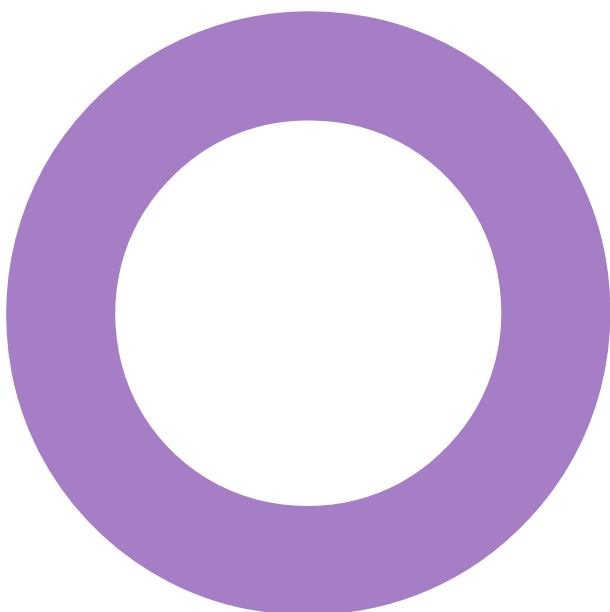


**Port Street.
Manchester.**
**Manchester (Port Street)
Limited.**

AIR QUALITY
AIR QUALITY ASSESSMENT

REVISION 01 – 12 NOVEMBER 2021



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
00	25/10/2021	First Draft	AG/LB	KW	CR
01	12/11/2021	First Issue	CS	ES	KW

This document has been prepared for Manchester (Port Street) Limited only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 10/13449

Document reference: REP-1013449-5A-20211112-AQA-Port Street Manchester-Rev01

Contents

Audit sheet.	2
Contents	3
Executive Summary.	5
1. Introduction.	6
1.1 Proposed Development.	6
1.2 Application Site Description and Location.	6
1.3 Scope of Assessment.	7
2. Legislation, Policy and Guidance Documents.	8
2.1 Air Quality Strategy and Local Air Quality Management.	8
2.2 EU Limit Values.	9
2.3 General Nuisance Legislation.	9
2.4 UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations.	9
2.5 Clean Air Strategy.	9
2.6 Planning Policy.	9
2.7 Local Policy.	11
2.8 Assessment Guidance.	12
3. Assessment Methodology.	13
3.1 Consultation.	13
3.2 Existing Air Quality in the Study Area.	13
3.3 Construction Phase Impacts.	13
3.4 Operational Phase Impacts.	14
3.5 Assessment of Significance.	16
4. Baseline Environment.	17
4.1 Site Setting.	17
4.2 Local Air Quality Management Review and Assessment.	17
4.3 Local Air Quality Monitoring.	17
4.4 Industrial Pollution.	21
4.5 Defra Predicted Concentrations.	21
4.6 Summary of Background Data.	21
5. Construction Phase Assessment.	22
5.1 Construction Phase Dust Assessment.	22
5.2 Construction Phase – Vehicular Pollutants.	24

5.3 Construction Phase – Non-Road Mobile Machinery.	24
6. Operational Phase Assessment.	26
6.1 Road Traffic Emissions Screening Assessment.	26
6.2 Site Suitability.	26
7. Mitigation.	29
7.1 Construction Phase.	29
7.2 Operational Phase.	31
8. Summary and Conclusions.	33
9. Glossary of Terms.	34
References.	35
Appendix 1 – EHO Consultation	36
Appendix 2 – Road Traffic Model Input Data	39
Appendix 3 – Model Results	43
Appendix 4 – Professional Experience	45

Executive Summary.

Hoare Lea have been commissioned by Manchester (Port Street) Limited to undertake an Air Quality Assessment to support the planning application for the Proposed Development located at the corner of Great Ancoats Street and Port Street, Manchester (hereafter referred to as the 'Application Site').

The Proposed Development comprises the demolition of existing structures on site and the construction of two buildings made up of approximately 485 apartments, 600 sqm of retail space, amenity space and provision for up to 47 car park spaces, all with electric charging capacity. The Proposed Development also includes 496 cycle spaces.

The Application Site is located within the Manchester City Centre Air Quality Management Area declared for exceedances of the annual mean objective for nitrogen dioxide (NO₂). The baseline assessment shows that the annual mean NO₂ Air Quality Objective (AQO) is generally exceeded at roadside and kerbside locations. The 60 µg/m³ threshold indicative of exceedance of the short term AQO for NO₂ has not been exceeded since 2016. Annual mean concentrations of PM₁₀ and PM_{2.5} in the vicinity of the Application Site have been below the respective AQOs since 2015.

The traffic generated by the Proposed Development was supplied by Curtins, the project transport consultants, and has been screened against the criteria set-out in the Environmental Protection United Kingdom and Institute of Air Quality Management planning guidance to determine the need for a detailed assessment. There is expected to be a net reduction of 106 vehicle trips per day when compared to the existing uses and therefore a detailed assessment is not required.

The energy strategy for the Proposed Development is proposed to be all electric, utilising zero emission technologies. As no combustion sources are proposed, no local air quality impacts are anticipated and a detailed assessment of impacts of combustion emissions from the energy plant has been screened out of this assessment.

The impacts of demolition and construction work on dust soiling and ambient fine particulate matter concentrations have been assessed. The assessment has identified that there is a medium risk of dust soiling impacts and a low risk to human health. The risk of dust causing a loss of local amenity and increased exposure to fine particulate matter concentrations has been used to identify appropriate mitigation measures. Provided these are implemented and included within a dust management plan, for example through a planning condition, the residual impacts are considered to be not significant.

Detailed dispersion modelling has been completed to determine the Site Suitability of the Proposed Development due to its roadside location within an AQMA. This assessment indicates that there are no exceedances of the annual mean NO₂, PM₁₀ or PM_{2.5} AQOs at any sensitive proposed receptors, or any exceedance of the short term AQOs at relevant exposure locations such as commercial uses or balconies. As such, mitigation is not required.

Based on the assessment results, the Application Site is considered suitable for the Proposed Development without the inclusion of mitigation, air quality should not be considered as a constraint to the planning consent and the Proposed Development conforms to the principles of the National Planning Policy Framework and the MCC Local Plan.

1. Introduction.

Hoare Lea have been commissioned by Manchester (Port Street) Limited to undertake an Air Quality Assessment to support the planning application for the Proposed Development located at the corner of Great Ancoats Street and Port Street, Manchester (hereafter referred to as the 'Application Site').

1.1 Proposed Development.

The Proposed Development comprises the demolition of existing structures on site and the construction of two joined building units made up of approximately 485 apartments, 600 sqm of retail space, amenity space and provision for up to 47 car park spaces, all with electric charging capacity. The Proposed Development also includes 496 cycle spaces.

1.2 Application Site Description and Location.

The Application Site is located within Manchester City Council's (MCC) administrative area at the approximate National Grid Reference (NGR): X 384850, Y 398440.

The Application Site is located on the corner of Great Ancoats Street (A665) and Port Street within the Piccadilly Basin Strategic Regeneration Framework (SRF) boundary, an area in the north eastern part of Manchester City Centre dedicated to potential office, retail, residential and leisure development. The Application Site is currently comprised of a surface level car park of low-quality hardstanding. There is a mixture of uses surrounding the Application Site, including high rise apartment buildings with commercial frontages and surface car parks to the west. North of the Application Site, across Great Ancoats Street is the newly regenerated area of Manchester containing a mixture of commercial and residential developments. To the east of the Application Site is Brownsfield Mill, a Grade II listed building recently refurbished to create new apartments along the Rochdale Canal. South of the Application Site are various residential developments located within the centre of the Piccadilly Basin. A visual representation of the Application Site boundary is shown in Figure 1 below.

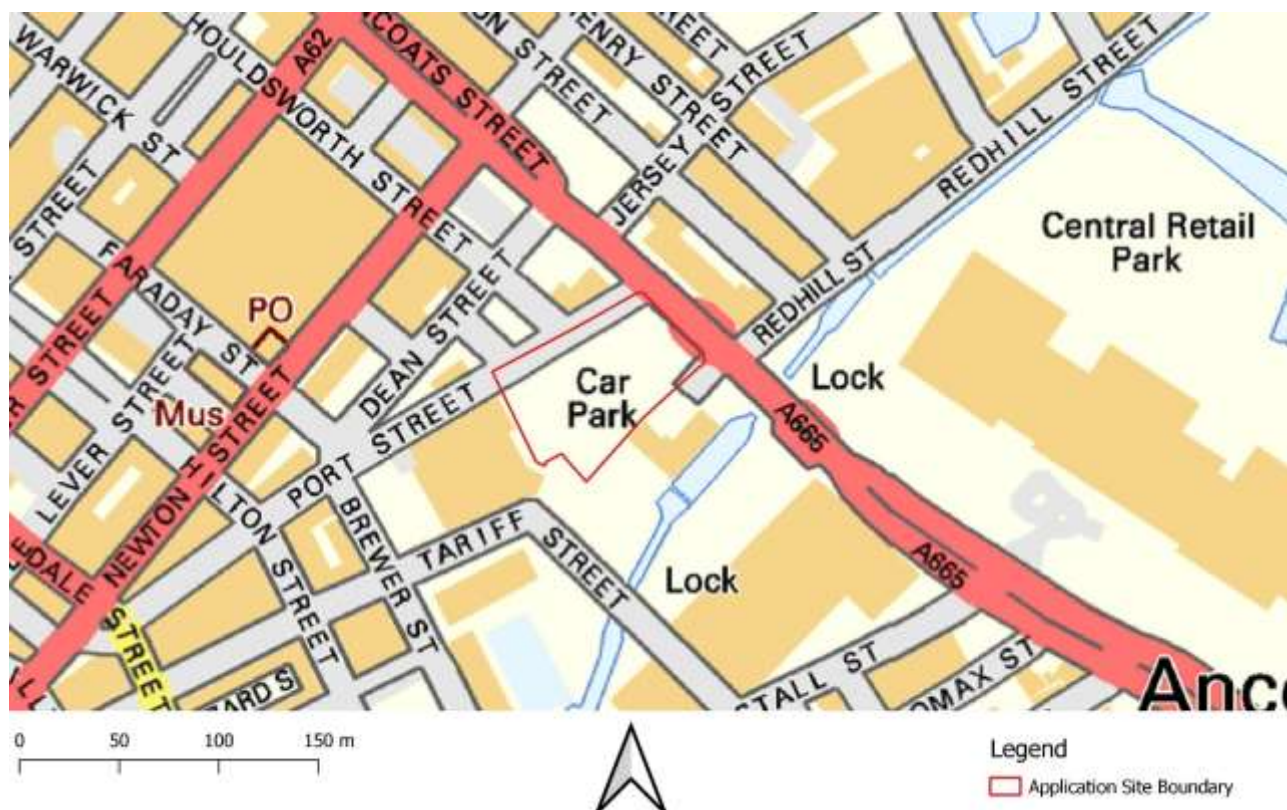


Figure 1: Application Site Boundary. Contains OS Data Crown Copyright and Database Rights 2021.

1.3 Scope of Assessment.

An email detailing the proposed methodology for the Air Quality Assessment was provided to MCC on the 18th October 2021 and a response was received from Karen Williamson in the Environmental Protection team at MCC on the 25th October 2021 who agreed the methodology. A copy of the correspondence has been included in Appendix 1.

A summary of the scope of the assessment includes:

- Determination of baseline scenario, using MCC monitoring data;
- Assessment of potential air quality impacts during the construction phase;
- Assessment of the suitability of the Application Site for the Proposed Development; and
- Identification of required mitigation measures.

2. Legislation, Policy and Guidance Documents.

2.1 Air Quality Strategy and Local Air Quality Management.

The Environment Act 1995 (Part IV)¹ requires the Secretary of State to publish an air quality strategy and local authorities to review and assess the quality of air within their boundaries. The latter has become known as Local Air Quality Management (LAQM).

