021	MH	BL
Minor Amendment			
P4	12/03/2021	MH	BL
Issued for Planning			
P3	16/12/2020	MH	BL
Minor update to bin store wall to suit structural comments			
P2	11/12/2020	MH	BL
Ground floor stair amended			
P1	12/11/2020	MH	PBH
Initial Issue			
REV	Date	Drawn by: -	Checked by: -
Status	Purpose of Issue		
S2	For Planning		
drawing stage	RIBA Stage 3		

client

DTZ Investors

project

Manchester, King Street

drawing title

Proposed Ground Floor Plan

date 12/11/2020 drawn MH
scale/A3 1:100 checked PBH

Rev

P5

Job No

11702-AEW-XX-00-DR-A-0520

aew architects
0161 214 4370
www.aewarchitects.com

APPENDIX C: PLANNING POLICY AND LEGISLATION

National Legislation and Planning Policy

The UK Air Quality Strategy

European Union (EU) legislation forms the basis of air quality policy and legislation in the UK. The EU 2008 ambient Air Quality Directive¹ sets limits for ambient concentrations of air pollutants including nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}). The air quality standards and objectives are prescribed through the Air Quality (England) Regulations 2000², as amended, for the purpose of the Local Air Quality Management Framework.

The UK Government are required under the Environment Act 1995³ to produce a national Air Quality Strategy (AQS). The AQS was first published in 1997⁵ and was most recently reviewed and updated in 2007⁶. The AQS provides an overview of the Government's ambient air quality policy and sets out the air quality standards and objectives to be achieved and measures to improve air quality.

The Environment Act 2021⁴ was granted Royal Assent in November 2021 and contains amendments to Part IV of the Environment Act 1995³ with regard to the Local Air Quality Management regime. Under the Environment Act 2021⁴, the Secretary of State must lay a statement before Parliament setting out progress made in meeting air quality objectives and standard in England and steps taken towards achieving the standards. The Environment Act 2021⁴ also places responsibility on local authorities to co-operate with air quality partners in the preparation of Air Quality Action Plans and identification of measures which should be monitored within the Plan and dates by which they should be implemented.

Part IV of the Environment Act³ requires local authorities in the UK to review local air quality within their administrative area and, if relevant air quality standards and objectives are likely to be exceeded, designate Air Quality Management Areas (AQMAs). Following the designation of an AQMA, local authorities are required to publish an Air Quality Action Plan (AQAP) detailing measures to be taken to improve local air quality and work towards meeting the relevant air quality standards and objectives.

National Planning Policy Framework

The National Planning Policy Framework (NPPF)⁷ was amended in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

The NPPF⁷ recognises air quality within Section 15: Conserving and enhancing the natural environment, and 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, taking into account relevant information such as river basin management plans;

[...]

Ground conditions and pollution

[...]

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.

[...]

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."

With regard to assessing cumulative effects the NPPF⁶ states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.

[...]"

Planning Practice Guidance

The Planning Practice Guidance (PPG) for air quality⁸ was updated in November 2019 and provides guiding principles on how the planning process can take account of the impacts of new development on air quality.

The PPG⁸ sets out the following with regard to air quality and planning:

- *"What air quality considerations does planning need to address;*
- *What is the role of plan-making with regard to air quality;*
- *Air quality concerns relevant to neighbourhood planning;*
- *What information is available about air quality;*

- *When could air quality considerations be relevant to the development management process;*
- *What specific issues may need to be considered when assessing air quality impacts;*
- *How detailed does an air quality assessment need to be; and*
- *How can an impact on air quality be mitigated".*

The PPG⁸ sets out the pollutants for which there are legally binding limits for concentrations and those which the UK also has national emissions reduction commitments.

The PPG⁸ states that development plans may need to consider:

- *"what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*
- *the impact of point sources of air pollution (pollution that originates from one place);*
- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
- *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
- *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement".*

The PPG⁸ also states what may be considered relevant to determining a planning application and these include whether a development would:

- *"Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or*

extraction systems (including chimneys) which require approval or permits under pollution control legislation;

- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*
- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value”.*

The PPG⁸ provides guidance regarding what should be included within an air quality assessment. Examples of potential air quality mitigation measures are also provided.

Local Planning Policy

Manchester's Local Development Framework: Core Strategy Development Plan Document

“Policy CC 5

Transport

[...]

Proposals will be supported that improve pedestrian safety, improve air quality and increase the scope for accessible public realm improvements,

[...]

Policy T 1

Sustainable Transport

To deliver a sustainable, high quality, integrated transport system to encourage modal shift away from car travel to public transport, cycling and walking, to support the needs of residents and businesses and to prepare for carbon free modes of transport, the Council will support proposals that: -

[...]

Would reduce the negative impacts of road traffic, for example, congestion, air pollution and road accident casualties.

[...]