The Air Quality Strategy² provides the policy framework for local air quality management and assessment in the UK. It sets out air quality standards and objectives for key air pollutants. These standards and objectives are designed to protect human health and the environment. The Strategy also sets out how the different sectors of industry, transport and local government, can contribute to achieving these air quality objectives.

Local authorities are required to identify whether the objectives have been, or will be, achieved at relevant locations. If the objectives are not achieved, the authority must declare an Air Quality Management Area (AQMA) and should prepare an Air Quality Action Plan (AQAP) within 12 months. The action plan must identify appropriate measures and policies that can be introduced to help achieve the objective(s).

The air quality objectives set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations 2000³, and the Air Quality (England) (Amendment) Regulations 2002⁴.

The objectives for nitrogen dioxide (NO₂) and fine particulate matter (PM₁₀ and PM_{2.5}) are given in Table 1. The target dates for meeting the NO₂ and PM₁₀ objectives were 2005 and 2004, respectively. It should be noted that local authorities in England have a flexible role in working towards reducing emissions and concentrations of PM_{2.5}.

Table 1: Air Quality Objectives for NO₂, PM₁₀ and PM_{2.5}

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO ₂)	1-hour Mean	200 µg/m ³ Not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m ³
Fine Particulate Matter (PM ₁₀) [†]	24-hour Mean	50 µg/m ³ Not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m ³
Fine Particulate Matter (PM _{2.5}) ^{†*}	Annual Mean	25 µg/m ³
Notes: [†] Measured gravimetrically.		

The objectives apply at locations where members of the public are likely to be regularly present and exposed over the averaging period of the objective. Examples of where the annual mean objectives should apply are provided in LAQM.TG16⁵ and include building facades of residential properties, schools, hospitals. The annual mean objectives are not relevant for the building facades of offices or other places of work where members of the public do not have regular access, nor kerbsides nor gardens.

The 24-hour objective for PM₁₀ is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels.

The 1-hour objective for NO₂ also applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations, pavements of busy shopping streets, carparks and bus stations which are not fully enclosed. The 1-hour objective does not apply at kerbside sites where the public do not have regular access.

2.2 EU Limit Values.

The European Union has also set limit values for NO₂, PM₁₀ and PM_{2.5}; these are legally binding and have been implemented into English legislation by The Air Quality Standards Regulations 2010⁶ and The Air Quality Standards (Amendment) Regulations 2016⁷.

The limit values for NO₂, PM₁₀ and PM_{2.5} are the same as the English objectives (given in Table 1), but applied from 2010 for NO₂, 2005 for PM₁₀ and 2015 for PM_{2.5}. The limit values apply at all locations (apart from where the public does not have access, where health and safety at work provisions apply and on the road carriageway).

2.3 General Nuisance Legislation.

Part III of the Environmental Protection Act (EPA) 1990 (as amended) contains the main legislation on Statutory Nuisance and allows local authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines, amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance, as a potential Statutory Nuisance.

Fractions of dust greater than 10 µm in diameter (i.e. greater than PM₁₀) typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the Air Quality Strategy. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.4 UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations.

The UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations⁸ was published in 2017. This sets out roles and responsibilities and measures for bringing NO₂ levels within the mandatory limit values in the shortest possible time. Under the UK Plan, local authorities with roadside concentrations of NO₂ forecast by the Defra as exceeding legal limits are identified; MCC has been identified as one of these local authorities and as a result a Clean Air Zone (CAZ) is planned to be implemented in May 2022.

2.5 Clean Air Strategy.

The Clean Air Strategy (CAS)⁹, published in 2019, sets out the Government's proposals aimed at delivering cleaner air in England, and also indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air to help meet EU limit values for the five most damaging air pollutants: NO_x (including NO₂), PM_{2.5}, NH₃, sulphur dioxide (SO₂), non-methane volatile organic compounds (NMVHC).

The immediate challenge is to reduce NO_x emissions due to non-compliance with the limit value for annual mean NO₂ (as given in Table 1). Targets for action include road traffic to reduce ambient NO₂ concentrations, and domestic coal and wood burning to improve ambient PM_{2.5} concentrations.

2.6 Planning Policy.

2.6.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) 2021¹⁰ sets out planning policy for England. It includes advice on when air quality should be a material consideration in development control decisions. Relevant sections are set out below:

Paragraph 55: "Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

Paragraph 104: "...c) opportunities to promote walking, cycling and public transport use are identified and pursued; d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account - including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains... ."

Paragraph 105: "Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health."

Paragraph 174: “Planning policies and decisions should contribute to and enhance the natural and local environment by: 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.”

Paragraph 185: “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.”

Paragraph 186: “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.”

Paragraph 188: “The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

The NPPF is supported by Planning Practice Guidance (PPG)¹¹.

The PPG states that:

Paragraph 001 (Reference ID: 32-001-20191101): “Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance relevant Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit or where the need for emissions reductions has been identified.”

Paragraph 002 (Reference ID: 32-002-20191101): Plans may need to consider ways in which the 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”.

Paragraph 005 (Reference ID: 32-005-20191101): “Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and / or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

The PPG also sets out the information that may be required in an air quality assessment, stating that:

Paragraph 007 (Reference ID: 32-007-20191101): “Assessments need to be proportional to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific. The scope and content of supporting information is best discussed and agreed between the local planning authority and applicant before it is commissioned”.

It also provides guidance on options for mitigating air quality impacts, and makes clear that:

Paragraph 008 (Reference ID: 32-008-20191101): “Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact.”

2.7 Local Policy.

2.7.1 Manchester City Council Core Strategy Development Plan

The Manchester Core Strategy Development Plan¹², adopted in July 2012 and covering the years 2012-2027, states in Policy EN16 that:

“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 developments the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas”

Other policies which relate to air quality include:

Policy CC 5 Transport:

“The Transport Strategy for Manchester City Centre will be delivered to ensure that transport is managed in a way which supports the projected growth of the City Centre. [...] Proposals will be supported that improve pedestrian safety, improve air quality and increase the scope of accessible public realm improvements.”

Policy EN 7 Energy Infrastructure Opportunities

“There will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations:

- *The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN16 Air Quality.”*

2.7.2 Manchester Citywide Unitary Development Policies – Environmental Improvement and Protection

The Application Site is located within Area ‘11’ of MCC’s City Centre Small Area Policies Map¹³. Within this area, Part 1 of the Extant Unitary Development Policies (UDP) – Environmental Improvement and Protection¹⁴ applies. This policy aims to encourage high-quality development within the city centre to enhance the City’s environment. Whilst this policy does not specifically mention air quality, it highlights the Council’s efforts to improve the environment through improved traffic routing schemes and increased “green” areas between city developments.

2.7.3 Local Air Quality Management in Manchester.

An AQMA was declared in Greater Manchester in 2016 for exceedances of the annual mean NO₂ AQO. The AQMA covers the 10 districts of Greater Manchester, including arterial routes, district centres, and the airport. Consequently, an Air Quality Action Plan¹⁵ was published in 2016 to set out actions and measures to bring about an improvement in air quality, to benefit the health of the population. The proposed actions cover three main themes:

- Reduce Traffic - for instance by encouraging modal shift from private vehicle use to public transport, cycling and walking.
- Increasing Efficiency - of traffic movement by reducing congestion and stop-start travel to achieve a smoother emission profile and overall lower emissions, which may be particularly significant at peak hours.
- Improve Fleet - by incentivising the replacement of older, more polluting vehicles with newer, smaller, cleaner, lower-emissions vehicles.

Alongside the Air Quality Action Plan, the Greater Manchester Low Emission Strategy¹⁶ presents a long-term approach to carbon emissions and air quality in the period up to 2040. The key aims of the strategy are to:

- Support the UK Government in meeting all EU thresholds for key pollutants at the earliest date;
- Contribute to reducing Greater Manchester's carbon footprint, in line with the Greater Manchester Climate Change Strategy; and
- Reduce air pollution as a contributor to ill-health in Greater Manchester.

A Clean Air Zone (CAZ) covering Greater Manchester, for which an outline business case¹⁷ was submitted in March 2019, will launch in May 2022 and will target the most polluting commercial vehicles including older Heavy Duty Vehicles (HDVs), buses, coaches, taxis and private hire vehicles.

Furthermore, Transport for Greater Manchester established the Greater Manchester Electric Vehicle (GMEV) Network in 2013. The network offers free electric vehicle charging for a nominal annual fee to help the mass adoption of electric vehicles across the region, playing a central role in improving air quality.

2.7.4 Transport Strategy for Manchester City Centre 2040

The Transport Strategy for Manchester City Centre¹⁸ adopted in March 2021 sets out the strategy for Manchester to create a well-connected, zero-carbon centre offering residents, workers and visitors a place to live. As part of the Transport Strategy, there is a focus on key development areas such as schemes proposed within the Piccadilly Basin SRF which aims to promote residential and commercial developments within the city alongside 'greener' means of transportation. The Proposed Development includes capacity for 496 cycle spaces and 47 car parking spaces all with electric-charging facilities.

2.8 Assessment Guidance.

The primary guidance documents consulted in undertaking this assessment are detailed below.

2.8.1 Defra Local Air Quality Management Technical Guidance

Defra Local Air Quality Management Technical Guidance (LAQM.TG(16))⁵ was published for use by local authorities in their LAQM review and assessment work. The document provides key guidance in aspects of air quality assessment, including screening, use of monitoring data, and use of background data that are applicable to all air quality assessments.

2.8.2 EPUK-IAQM 'Air Quality Guidance for Planning'

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance¹⁹ to help ensure that air quality is properly accounted for in the development control process. It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed including guidelines for assessing the significance of impacts.

2.8.3 IAQM 'Construction and Demolition Dust Guidance'

Guidance on the assessment of dust from demolition and construction has been published by the IAQM²⁰. The guidance provides a methodology to determine the dust emission magnitude and provides a series of matrices to determine the risk magnitude of potential dust sources associated with construction activities. This allows for the identification of appropriate mitigation measures that are defined within further IAQM guidance.

3. Assessment Methodology.

3.1 Consultation.

The approach to the assessment, as described in Section 1.3, was provided to MCC for review and was agreed with Karen Williams in the Environmental Protection team on the 25th October 2021.

3.2 Existing Air Quality in the Study Area.

A baseline air quality review was undertaken to determine the existing air quality in the vicinity of the Application Site. This desk-top study was undertaken using the following sources:

- Air quality data for MMC, including a review of MMC air quality reports and local monitoring data²¹;
- The UK Pollutant Release and Transfer Register²²;
- Background pollution maps taken from Defra's Local Air Quality Management (LAQM) website²³;
- Pollution Inventory from the Environment Agency²⁴
- The UK Ambient Air Quality Interactive Map²⁵;
- Ordnance Survey data and aerial photography from Google Maps.

3.3 Construction Phase Impacts.

3.3.1 Construction Dust Assessment

The assessment of construction dust impacts has been undertaken in line with the IAQM methodology. Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

The risk of dust emissions was assessed for each activity with respect to:

- Potential loss of amenity due to dust soiling; and
- The risk of health effects due to a significant increase in exposure to PM₁₀.

The first stage of the assessment involves screening to determine whether there are any sensitive receptors within the threshold distances defined by the IAQM guidance. A detailed assessment of the impact of dust from construction sites will be required where:

- A 'human receptor' is located within 350 m of the boundary of the Site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance; and/or
- An 'ecological receptor' is located within 50 m of the boundary of the Site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance.

The magnitude of dust emission for each activity is determined on the basis of the guidance, indicative thresholds, information available relating to the project and expert judgement. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area. The risk of impact is then used to determine the mitigation requirements.

Descriptors for magnitude of impact and impact significance used in this assessment of construction phase dust are given in the guidance²⁰ available online.

3.3.2 Construction Traffic

3.3.2.1 Construction Traffic Emissions Screening

A screening assessment has been undertaken with reference to the following EPUK and IAQM guidance indicative criteria:

- a change of Light Duty Vehicles (LDV) flows of more than 100 AADT (within an AQMA); and/or
- a change of Heavy Duty Vehicles (HDV) flows of more than 25 AADT (within an AQMA).

3.3.2.2 NRMM Emissions Screening

Non-Road Mobile Machinery (NRMM) refers to mobile machines, transportable industrial equipment or vehicles which are fitted with an internal combustion engine and not intended for transporting goods or passengers on roads. NRMM emissions have been screened following the guidance in Defra's LAQM.TG(16).

3.4 Operational Phase Impacts.

3.4.1 Road Traffic Impacts

The screening assessment has been undertaken with reference to the following documents:

- Defra's LAQM.TG(16); and
- EPUK and IAQM guidance indicative criteria, i.e.:
 - a change of LDV flows of more than 100 AADT (within an AQMA); and/or
 - a change of HDV flows of more than 25 AADT (within an AQMA).

Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that "the criteria provided are precautionary and should be treated as indicative", and "it may be appropriate to amend them on the basis of professional judgement".

If these criteria are not exceeded there is no need to progress to a more detailed assessment as in line with EPUK/ IAQM guidance impacts can be considered as having an insignificant effect.

3.4.2 Site Suitability Assessment

3.4.2.1 Model Methodology

A qualitative 'site suitability' assessment has been undertaken to consider the exposure of future occupants, introduced by the Proposed Development, to existing air quality. Concentrations of NO₂, PM₁₀ and PM_{2.5} have been predicted at proposed sensitive receptor locations for 2025, which is the earliest anticipated year of occupation for the Proposed Development.

Concentrations at proposed sensitive receptors have been modelled using the dispersion model ADMS Roads (version 5.0.0.1). This model has been extensively validated and is widely used by regulators, government departments, consultancies and industry. Emission factors have been used from EFT v10.1 which is embedded within the ADMS-Roads model. The NO_x to NO₂ calculator v8.1 has been used to convert the total NO_x concentrations to NO₂ concentrations. The model has been run using meteorological data from Manchester Airport in the verification year of 2019.

Emissions factors and background concentrations for 2019 have been used for this assessment as this will give a precautionary prediction of future concentrations.

Full details of air quality modelling methodology are presented in O.

The following scenarios have been modelled:

- Base year – verification (2019); and
- Do-Something (DS 2025) – future year traffic flows, including the Proposed Development.

3.4.2.2 Traffic Data

Traffic data has been provided by the project's transport consultants, Curtins. Data has been compiled from Transport for Greater Manchester (TfGM) and Department for Transport (DfT) traffic counts. Curtins advised

that there is not expected to be any traffic growth along the network in Manchester City Centre due to changes in travel patterns and increased residential capacity in the city centre, therefore it is considered that the future opening year data would be the same as the base year data (2019).

A review of traffic flows associated with Committed Development in the vicinity of the Proposed Development was undertaken by Curtins. The Store Street Redevelopment (Ref: 115545/FO/2017) was the only application to include trip distribution and has been included in the future year traffic flows (DS 2025).

3.4.2.3 Proposed Sensitive Receptors

Concentrations of the pollutants NO₂, PM₁₀ and PM_{2.5} have been predicted at seven proposed sensitive receptors located at the façades of the Proposed Development. Proposed sensitive receptors were modelled at 1.5 m (breathing height) at each storey up to the tenth floor (where possible) as this is the height at which concentrations stabilise at background levels; elevation plans were used to obtain heights.

In line with LAQM.TG(16), predicted concentrations at residential uses will be compared to annual mean AQOs, this includes all buildings from the first floor and above. At any retail uses at the ground floor or balconies the short term AQO is applicable as detailed in Section 2.

The locations of these proposed sensitive receptors are provided in Table 2 and Figure 2.

Table 2: Proposed Sensitive Receptors

Receptor ID	Description	X	Y	Heights (m)
R1	Residential unit	384899	398448	1.5 – 31.8
R2	Residential unit	384877	398472	1.5 - 26.8
R3	Residential unit	384865	398468	1.5 – 21.2
R4	Residential unit	384841	398454	1.5 – 21.2
R5	Residential unit	384828	398443	1.5 - 91.8
R6	Balcony	384895	398455	1.5 – 31.8
R7	Balcony	384867	398469	1.5 – 21.2

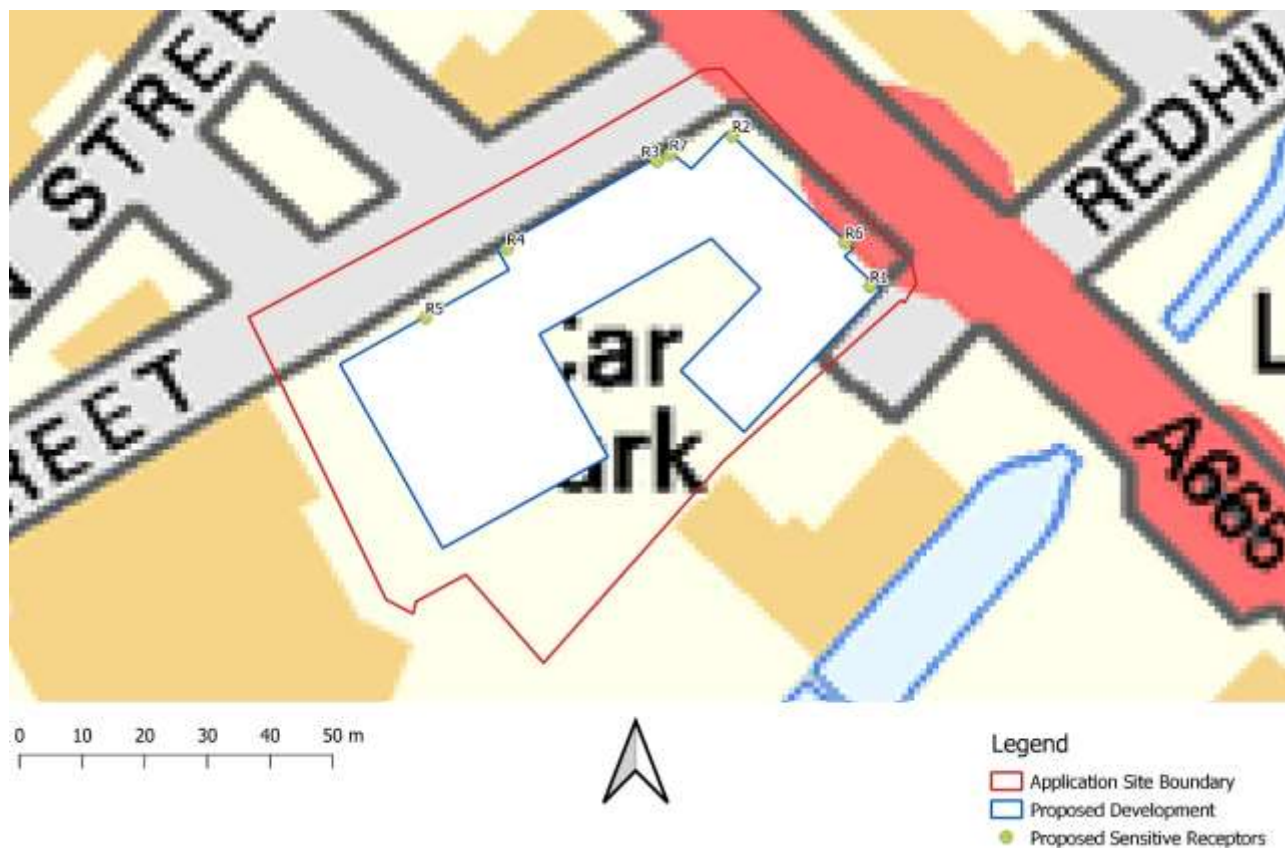


Figure 2: Proposed Sensitive Receptors. Contains OS Data Crown Copyright and Database Rights 2021.

3.5 Assessment of Significance.

3.5.1 Construction Phase Impacts

The IAQM guidance²⁰ on the assessment of dust from demolition and construction states that the primary aim of the risk assessment is to identify site specific mitigation that, once implemented, should ensure that there will be no significant effect. Therefore, the assessment has been used to determine an appropriate level of mitigation for the construction phase.

The determination of which mitigation measures are recommended include elements of professional judgement and the professional experience of the consultants preparing this report is set out in Appendix 4.

3.5.2 Operational Phase Impacts

The EPUK and IAQM guidance¹⁹ has been used to assess the potential for significant impacts as a result of vehicle emissions from traffic associated with the Proposed Development. The focus of the guidance is to assess traffic emission impacts and advises on how to describe the air quality impacts and their significance.

3.5.3 Site Suitability

To determine the significance of predicted air quality impacts based upon a site suitability assessment, the EPUK/IAQM guidance states:

“Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means.”

The determination of the significance of the effects includes elements of professional judgement and the professional experience of the consultant preparing the report is set out in O.

4. Baseline Environment.

This section sets out the available information on air quality in the vicinity of the Application Site.

4.1 Site Setting.

The Application Site is located within MCC's area of administration at approximate NGR: X 384850, Y 398440.

The Application Site currently comprises a surface level car park of low-quality hardstanding with entrances on Port Street. There is a mixture of uses surrounding the Site, including high rise apartment buildings with commercial frontages and surface car parks to the west. North of the Site, across Great Ancoats Street is the newly regenerated area of Manchester containing a mixture of commercial and residential developments. To the east of the Application Site is Brownsfield Mill, a Grade II listed building recently refurbished to create new apartments along the Rochdale Canal. South of the Application Site are various residential developments located within the centre of the Piccadilly Basin.

4.2 Local Air Quality Management Review and Assessment.

Greater Manchester Combined Authority (GMCA) have declared an AQMA for exceedances of the annual mean NO₂ AQO which covers Manchester City Centre, the area around Manchester Airport and the main arterial traffic routes into the City. The Application Site falls within this designated AQMA.

According to the latest MCC Annual Status Report (ASR)²¹, long term trends have shown that there has been improvement in air quality in Manchester, but areas still remain above the annual mean NO₂ AQO. Furthermore, in MCC's latest 2020 ASR during the onset of the COVID-19 pandemic, average pollutant concentrations during 2020 are directly attributable to reduced traffic levels as a result of Government implemented lockdowns. As such, the pollutant concentrations recorded at automatic and passive diffusion tube monitoring locations in 2020 are not considered to be representative of "normal" air quality conditions. Whilst it is expected that as a result of the COVID-19 pandemic that behaviours will change in the future, the impact of this on air quality long-term is currently unknown and therefore 2020 data has not been used to determine baseline conditions, however, has been included for information.

4.3 Local Air Quality Monitoring.

The UK Automatic Urban and Rural Network (AURN) is a countrywide network of air quality monitoring stations operated on behalf of Defra. Monitoring data for AURN sites is available from the UK Air Information Resource website (UK-AIR). There are three AURN sites in operation across Greater Manchester with the nearest located approximately 500 m west in Manchester City Centre (MAN3 – Manchester Piccadilly) in an urban centre location. The other AURN sites are located more than 5 km from the Application Site. Additionally, MCC operate several other automatic monitors, the closest of which is located approximately 1.3 km southwest on Oxford Road, a busy bus route into the City Centre. Due to distance and differences in site characteristics, only Manchester Piccadilly (MAN3) has been considered further.

Recent monitoring data for the last five years for MAN3 automatic monitoring site is presented in Table 3 and a visual representation of the location in Figure 3.