Policy EN 16

Air Quality

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 impact 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 impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas.

Policy DM 1

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, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise."

The above policies were taken into consideration throughout the undertaking of the assessment.

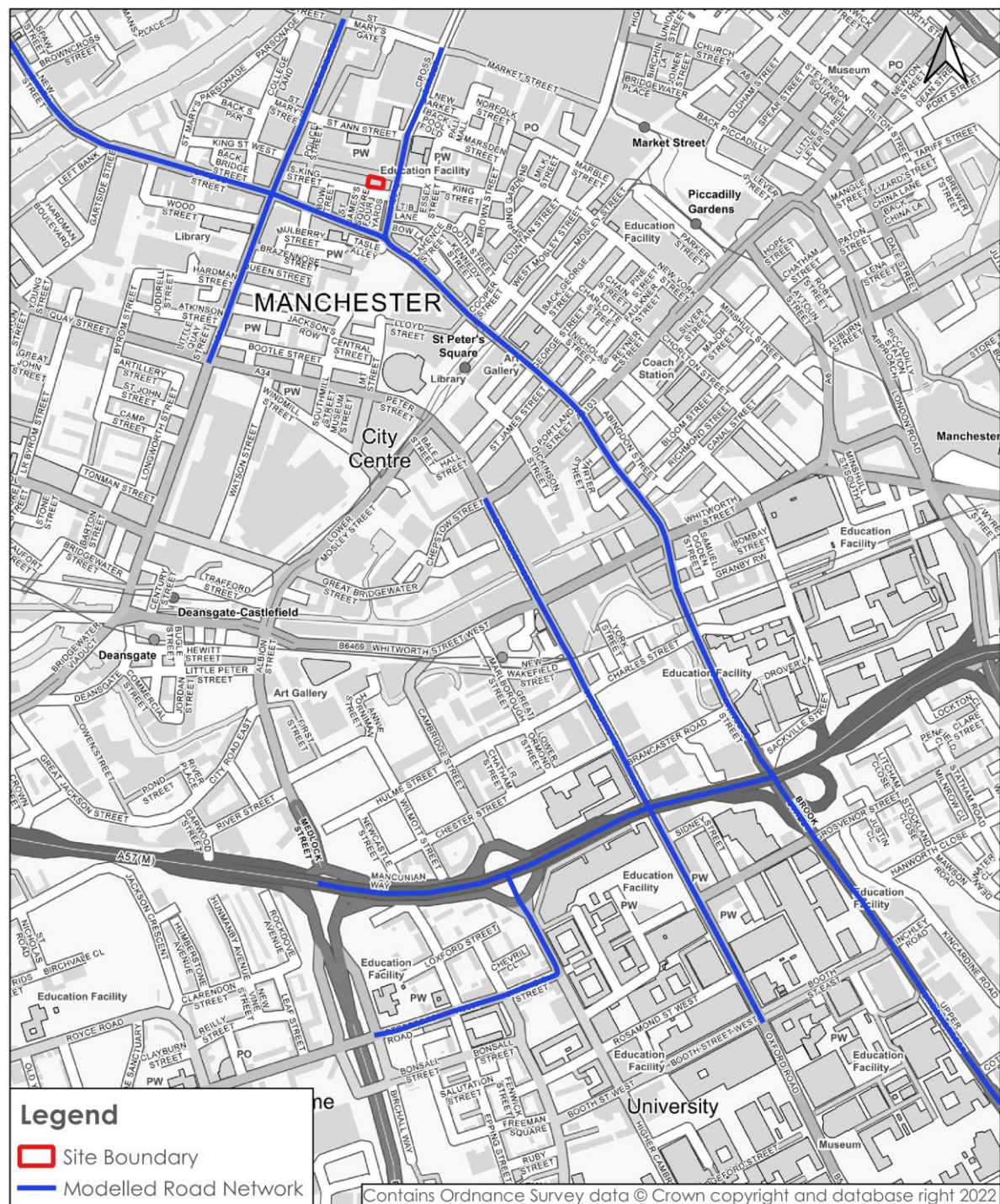
APPENDIX D: TRAFFIC DATA UTILISED IN THE AIR QUALITY ASSESSMENT

Table D1: Traffic Data Utilised in the Air Dispersion Modelling Assessment

Road Link	Speed	Scenario 1: 2019 Verification Year		Scenario 2: 2023 Opening Year With Development	
	Km.hr ⁻¹	24 hour AADT Total Flow	HDV Flow	24 hour AADT Total Flow	HDV Flow
Cross Street	32	3,374	79	3,588	84
John Dalton Street	32	8,663	89	9,212	95
Princess Street	32	2,361	34	2,511	36
A56 Deansgate (North of John Dalton Street)	22	6,615	110	7,034	117
A56 Deansgate (South of John Dalton Street)	32	9,883	178	10,509	189
A34 Bridge Street	32	6,753	123	7,181	131
Oxford Road	22	5,463	65	5,809	69
Mancunian Way (Between Cambridge Street and Upper Brook Street)	80	90,785	3,339	96,535	3,550
Princess Street	32	8,081	179	8,593	190
A34 Upper Brook Street (South of Grosvenor Street)	48	18,317	293	19,477	312
A34 Brook Street (North of Grosvenor Street)	48	9,159	147	9,739	156