Table 3: Automatic Monitoring Results

Monitoring site and distance (m) from site boundary (approx.)	Objective	2015	2016	2017	2018	2019	2020*
NO₂							
MAN3 Manchester Piccadilly, 990 m	Annual mean (µg/m ³)	39	40	36	35	36	27
	Number of hours with concentrations >200 µg/m ³	1	0	1	0	0	0
PM₁₀							
MAN3 Manchester Piccadilly, 990 m	Annual mean (µg/m ³)	20	20	20	21	20	15
	Number of days with concentrations > 50 µg/m ³	3	3	3	2	7	1
PM_{2.5}							
MAN3 Manchester Piccadilly, 990 m	Annual mean (µg/m ³)	10	10	8	11	12	8

Note: *Included for information only; not used in assessment due to the impact of Covid-19 lockdowns.

The automatic monitoring results presented in Table 3 show compliance with the annual mean NO₂, PM₁₀ and PM_{2.5} objectives in the five-year monitoring period between 2015 and 2019. Concentrations of NO₂ remained constant between 2017 and 2019. Annual mean PM₁₀ and PM_{2.5} concentrations also remained constant during this period. The short-term AQOs for NO₂ and PM₁₀ have not been exceeded in recent years at MAN3.

Site ID	Site Type	Distance (km) from site (approx.)	Annual Mean NO ₂ Concentration (µg/m ³)					
			2015	2016	2017	2018	2019	2020
MA72NO	Urban background	1.0	50.8	40.0	34.6	33.4	32.8	24.5
MA29ANO	Roadside	1.1	59.6	<u>66.2</u>	57.7	58.8	55.4	39.0
MA82NO	Roadside	1.3	<u>64.0</u>	<u>60.2</u>	56.2	54.0	52.0	33.9
MA36NO	Roadside	1.3	46.8	40.1	34.0	33.1	31.7	24.3
MA96BNO	Roadside	1.3	-	-	-	-	46.0	36.4

Note: **Bold** denoted exceedance of annual mean AQO, whilst underline indicates likely exceedance of short term AQO.

As shown in Table 4 above, the annual mean NO₂ AQO has been exceeded at all roadside and kerbside monitoring locations in the vicinity of the Proposed Development in recent years. In addition, since 2016 there have been no exceedances of the 60 µg/m³ indicative threshold for exceedance of the 1-hour NO₂ AQO at roadside and kerbside monitoring locations.

Annual mean NO₂ concentrations recorded at urban background monitoring locations have been below the annual mean AQO since at least 2017.

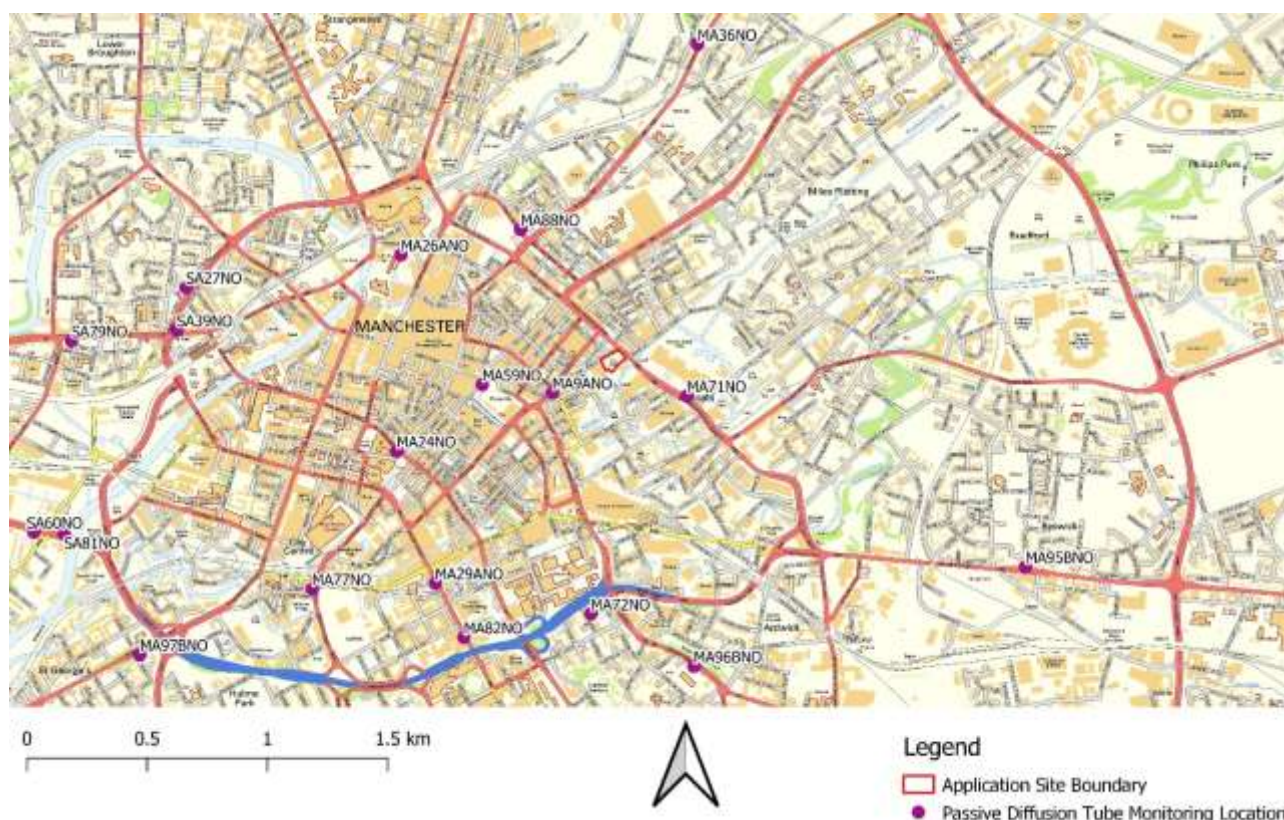


Figure 4: Passive Diffusion Tube Monitoring Locations. Contains OS Data © Crown Copyright and Database rights 2021.

4.4 Industrial Pollution.

There are industrial and commercial units within the immediate vicinity of the Application Site. A desk-based review of potential industrial sources using the UK Pollutant Release and Transfer Register and the Environment Agency's Pollution Inventory did not identify any significant industrial or waste management sources of air pollution that are likely to affect the Application Site with regard to air quality. Further to this, a review has been completed of publicly available sources such as Google Earth and Street View. No obvious signs of heavy industry such as flues and chimneys have been identified. As such, it is considered unlikely that the local air quality at the Application Site will be impacted by surrounding industrial and commercial units.

4.5 Defra Predicted Concentrations.

The background concentrations have been obtained from the national maps published by Defra²³. These estimated concentrations are produced on a 1 km by 1 km grid basis for the whole of the UK. The Application Site falls into grid square X 384500, Y 398500 and the predicted concentrations for this grid square for NO₂, PM₁₀ and PM_{2.5} are provided in Table 5 for 2019, the most recent year with available monitoring data and for 2025, the anticipated opening year for the Proposed Development.

Table 5: Defra Predicted Background Concentrations

Year	Predicted Background Concentration (µg/m ³)		
	NO ₂	PM ₁₀	PM _{2.5}
2019	29.3	13.6	8.8
2025	24.1	12.7	8.1

As shown in Table 5, background concentrations are below the relevant AQOs for all pollutants in 2025, the earliest anticipated opening year of the Proposed Development.

4.6 Summary of Background Data.

The baseline assessment has shown that the Application Site is within the MCC's city-wide AQMA.

The baseline assessment shows that the annual mean NO₂ AQO is generally exceeded at roadside and kerbside locations, whereas at urban background locations concentrations have been below the NO₂ annual mean AQO since at least 2017.

The 1-hour NO₂ objective has not been exceeded at the nearest automatic monitoring site in the five-year monitoring period (2015-2019). Concentrations at nearby passive diffusion tubes have not exceeded the annual mean concentration of 60 µg/m³ used to inform compliance with the 1-hour mean AQO since 2016.

The annual mean PM₁₀ and PM_{2.5} and the 24-hour mean PM₁₀ objectives have not been exceeded at the nearest automatic monitoring site in the five-year monitoring period.

Defra predicted background concentrations are expected to be below the annual mean objectives for all considered pollutants at the Application Site in 2025, the earliest anticipated opening year.

5. Construction Phase Assessment.

The potential for air quality impacts during the construction of the Proposed Development are assessed in this section. As part of the proposals, the current hardstanding parking area at the Application Site is to be demolished and a 33-storey block comprising 485 apartments, 600 sqm of retail space, amenity space and provision for up to 47 car park spaces is to be constructed.

5.1 Construction Phase Dust Assessment.

The risk of dust impacts is based on the potential dust emissions magnitude and the sensitivity of the area. These two factors are then combined to determine the risk of dust impacts with no mitigation applied. In the absence of any site-specific information, a higher risk category has been applied to represent a worst-case scenario.

5.1.1 Assessment Screening

There are 'human receptors' within 350 m of the Application Site, but no designated habitat sites within 50 m of the Application Site boundary or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Application Site entrance. The nearest ecological site to the Application Site is the Clayton Vale Local Nature Reserve, approximately 2.4 km to the east.

Therefore, an assessment of construction dust on ecological receptors can be screened out from this assessment but an assessment of construction dust at human receptors is required.

5.1.2 Potential Dust Emission Magnitude

The potential magnitude of dust emissions from demolition, earthworks, construction and trackout have been assessed, as identified in Table 6.

Table 6: Predicted Magnitude of Dust Emissions

Activity	Magnitude	Justification
Demolition	Small	The Application Site is currently occupied by a ground-level, hard-standing car park (approximately 4845 m ²) which is to be demolished. The car park is made up of predominantly concrete, a construction material with a potentially high dust-dispersion.
Earthworks	Medium	The Application Site is currently a hard-standing area currently used as a car park; however, the new buildings and structures require new foundations to be excavated. Total Application Site area is approximately 4845 m ² that could be subject to earthworks with a potentially dusty soil type (e.g. loamy and clayey soils).
Construction	Medium	The proposals are for a single adjoined unit of varying height up to 33 storeys. Construction materials are expected to be a mixture of low dust-producing materials such as steel frame and metal cladding as well as potentially dusty construction materials such as concrete and brickwork. Total building volume is likely to be between 25,000 – 100,000 m ³ .
Trackout	Medium	The proposals are likely to result in between 10 and 50 outward HDV movements in any one day which will be transporting potentially dusty material away from the Application Site. Due to the size and nature of the Application Site, there are unlikely to be unpaved roads greater than 100 m in length.

5.1.3 Sensitivity of the Study Area

The sensitivity of the area takes into account the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM₁₀, the local background concentration; and
- Site-specific factors, such as whether there are natural shelters, such as trees or other vegetation, to reduce the risk of wind-blown dust.

The sensitivity of the area and the factors considered are detailed in Table 7. Figure 5 shows the location of the Application Site within the wider context of Manchester and a series of distance bands used to inform the assessment as outlined in the EPUK and IAQM guidance¹⁹.

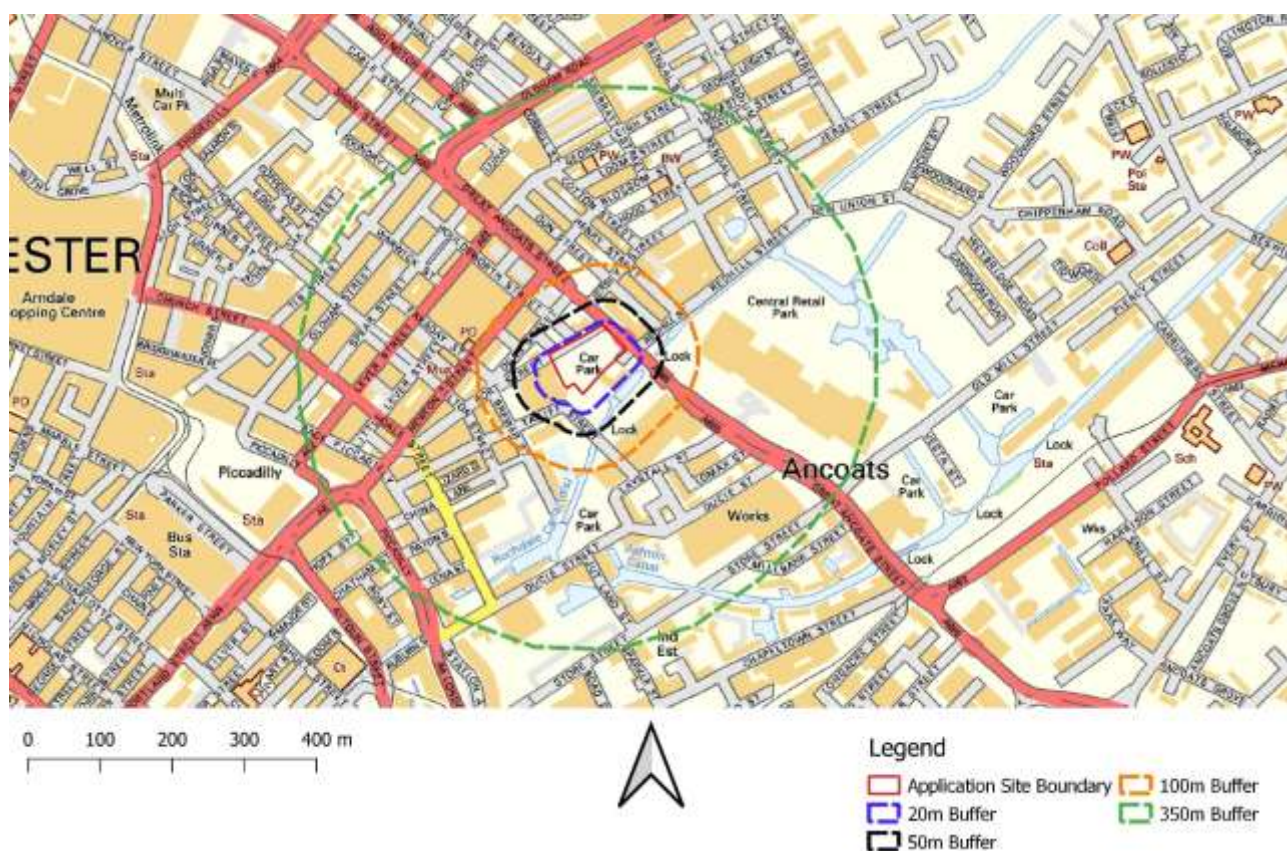


Figure 5: IAQM Demolition and Construction Distance Band Criteria from the Application Site Boundary. Contains OS Data © Crown Copyright and Database rights 2021.

Table 7: Sensitivity of the Area

Sensitivity Type	Factors	Sensitivity of Area	
		On – Site Activity	Trackout
Dust Soiling	There are estimated to be more than 100 high-sensitivity receptors within 50 m of the Application Site, namely the newly refurbished apartments at Brownsfield Mill adjacent to the Application Site and 84 Great Ancoats Street apartments to the northwest.	High	High

Sensitivity Type	Factors	Sensitivity of Area	
		On – Site Activity	Trackout
	There are estimated to be more than 100 high sensitivity receptors, such as residential apartments, with façades located within 20 m of the likely routes used by construction traffic up to 500 m from the Application Site, namely Great Ancoats Street and Oldham Road.		
Human Health	Automatic monitor MAN3, located approximately 1 km from the Application site, in an urban centre location recorded an annual mean concentration of 20 µg/m ³ in 2019. There are estimated to be more than 100 high-sensitivity receptors within 50 m of the Application Site. There are estimated to be more than 100 high sensitivity receptors, such as residential apartments, with façades located within 20 m of the likely routes used by construction traffic up to 500 m from the Application Site, namely Great Ancoats Street and Oldham Road.	Low	Low

5.1.4 Risk of Dust Impacts

The outcomes of the assessments of potential magnitude of dust emissions and the sensitivity of the area are combined to determine the risk of impact. This risk is then used to inform the selection of appropriate mitigation. Table 8 details the risk of dust impacts for demolition, earthworks, construction and trackout activities.

Table 8: Summary of Potential Unmitigated Dust Risks

Potential Impact	Sensitivity	Demolition	Earthworks	Construction	Trackout
		Magnitude			
		Small	Medium	Medium	Medium
Dust Soiling Impacts	High	Medium Risk	Medium Risk	Medium Risk	Medium Risk
Human Health Impacts	Low	Negligible	Low Risk	Low Risk	Low Risk

5.2 Construction Phase – Vehicular Pollutants.

The Application Site is located within Manchester City AQMA and therefore the lower screening criterion (i.e. 100 LDV and 25 HDV) would apply.

Information on traffic movements anticipated during construction works was unavailable for the completion of the Air Quality Assessment. However, the development quantum is not anticipated to result in a significant increase in movements above the EPUK and IAQM criterion. The duration of movements will be short-term in nature and are not considered further within the context of this assessment. Therefore, in accordance with the criterion presented within EPUK and IAQM guidance, additional road vehicle trips during the construction phase of the Proposed Development “can be considered to have insignificant effects” on air quality.

5.3 Construction Phase – Non-Road Mobile Machinery.

Exhaust emissions of NO_x and fine particulate matter (PM₁₀ and PM_{2.5}) from Non-Road Mobile Machinery (NRMM), associated with construction sites, may have a significant effect on local air quality. Typically, NRMM is and, therefore there is a potential for NRMM emissions to adversely affect local air quality as a result of the Proposed Development.

LAQM.TG(16) guidance states that, with the application of suitable control measures and site management, exhaust emissions from on-site NRMM are “unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed”.

6. Operational Phase Assessment.

The potential for air quality impacts during the operation of the Proposed Development are assessed in this section.

6.1 Road Traffic Emissions Screening Assessment.

Initial road traffic data associated with the Proposed Development has been provided by Curtins, the appointed Transport Consultants for the project. The Application Site is currently used for car parking with approximately 100 spaces however, the Proposed Development only incorporates up to 47 car parking spaces. Curtins advised that this decrease in car parking capacity is likely to result in a net decrease of 106 vehicle movements per day on the local road network.

In accordance with the EPUK/IAQM guidance, the impacts on air quality from operational phase traffic generation are considered to be not significant and no further assessment is required.

6.2 Site Suitability.

A site suitability assessment has been undertaken to determine potential personal exposure to pollutants of future residents at the Proposed Development.

The future year traffic data (2025) with baseline (2019) emissions factors and background concentrations has been used for the site suitability assessment as this will give a precautionary prediction of onsite concentrations. Predicted concentrations are compared to annual mean AQO at proposed sensitive receptors at residential uses, whereas the short term AQO is applicable at all other uses including the ground floor retail uses and balconies at the Proposed Development, in line with LAQM.TG(16).

Table 9 shows predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} to the third floor, whereas Table 15 in Appendix 3 presents predicted concentrations up to the tenth floor, where possible.

Table 9: Predicted annual mean concentrations of NO₂, PM₁₀ and PM_{2.5}

Receptor		Level Height (m)	Type	NO ₂		PM ₁₀		PM _{2.5}	
ID	Floor			Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL
R1	G	1.5	Commercial	41.9	105%	15.8	40%	10.1	40%
	1	6	Residential	35.6	89%	14.8	37%	9.5	38%
	2	9	Residential	33.1	83%	14.3	36%	9.2	37%
	3	12	Residential	31.8	79%	14.1	35%	9.1	36%
R2	G	1.5	Commercial	44.9	112%	16.3	41%	10.4	42%
	1	6	Residential	36.4	91%	14.9	37%	9.5	38%
	2	9	Residential	33.4	84%	14.3	36%	9.2	37%
	3	12	Residential	31.9	80%	14.1	35%	9.1	36%
R3	G	1.5	Commercial	38.2	95%	15.2	38%	9.7	39%
	1	6	Residential	35.0	87%	14.6	37%	9.4	38%
	2	9	Residential	33.1	83%	14.3	36%	9.2	37%
	3	12	Residential	31.8	80%	14.1	35%	9.1	36%
R4	G	1.5	Commercial	34.0	85%	14.4	36%	9.3	37%
	1	6	Residential	32.8	82%	14.2	36%	9.2	37%
	2	9	Residential	32.0	80%	14.1	35%	9.1	36%

Receptor		Level Height (m)	Type	NO ₂		PM ₁₀		PM _{2.5}	
ID	Floor			Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL
	3	12	Residential	31.4	78%	14.0	35%	9.0	36%
R5	G	1.5	Commercial	32.8	82%	14.2	36%	9.2	37%
	1	6	Residential	32.1	80%	14.1	35%	9.1	36%
	2	9	Residential	31.6	79%	14.0	35%	9.0	36%
	3	12	Residential	31.2	78%	13.9	35%	9.0	36%
R6	1	6	Balcony	36.1	90%	14.8	37%	9.5	38%
	2	9	Balcony	33.2	83%	14.3	36%	9.2	37%
	3	12	Balcony	31.8	80%	14.1	35%	9.1	36%
R7	1	6	Balcony	34.8	87%	14.6	36%	9.4	37%
	2	9	Balcony	32.8	82%	14.2	36%	9.2	37%
	3	12	Balcony	31.7	79%	14.0	35%	9.0	36%

6.2.1 NO₂ Concentrations

There are not predicted to be any exceedances of the annual mean NO₂ AQO at any proposed sensitive receptor representative of residential occupants. The maximum predicted annual mean NO₂ concentrations is at R2_1 (first floor) at 36.6 µg/m³, which equates to 91.4% of the AQO.

The maximum annual mean concentration is predicted at the ground floor at R2_G, which is intended for commercial uses. An annual mean NO₂ concentration of 45.0 µg/m³ is predicted at this proposed sensitive receptor, which is below the 60 µg/m³ concentration indicative of exceedance of the short term AQO.

6.2.2 PM₁₀ Concentrations

There are not predicted to be any exceedances of the annual mean PM₁₀ AQO, applicable at residential units only, at any proposed sensitive receptor. The maximum concentration of 14.9 µg/m³ is predicted at proposed sensitive receptor R2_1 (first floor), which equates to 37.2% of the annual mean PM₁₀ AQO.

Additionally, 24-hour mean PM₁₀ concentrations are predicted to be greater than 50 µg/m³ for a maximum of one day per year across all of the proposed sensitive receptors. Therefore, the number of exceedances is well within the 35-day compliance limit of the 24-hour mean PM₁₀ AQO.

6.2.3 PM_{2.5} Concentrations

There are not predicted to be any exceedance of the annual mean PM_{2.5} AQO at any proposed sensitive receptor at the Proposed Development. The highest predicted annual mean concentration of PM_{2.5} at any proposed sensitive receptor is at the first floor of R2 (9.5 µg/m³), which equates to 38.2% of the AQO.

6.2.4 Significance of Air Quality Impacts

To determine the significance of predicted air quality impacts based upon a site-suitability assessment, such as that undertaken as part of this assessment, the EPUK & IAQM guidance states:

“Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means.”

With regards to the Proposed Development, the unmitigated impact significance associated with the Proposed Development has been predicted in accordance with the stated assessment methodology. The following factors have been considered when providing justification:

- The Proposed Development will not introduce any new receptor into an area of exceedance of the annual or 1-hour mean NO₂ air quality objective based upon detailed dispersion modelling;
- The Proposed Development will not introduce any new receptor exposure into an area of exceedance of the annual mean PM₁₀ air quality objectives based upon detailed dispersion modelling;
- The Proposed Development will not introduce any new receptor exposure into an area of exceedance of the annual mean PM_{2.5} air quality objective based upon detailed dispersion modelling;
- A conservative approach has been taken to modelling whereby emissions factors and background concentrations were used throughout the assessment, when in reality both are expected to decrease in future years.