Mancunian Way (West of Cambridge Street)	80	59,556	2,175	63,328	2,313
A5103 (Underneath Mancunian Way)	48	25,276	584	26,877	621
Cambridge Street (South of Mancunian Way)	32	6,556	66	6,971	70

An illustration of the road links included in the ADMS-Roads model is provided in **Figure D1**.

Figure D1: Road Links Included in the ADMS-Roads Model



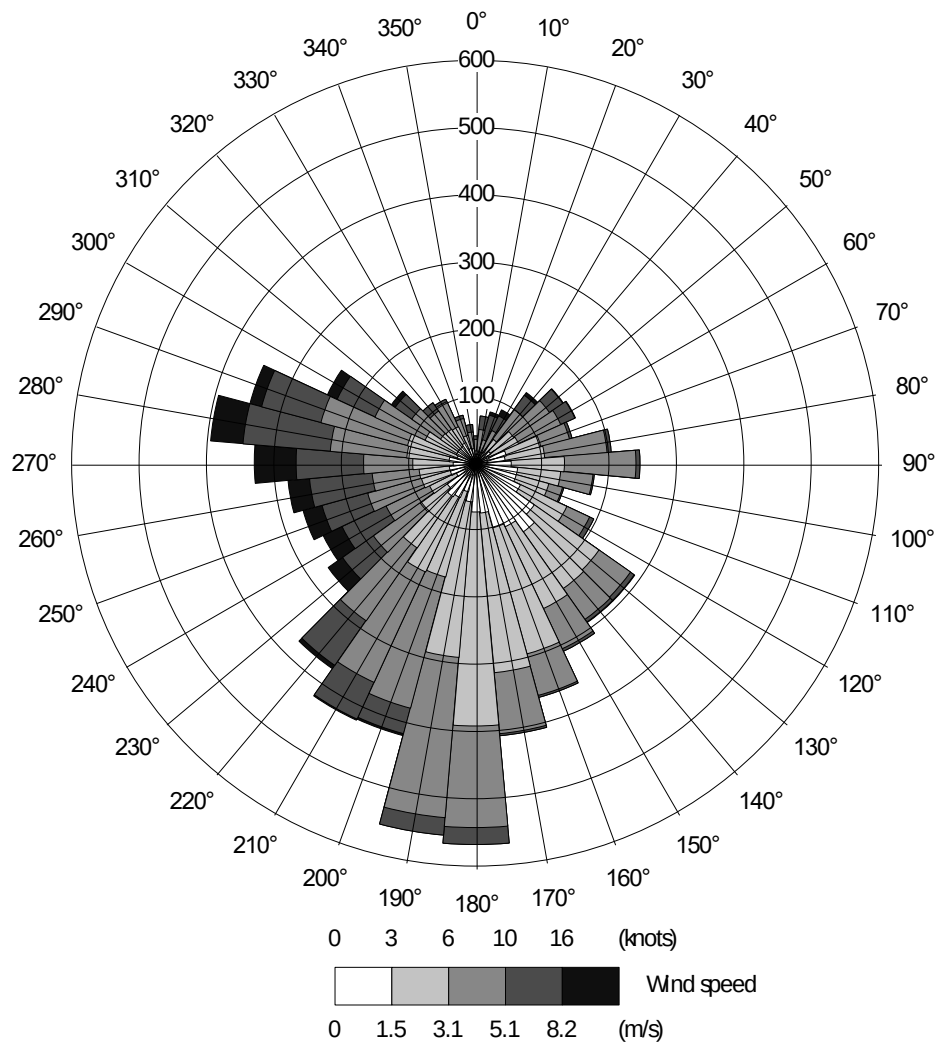
0 0.5 1 km

Figure D1: Modelled Road Network

Drawn by: JH
Date: 04/05/2022

APPENDIX E: WIND ROSE FOR 2019 FOR MANCHESTER AIRPORT METEOROLOGICAL RECORDING STATION

Meteorological data for 2019 Verification Year scenario for the Manchester Airport recording station was obtained for use in the air dispersion modelling assessment. The wind rose for 2019 is detailed below and illustrates a predominant wind direction from the south.



APPENDIX F: MODEL VERIFICATION

Whilst ADMS-Roads is widely validated for use in this type of assessment, model verification for the area around the Site will not have been included. To determine model performance at a local level, a comparison of modelled results with monitored results in the study area was done in accordance with the methodology provided by Defra. This process of verification aims to minimise modelling uncertainty by correcting modelled results by an adjustment factor to give greater confidence to the results.