As no exceedances of the considered air quality objectives are predicted, mitigation measures are not required for the operational phase of the Proposed Development. As such, the overall effect is considered to be 'not significant'.

7. Mitigation.

7.1 Construction Phase.

To mitigate the potential impacts during the construction phase it is recommended that mitigation measures as detailed in the IAQM guidance are implemented. These mitigation measures have been carefully selected for the Proposed Development and are based upon the dust risk categories outlined in the guidance²⁰.

It is recommended that the MCC approve a Dust Management Plan (DMP) prior to works commencing on site, and that this is implemented using an appropriately worded planning condition. Table 10 below details the measures that should be incorporated in the DMP. For general mitigation measures, which excludes those specifically targeted towards demolition, earthworks, construction and trackout (which are given towards the end of the table), medium risk measures have been applied as these represent the highest risk category determined in Table 8. This approach is consistent with the IAQM guidance.

Table 10: Mitigation Measures

Issue	Mitigation Measure
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
	Display the head or regional office contact information.
Dust Management Plan	Develop and implement a Dust Management Plan (DMP), which may include measures to control emissions, approved by the Local Authority. The DMP may include monitoring of dust deposition, dust flux, real-time PM ₁₀ continuous monitoring and/or visual inspections.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Make the complaints log available to the 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	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 check of surfaces such as street furniture, cars, window sills within 100 m of the site boundary, with cleaning to be provided if necessary.
	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the Local Authority when asked.
	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.
	Agree dust deposition, dust flux, or real-time PM ₁₀ continuous monitoring locations with the Local Authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences.
Preparing and maintaining the site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.

Issue	Mitigation Measure
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
	Avoid site runoff of water or mud.
	Keep site fencing, barriers and scaffolding clean using wet methods.
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
Operating vehicles/machinery and sustainable travel	Ensure all vehicles switch off engines when stationary – no idling vehicles.
	Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where applicable).
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing)
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.
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.
	Minimize drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Waste management	Avoid bonfires and burning of waste materials.
Demolition	Bag and remove any biological debris before demolition.
	Ensure effective water suppression is used during demolition activities.
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
	Only remove the cover in small areas during work and not all at once.
Construction	Avoid scabbling (roughening of concrete surfaces) if possible.

Issue	Mitigation Measure
	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.
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
	For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being in continuous use.
	Avoid dry sweeping of large areas.
	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
	Record all inspections of haul routes and any subsequent action in a site log book.

Potential dust effects during the construction phase are considered to be both temporary and short-term in nature. The impacts are determined to be 'temporary' as they will only potentially occur throughout the construction phase and 'short term' because these will only arise at particular times when certain activities and meteorological conditions combine to create the predicted level. Notwithstanding this, with the application of the above dust control and mitigation measures, it is considered that residual effect at all receptors will be 'not significant' in accordance with the IAQM guidance.

7.1.1 Construction Phase Road Traffic Emissions

The need for further assessment of the potential air quality impacts associated with construction phase road traffic emissions, principally HDV movements, have been screened out as they are considered to have an insignificant effect on air quality and mitigation measures are not required.

7.1.2 Construction Phase NRMM Emissions

In accordance with Part 4 of the IAQM Control of Dust and Emissions guidance, all NRMM would need to adhere to the emissions standards for NO₂ and PM₁₀ set out for NRMM. It is therefore considered the likely effects of construction plant on local air quality would be insignificant.

7.2 Operational Phase.

7.2.1 Road Traffic Emissions

Potential air quality impacts associated with operational phase development trips have been screened out from further assessment as 'the impacts [on air quality from operational phase movements] can be considered to have insignificant effects' in accordance with the EPUK and IAQM Guidance. Therefore, mitigation measures such as sustainable travel plan are not considered to be required.

7.2.2 Site Suitability Assessment

There are not predicted to be any exceedances of the annual mean concentrations of NO₂, PM₁₀ or PM_{2.5} at any of the proposed sensitive residential receptors.

As no exceedances of any considered air quality objective are predicted, this follows the 1st hierarchy principle of the IAQM guidance to 'prevent and avoid' exposure²⁶. Therefore, no embedded mitigation into the Proposed Development design (in the form of mechanical ventilation, for example) is required and natural ventilation is possible from an air quality perspective.

8. Summary and Conclusions.

This report details the potential air quality impacts associated with the construction and operation of the proposed mixed-use residential development at Port Street, Manchester.

The findings of the assessment are as follows:

- A qualitative assessment of the potential dust impacts during the construction of the Proposed Development has been undertaken. Through good practice and implementation of appropriate mitigation measures, it is expected that the release of dust would be effectively controlled and mitigated, with resulting impacts considered to be 'not significant'. All dust impacts are considered to be temporary and short-term in nature;
- An air quality screening assessment of the air quality impacts of traffic generated by the Proposed Development has been undertaken and the effects are not predicted to be significant as a result of the expected net reduction in vehicle trips when compared to the existing use as a car park. Therefore, further assessment is not required;
- Energy provision for the Proposed Development will not involve any on-site combustion processes or release of combustion emissions during normal operation. As such, the air quality effects will not be significant, and further assessment is not required;
- A Site Suitability assessment has been undertaken using ADMS-Roads dispersion model to assess the suitability of the Application Site for the proposed uses. There are not expected to be any exceedances of the annual mean or short term NO₂, PM₁₀ or PM_{2.5} AQO.

Based on the information above, it is considered that air quality should not be viewed as a constraint to planning and the Proposed Development conforms to the principles of National Planning Policy Framework and the MCC Local Plan.

9. Glossary of Terms.

AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area
AQO	Air Quality Objective
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicles (> 3.5 tonnes gross vehicle weight)
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles ($\leq$ 3.5 tonnes gross vehicle weight)
MCC	Manchester City Council
$\mu\text{g}/\text{m}^3$	Micrograms per cubic metre
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides (taken to be $\text{NO}_2 + \text{NO}$)
NPPF	National Planning Policy Framework
NRMM	Non-Road Mobile Machinery
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM_{10}	Particulate matter with an aerodynamic diameter less than 10 micrometres
$\text{PM}_{2.5}$	Particulate matter with an aerodynamic diameter less than 2.5 micrometres
PPG	Planning Practice Guidance
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
Trackout	The process involving the transport of dust and dirt from the construction / demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction / demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site

References.

- ¹ The Stationery Office (1995) The Environment Act 1995 (Part IV), London
- ² Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – [online] (Last accessed: 17/08/2021), Available at: www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1
- ³ The Stationery Office (2000) Statutory Instrument 2000, No 928, The Air Quality (England) Regulations 2000, London
- ⁴ The Stationery Office (2002) Statutory Instrument 2002, No 3043, The Air Quality (England) (Amendment) Regulations 2002, London
- ⁵ Defra (2021) Local Air Quality Management Technical Guidance (TG16) – [online] (Last accessed: 17/08/2021), Available at: laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf
- ⁶ The Stationery Office (2010) Statutory Instrument 2010, No 1001, The Air Quality Standards Regulations 2010, London
- ⁷ The Stationery Office (2016) Statutory Instrument 2016, No 1184, The Air Quality Standards (Amendment) Regulations 2016, London
- ⁸ Defra (2017) Air Quality Plan for Nitrogen Dioxide (NO₂) in UK – [online] (Last accessed: 17/08/2021) Available at: www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017
- ⁹ Defra (2019) The Clean Air Strategy.
- ¹⁰ Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework, Department for Communities and Local Governments, London
- ¹¹ Ministry of Housing, Communities & Local Government (2019) Planning Practice Guidance, London
- ¹² Manchester City Council, Manchester's Local Development Framework (2012) Core Strategy Development Plan Document – [online]. (Last accessed: 23/08/2021). Available at: https://secure.manchester.gov.uk/downloads/download/5672/core_strategy
- ¹³ Manchester City Council – City Centre Small Area Policies Map – [online]. (Last accessed: 23/08/2021). Available at: https://secure.manchester.gov.uk/downloads/download/4975/extant_udp_policies
- ¹⁴ Manchester City Council – Extant Unitary Development Policies, Part 1 – Environmental Improvement and Protection – [online]. (Last accessed: 23/08/2021). Available at: https://secure.manchester.gov.uk/downloads/download/4975/extant_udp_policies
- ¹⁵ Greater Manchester Combined Authority, Transport for Greater Manchester (2016) Greater Manchester Air Quality Action Plan 2016-2021 – [online]. (Last accessed: 23/08/2021). Available at: https://www.manchester.gov.uk/downloads/download/4166/air_quality_reports
- ¹⁶ Greater Manchester Combined Authority, Transport for Greater Manchester (2016) Greater Manchester Low-Emission Strategy – [online] (Last accessed: 23/08/2021), Available: greatermanchester-ca.gov.uk/media/1276/low-emission-strategy-dec-2016.pdf
- ¹⁷ Transport for Greater Manchester (2019) Greater Manchester's Outline Business Case to tackle Nitrogen Dioxide Exceedances at the Roadside – [online] (Last accessed: 18/08/2021), Available: assets.ctfassets.net/qwn52pjrtij/1UTXtx1sZoj9ecwPzmKVCG/97077e8c2d4e1df2bbe0c7cd48388fbc/CAP_Exec_Summary_FINAL.pdf
- ¹⁸ Manchester City Council (2021) City Centre Transport Strategy to 2040
- ¹⁹ Environmental Protection UK and Institute of Air Quality Management (2017), Land-Use Planning & Development Control: Planning For Air Quality v1.2 – [online] (Last accessed: 18/08/2021), Available at: iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf
- ²⁰ Institute of Air Quality Management (2016) Guidance on the assessment of dust from demolition and construction v1.1 – [online], (Last accessed: 23/08/2021), Available at: iaqm.co.uk/text/guidance/construction-dust-2014.pdf
- ²¹ Greater Manchester Combined Authority (2020) 2019 Air Quality Annual Status Report (ASR) – [online]. (Last accessed: 18/08/2021) Available at: https://www.manchester.gov.uk/downloads/download/4166/air_quality_reports
- ²² Defra (2014) UK Pollutant Release and Transfer Register – [online], (Last accessed: 18/08/2021), Available at: www.gov.uk/guidance/uk-pollutant-release-and-transfer-register-prtr-data-sets
- ²³ Defra (2020) Background Pollution Maps – 2018 – [online], (Last accessed: 18/08/2021), Available at: uk-air.defra.gov.uk/data/laqm-background-maps?year=2018
- ²⁴ Environment Agency (2020) Pollution Inventory – [online], (Last accessed: 18/08/2021), Available at: data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory
- ²⁵ Defra (n.d) UK Ambient Air Quality Interactive Map – [online], (Last accessed: 18/08/2021), Available at: uk-air.defra.gov.uk/data/gis-mapping

Appendix 1 – EHO Consultation

From: Karen Williamson <karen.williamson@manchester.gov.uk>
Sent: 25 October 2021 13:28
To: Lauren Buchanan <LaurenBuchanan@hoarelea.com>
Subject: Port Street

[External email]

Lauren

The methodology for the AQ assessment is acceptable.

Kind regards

Karen Williamson BSc(Hons), Ph.D
Environmental Protection
Environmental Health
The Neighbourhoods Service
Growth & Neighbourhoods
Manchester City Council
1 Hammerstone Road
Gorton
Manchester
M18 8EQ

External: 0161 234 5004

Internal: 31374

email: karen.williamson@manchester.gov.uk

website: www.manchester.gov.uk

This email and any files transmitted with it are confidential and intended solely for the use of the individual or entity to whom they are addressed.

If you have received this email in error, please notify the system manager.

The full text of the Council's email disclaimer is available at www.manchester.gov.uk/emaildisclaimer.