The model was run for Scenario 1: 2019 Verification Year to predict the 2019 annual mean road contributions of NO_x and PM₁₀ at the monitoring locations in the study area. The model NO_x and PM₁₀ outputs at these locations were compared to the 2019 monitored concentrations to provide adjustment factors. **Tables F1** and **F2** presents the verification process for NO_x and **Table F4** presents the verification process for PM₁₀ respectively. **Figure F1** details the monitoring locations utilised in the model verification.

No monitoring of PM_{2.5} is undertaken at roadside locations within the study area. Therefore the adjustment factor calculated during the PM₁₀ verification process was utilised to adjust predicted concentrations of PM_{2.5}.

Table F1: NO_x Verification Process for the Diffusion Tubes

Model Verification Steps	MA29ANO	MA82NO, MA83NO, MA84NO
2019 monitored total NO ₂ (µg.m ⁻³)	55.4	52.0
2019 background NO ₂ concentration (µg.m ⁻³)	33.0	33.0
Monitored road contribution NO _x (µg.m ⁻³)*	49.5	41.3
Modelled road contribution NO _x (µg.m ⁻³)	5.0	11.4
Ratio of monitored road NO _x to modelled road NO _x	9.9	3.6

* Road-NO_x component, determined from NO_x to NO₂ calculator

Table F2: NO_x verification Process for the Automatic Monitor

Model Verification Steps	MAN1
2019 monitored total NO _x (µg.m ⁻³)	91.7
2019 background NO _x concentration (µg.m ⁻³)	44.5
Monitored road contribution NO _x (µg.m ⁻³)	47.3
Modelled road contribution NO _x (µg.m ⁻³)	11.4
Ratio of monitored road NO _x to modelled road NO _x	4.1

The ratio of monitored road NO_x to modelled road NO_x for the above monitoring locations were used to derive an overall road-NO_x factor of **4.4142**, which is determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero. This factor was then applied to the modelled road-NO_x concentrations across the proposed receptor cartesian grid, before conversion to NO₂ concentrations using the NO_x to NO₂ calculator provided by Defra and the monitored NO₂ background concentration.

It was noted that the ratio of monitored road NO_x to modelled road NO_x at monitoring location MA29ANO was relatively high. Monitoring location MA29ANO is located behind a signpost which is considered to affect the dispersal of pollutants at this monitoring location. The inclusion of monitoring location MA29ANO resulted in the derivation of a higher adjustment factor, and it was therefore retained in the verification process to provide a conservative assessment.

In addition, it was noted that a high overall adjustment factor was derived. This was considered to be a result of the monitoring locations being located along Oxford Road, in close proximity to a number of bus stops where idling and irregular acceleration and braking could occur. However, the use of a high adjustment factor provides a conservative assessment.

Statistical analysis was also undertaken to determine the level of uncertainty with the air quality model.

Table F3: Statistical Analysis

Model Verification Steps	MA29ANO	MA82NO, MA83NO, MA84NO	MAN1
Adjusted modelled road contribution NO _x (µg.m ⁻³)	22.1	50.3	50.3
Modelled total NO ₂ (NO _x for MAN1) concentration (µg.m ⁻³)	43.6	55.7	94.7
Monitored total NO ₂ (NO _x for MAN1) concentration (µg.m ⁻³)	55.4	52.0	91.7
% difference between modelled and monitored total NO ₂ (NO _x for MAN1) concentration	-27.2	6.7	3.2
RMSE % (should be less than 25% and ideally less than 10%)	18.4		

Statistical analysis undertaken for the results in **Table F1** demonstrate that the RMSE is within the acceptable range and the RMSE value is considered to represent an acceptable level of average uncertainty within the air quality model.

Table F4: PM₁₀ Verification Process

Model Verification Steps	MAN1
2019 monitored total PM ₁₀ (µg.m ⁻³)	26.0
2019 background PM ₁₀ concentration (µg.m ⁻³)	14.4
Monitored road contribution PM ₁₀ (µg.m ⁻³)	11.6

Model Verification Steps	MAN1
Modelled road contribution PM ₁₀ (µg.m ⁻³)	1.2
Ratio of monitored road PM ₁₀ to modelled road PM ₁₀	9.7
Adjustment factor for modelled road contribution PM₁₀	9.7033

A PM₁₀ adjustment factor of **9.7033** was determined from the PM₁₀ verification process and applied to the predicted road-PM₁₀ and PM_{2.5} concentrations across the proposed receptor cartesian grid. The use of a high adjustment factor is considered to provide a conservative assessment.

Figure F1: Monitoring Locations Utilised in the ADMS-Roads Model Verification Process