Your personal data is very important to us. Please refer to our privacy notice at www.manchester.gov.uk/privacy for further information.

This footnote also confirms that this email message has been swept for the presence of computer viruses.

From: Lauren Buchanan
Sent: 18 October 2021 17:26
To: R.Twigg@manchester.gov.uk
Cc: Charlotte Smith
Subject: Air Quality Assessment consultation - Port Street, Manchester

Good Afternoon

Hoare Lea have been commissioned to undertake an Air Quality Assessment (AQA) to support the planning application for the Proposed Development within the Piccadilly Basin Strategic Regeneration Framework at the corner of Great Ancoats Street and Port Street, Manchester.



Proposals comprise demolition of existing buildings at the Application Site and construction of two adjoining buildings with approximately 460 residential units, 700 m² retail space and associated parking (30 spaces all with electric charging capability).

Hoare Lea propose to undertake the assessment using the following methodology:

- A baseline assessment will be undertaken using Manchester City Council (MCC) most recent Annual Status Report.
- DEFRA's background pollution maps will be used to establish background concentrations in the area.
- An assessment of the construction impacts on air quality and dust will be undertaken using the IAQM methodology, in compliance with 'Assessment of Dust from Demolition and Construction'.
- There is predicted to be a net reduction in traffic flows of 150 vehicles per day when compared to the existing uses at the Application Site. Therefore, it is not considered necessary to undertake a detailed assessment of road traffic impacts at existing receptors in the vicinity, with reference to EPUK/IAQM guidance 'Land use planning and development

control: Planning for air quality', and a screening assessment will be undertaken to provide evidence of the traffic figures.

- A detailed assessment using ADMS-Roads V5.0 will be undertaken to consider the suitability of the Site for its proposed use. Concentrations of NO₂, PM₁₀ and PM_{2.5} will be predicted at proposed receptor locations for 2025, the development's proposed opening year. We propose using 2019 background concentrations and emission factors as a conservative approach.
- Meteorological data for Manchester Airport (2019) will be used.
- The dispersion model will be verified against MCC diffusion tube monitored data for 2019 at locations on Great Ancoats Street, Rochdale Road and Ashton Old Road. Diffusion tube MA9ANO has been discounted due to its location within a bus stop, which cannot be accounted for in traffic data we have available.
- Energy provision for the Proposed Development will be all-electric via the use of air source heat pumps and will not involve any combustion processes or release of combustion emissions during normal operation.
- If any impacts are observed, suitable mitigation will be recommended.

I would be grateful if you could please confirm your acceptance of the proposed methodology and provide me with any comments you may have. However, if you would like to discuss further, please do not hesitate to contact me on the number below.

Kind Regards

Lauren

Lauren Buchanan
Senior Air Quality Consultant

Lauren Buchanan
Senior Air Quality Consultant

ODI +44 20 3668 7217
Tel +44 20 3668 7100
Email laurenbuchanan@hoarelealea.com



Appendix 2 – Road Traffic Model Input Data

Model Input Parameters

Table 11: Model Input Parameters Summary

Parameter	Description	Input Variable
Surface Roughness	Surface roughness of the modelling domain as a function of land use	A roughness length z_0 of 0.75m was used within the assessment area of this dispersion modelling study. This value is for 'cities' and therefore considered appropriate for the surface roughness of the dispersion modelling assessment area.
Road Source Emissions	Source of the emission factors used	EFT v.10.0.1
Emission Year	Modelling year used to factor the traffic emissions	2019 for the verification year and future years.
NO _x to NO ₂ Conversion	Conversion from NO _x concentrations to NO ₂ concentrations	NO _x to NO ₂ calculator v8.1. General inputs – 2019, All other urban UK traffic.
Road Type	Road type within the EFT emission database	England (urban)
Elevation of Road	Height of the road link above ground level	0m no elevation – roads are at ground level
Road Width	Width of the road link	Road width obtained from Google Street View
Road Speed	Road speed in km/h	Variable based on Google Street View and adjustment for road geometry in line with LAQM.TG(16).
Meteorology	Representative hourly sequential meteorological data	Manchester Airport 2019
Background	Background pollutant concentration considered during the modelling	Defra 2018 background maps 1km x 1km grid squares for the verification year (2019).
Output	Output as gridded or specified points	At specified points as detailed in Table 2.
Pollutant Output	Pollutants modelled and averaging time	NO ₂ , PM ₁₀ and PM _{2.5} annual mean,

Traffic Data

Annual Average Daily Traffic (AADT) flows were provided by Curtins, transport consultants for the Proposed Development.

Traffic speeds were estimated using national speed limits and professional experience, with junctions and roundabouts modelled at 20kph in line with LAQM.TG(16). The traffic data used in this air quality assessment are shown in Table 12.

Table 12: Summary of Traffic Data used in the Assessment.

Source	Road Name	Base 2019 Total AADT	Base 2019 HGV	DS 2025 Total AADT	DS 2025 HGV	Speed (km/h)
TfGM	Port Street	1054	11	1054	11	20 - 32
TfGM	Newton Street	3648	36	3648	36	20 - 32
TfGM	Lever Street	5287	159	5287	159	20 - 32
TfGM	Store Street	1273	13	1997	20	20 - 32
TfGM	Old Mill Street	11590	348	11630	349	20 - 32
DfT	A665 Great Ancoats Street (east of Newton Rd)	31264	938	31418	943	20 - 48
DfT	A665 Great Ancoats Street (west of Newton Rd)	43555	1365	43709	1370	20 - 48
DfT	Rochford Road	27447	913	N/a	N/a	20 - 48
DfT	Ducie St	1054	11	N/a	N/a	20 - 48
DfT	Rylance St	2408	26	N/a	N/a	20 - 48
-	Minor roads in the vicinity of the Application Site*	1054	11	1054	11	20 - 32

Note: * Curtins advised use of Port Street traffic flows were representative of other minor roads surrounding the Application Site.

Verification

The verification process seeks to minimise uncertainties associated with the air quality model by comparing the model output with locally measured concentrations. The verification methodology is described in subsequent sections.

NO₂

Most NO₂ is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NO_x = NO + NO₂). The model has been run to predict the 2019 annual mean NO_x concentrations at the monitoring site MA36NO, MA71NO and MA95NO.

MA24NO and MA88NO are located in relatively close proximity to the Application Site, however there was not sufficient traffic data available to include these monitoring locations in model verification. In addition, traffic data was available for Newton Street where diffusion tube MA9ANO is located, however this was omitted from model verification as the diffusion tube is located at the kerbside within a bus stop.

The model output of road-NO_x has been compared with the 'measured' road-NO_x, calculated from the measured annual mean NO₂ concentrations and the background concentrations using the NO_x from NO₂ calculator v8.1 published by Defra.

The slope of the best-fit line between the 'measured' road-NO_x contribution and the model derived road-NO_x contribution, forced through zero, has been used to determine a primary adjustment factor). This factor has then been applied to the modelled road-NO_x concentration for each receptor to provide adjusted modelled road-NO_x concentrations. The NO_x to NO₂ calculator has then been used to determine total NO₂ concentrations from the adjusted modelled road-NO_x concentrations and the background NO₂ concentrations.

The following adjustment factor has been applied to all modelled nitrogen dioxide data:

Primary verification factor: 2.19

The results imply that the model has under-predicted the road-NO_x contribution. This is a common experience with this and most other models.

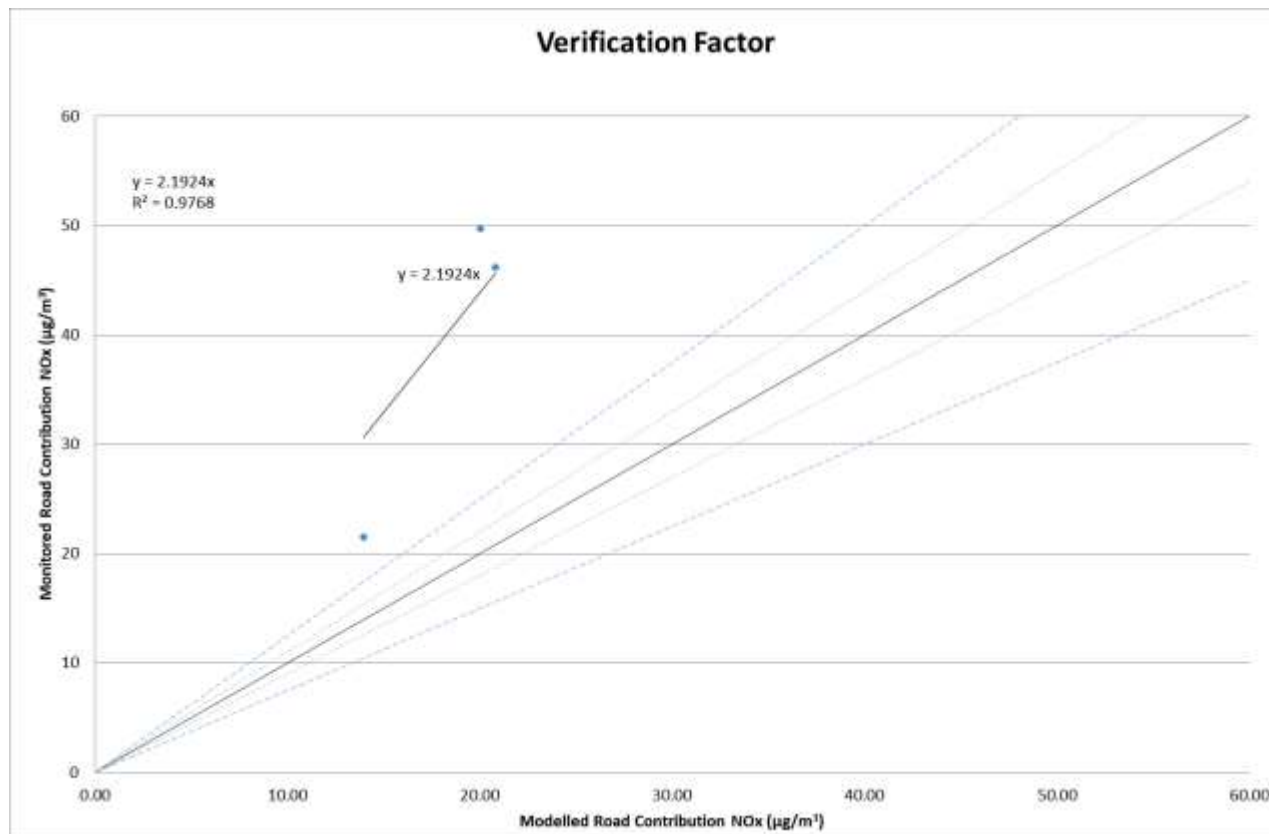


Figure 6 Comparison of Measured Road NO_x to Unadjusted Modelled Road NO_x Concentrations.

Table 13 provides the inputs for the comparison of the adjusted modelled NO₂ and monitored NO₂, which are used to calculate the adjustment factor.

Table 13: Comparison of Modelled and Monitored NO₂ Concentrations.

Monitoring Location	Modelled NO _x Road Contribution (µg/m³)	Monitored NO _x Road Contribution (µg/m³)	Adjusted Modelled NO _x Road Contribution (µg/m³)	Monitored Total NO ₂ Concentration (µg/m³)	Adjusted Modelled Total NO ₂ Concentration (µg/m³)	Difference (%)
MA36NO	14.0	21.6	30.7	31.7	36.0	13.6
MA71NO	20.8	46.2	45.7	45.3	45.1	-0.5
MA95NO	20.0	49.8	43.9	43.4	40.9	-5.9
Adjustment Factor	2.19					

Statistical Analysis of Model Performance

LAQM.TG (16) recommends three statistical procedures that should be applied to evaluate model performance and assess the overall uncertainty. These are:

- Root mean square error (RMSE) defines the average error or uncertainty of the model. Ideally a RMSE within 10% of the air quality objective which is being assessed would be derived (for the annual mean NO₂ objective the ideal RMSE would be < 4 µg/m³). Where the RMSE is greater than 25% of the objective being assessed (i.e. 10 µg/m³ for the annual mean NO₂ objective) it is advised to revisit the model parameters and verification;
- Fractional bias identifies whether the model has a tendency to under-predict (positive value) or over-predict (negative value). The ideal value is zero but may range from +2 to -2; and
- Correlation coefficient provides a measure of the linear relationship between modelled and measured data. Values range between zero (no relationship) and 1 (perfect relationship).

The values for each of these methods are provided in Table 14.

Table 14: Statistical analysis of model verification.

Method	Value
RMSE	2.885
Fractional Bias	0.127
Correlation Coefficient	0.938

PM₁₀ and PM_{2.5}

There are no PM₁₀ or PM_{2.5} monitors within the study area; therefore, the model outputs of road-PM have been adjusted by applying the primary adjustment factor calculated for road NO_x in line with LAQM.TG(16).

Appendix 3 – Model Results

This section presents the predicted air quality concentrations at proposed sensitive receptors at the Proposed Development to assess site suitability.

Table 15: Predicted Concentrations of NO₂, PM₁₀ and PM_{2.5} in 2025 at Proposed Sensitive Receptors.

Receptor		Level Height (m)	Type	NO ₂		PM ₁₀		PM _{2.5}	
ID	Floor			Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL
R1	G	1.5	Commercial	41.9	105%	15.8	40%	10.1	40%
	1	5.8	Residential	35.6	89%	14.8	37%	9.5	38%
	2	8.6	Residential	33.1	83%	14.3	36%	9.2	37%
	3	11.5	Residential	31.8	79%	14.1	35%	9.1	36%
	4	14.3	Residential	31.1	78%	13.9	35%	9.0	36%
	5	17.2	Residential	30.6	77%	13.9	35%	8.9	36%
	6	20.0	Residential	30.3	76%	13.8	34%	8.9	36%
	7	22.9	Residential	30.1	75%	13.8	34%	8.9	35%
	8	25.7	Residential	29.9	75%	13.7	34%	8.9	35%
	9	28.6	Residential	29.8	75%	13.7	34%	8.8	35%
	10	31.4	Residential	29.7	74%	13.7	34%	8.8	35%
R2	G	1.5	Commercial	44.9	112%	16.3	41%	10.4	42%
	1	5.8	Residential	36.4	91%	14.9	37%	9.5	38%
	2	8.6	Residential	33.4	84%	14.3	36%	9.2	37%
	3	11.5	Residential	31.9	80%	14.1	35%	9.1	36%
	4	14.3	Residential	31.2	78%	13.9	35%	9.0	36%
	5	17.2	Residential	30.7	77%	13.9	35%	8.9	36%
	6	20.0	Residential	30.4	76%	13.8	34%	8.9	36%
	7	22.9	Residential	30.1	75%	13.8	34%	8.9	35%
R3	G	1.5	Commercial	38.2	95%	15.2	38%	9.7	39%
	1	5.8	Residential	35.0	87%	14.6	37%	9.4	38%
	2	8.6	Residential	33.1	83%	14.3	36%	9.2	37%
	3	11.5	Residential	31.8	80%	14.1	35%	9.1	36%
	4	14.3	Residential	31.1	78%	13.9	35%	9.0	36%
	5	17.2	Residential	30.6	77%	13.8	35%	8.9	36%
	6	20.0	Residential	30.3	76%	13.8	34%	8.9	36%
	7	22.9	Residential	30.1	75%	13.7	34%	8.9	35%
	8	25.7	Residential	29.9	75%	13.7	34%	8.8	35%
	9	28.6	Residential	29.8	75%	13.7	34%	8.8	35%
	10	31.4	Residential	29.7	74%	13.7	34%	8.8	35%
R4	G	1.5	Commercial	34.0	85%	14.4	36%	9.3	37%
	1	6.3	Residential	32.8	82%	14.2	36%	9.2	37%
	2	9.2	Residential	32.0	80%	14.1	35%	9.1	36%
	3	12.0	Residential	31.4	78%	14.0	35%	9.0	36%
	4	14.9	Residential	30.9	77%	13.9	35%	9.0	36%
	5	17.7	Residential	30.5	76%	13.8	35%	8.9	36%

Receptor		Level Height (m)	Type	NO ₂		PM ₁₀		PM _{2.5}	
ID	Floor			Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL	Conc. (µg/m ³)	% of AQAL
	6	20.6	Residential	30.2	76%	13.8	34%	8.9	36%
	7	23.4	Residential	30.0	75%	13.7	34%	8.9	35%
	8	26.3	Residential	29.9	75%	13.7	34%	8.8	35%
	9	29.1	Residential	29.8	74%	13.7	34%	8.8	35%
	10	32.0	Residential	29.7	74%	13.7	34%	8.8	35%
R5	G	1.5	Amenity	32.8	82%	14.2	36%	9.2	37%
	1	6.3	Residential	32.1	80%	14.1	35%	9.1	36%
	2	9.2	Residential	31.6	79%	14.0	35%	9.0	36%
	3	12.0	Residential	31.2	78%	13.9	35%	9.0	36%
	4	14.9	Residential	30.8	77%	13.9	35%	8.9	36%
	5	17.7	Residential	30.4	76%	13.8	35%	8.9	36%
	6	20.6	Residential	30.2	75%	13.8	34%	8.9	36%
	7	23.4	Residential	30.0	75%	13.7	34%	8.9	35%
	8	26.3	Residential	29.9	75%	13.7	34%	8.8	35%
	9	29.1	Residential	29.8	74%	13.7	34%	8.8	35%
	10	32.0	Residential	29.7	74%	13.7	34%	8.8	35%
R6	1	5.8	Balcony	36.1	90%	14.8	37%	9.5	38%
	2	8.6	Balcony	33.2	83%	14.3	36%	9.2	37%
	3	11.5	Balcony	31.8	80%	14.1	35%	9.1	36%
	4	14.3	Balcony	31.1	78%	13.9	35%	9.0	36%
	5	17.2	Balcony	30.6	77%	13.9	35%	8.9	36%
	6	20.0	Balcony	30.3	76%	13.8	34%	8.9	36%
	7	22.9	Balcony	30.1	75%	13.8	34%	8.9	35%
	8	25.7	Balcony	30.0	75%	13.7	34%	8.9	35%
R7	1	6.3	Balcony	34.8	87%	14.6	36%	9.4	37%
	2	9.2	Balcony	32.8	82%	14.2	36%	9.2	37%
	3	12.0	Balcony	31.7	79%	14.0	35%	9.0	36%
	4	14.9	Balcony	31.0	78%	13.9	35%	9.0	36%
	5	17.7	Balcony	30.6	76%	13.8	35%	8.9	36%
	6	20.6	Balcony	30.3	76%	13.8	34%	8.9	36%
	7	23.4	Balcony	30.1	75%	13.7	34%	8.9	35%
	8	26.3	Balcony	29.9	75%	13.7	34%	8.8	35%
	9	29.1	Balcony	29.8	74%	13.7	34%	8.8	35%
	10	32.0	Balcony	29.7	74%	13.7	34%	8.8	35%

Appendix 4 – Professional Experience

Chris Rush (Hoare Lea), BSc (Hons), MSc, PG Dip Acoustics, CEnv, MIOA, MIEMA, MIEEnvSc, MIAQM

Chris is a Senior Associate Air Quality Consultant with Hoare Lea. He is a Chartered Environmentalist, a Member of the Institute of Acoustics, a Full Member of the Institute of Environmental Management and Assessment, a Member of the Institution of Environmental Sciences and a Full Member of the Institute of Air Quality Management (IAQM).

He has a diverse portfolio of experience and has worked on a range of projects from initial site feasibility, through planning and development to construction and operation. Chris's expertise covers planning, noise and air quality, specifically in relation to residential developments, industrial fixed installations such as waste management centres and transportation environmental impact on developments including air traffic. Chris is involved in the testing and assessment of the impact of indoor air quality and how building design contributes to this. He also is a member of Chartered Institute of Building Services Engineers (CIBSE) Air Quality Working Group and a committee member of the IAQM.

Kathryn Woolley (Hoare Lea), BSc (Hons), AMIEEnvSc, MIAQM

Kathryn is an Associate with Hoare Lea. She is an associate Member of the Institution of Environmental Sciences and a Full Member of the Institute of Air Quality Management.

She has a diverse portfolio of experience and has worked on a range of projects from initial site feasibility, through planning and development to construction and operation. Kathryn's expertise covers planning, and air quality, specifically in relation to residential developments, industrial fixed installations such as waste management centres and transportation environmental impact on developments including air traffic. Kathryn is involved in the testing and assessment of the impact of indoor air quality and how building design contributes to this.

Lauren Buchanan (Hoare Lea), MSc, BSc (Hons), AMIEEnvSc, MIAQM

Lauren is a Senior Air Quality Consultant at Hoare Lea. She is an Associate Member of the Institution of Environmental Sciences and a Member of the Institute of Air Quality Management. She has worked on a range of projects gaining experience in many different aspects of air quality assessment, including monitoring and detailed dispersion modelling of dust, odour, roads and industrial emissions for a variety of sectors and to fulfil Local Air Quality Management (LAQM) duties on behalf of Local Authorities. Lauren has undertaken air quality assessments for permit requirements and planning applications, including stand-alone reports, Environmental Impact Assessments, Habitats Regulations Assessments and Development Consent Orders.

Charlotte Smith (Hoare Lea), BSc (Hons), AMIEEnvSc, MIAQM

Charlotte is a Senior Air Quality Consultant at Hoare Lea. She is an Associate Member of the Institution of Environmental Sciences and a Member of the Institute of Air Quality Management. She has worked on a range of projects across a number of industries including residential, educational, commercial and industrial for site feasibility studies, planning applications and Environmental Impact Assessments. She also has experience in qualitative odour studies and has been successfully tested for odour acuity. She also has experience in air quality monitoring at sites ranging from residential and educational facilities to large road network schemes. Charlotte's interests lie in the effects that pollution has on human health and wellbeing.

Dr Emily Sullivan (Hoare Lea), BSc (Hons), PhD, MIEEnvSc, MIAQM

Emily is a Senior Air Quality Consultant with Hoare Lea. She is a member of the of the Institution of Environmental Sciences and the Institute of Air Quality Management.

Emily has worked on a range of projects of varying size for residential and commercial developments in urban areas across the UK. Her project work has included dispersion modelling of both road traffic and energy combustion plant emissions, air quality monitoring and emission mitigation statements. Emily has completed numerous EIA throughout the UK.

Emily has also spent time developing and improving the methodology used to calculate road traffic emissions for the London Atmospheric Emissions Inventory (LAEI), and has been involved with devising methodologies to calculate human exposure to air pollution both in terms of numbers of people exposed and 'years of life lost'.

Alex Gorringe (Hoare Lea), MEng (Hons)

Alex is an Environmental Engineer with Hoare Lea. She graduated from Cardiff University with an Integrated Masters in Environmental Geoscience and has two years' previous experience as an Environmental Scientist. Alex has worked on a range of projects amongst different specialist groups, most notably, Acoustics, and has experience writing EIAs, noise assessments and air quality assessments. Alex has also undertaken a number of noise and air quality monitoring surveys, as well as engaged in environmental monitoring of dust, noise and vibration on construction and demolition sites for a variety of large scale residential and commercial projects. Alex's interests lie in the interconnectivity of different environmental specialisms and the roles they play in large-scale development projects.



KATHRYN WOOLLEY
ASSOCIATE

+44 20 3668 7233
kathrynwoolley@hoarelea.com

HOARELEA.COM

Royal Exchange
Manchester
M2 7FL
England

