



AAIP Partnership

55 NEWTON STREET, MANCHESTER

Air Quality Assessment

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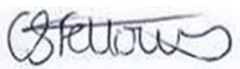
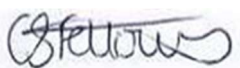
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QUALITY CONTROL

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WIND ROSE FOR MANCHESTER 2019

LIMITATIONS AND ASSUMPTIONS

1. INTRODUCTION

1.1. BACKGROUND

- 1.1.1. Haze Environmental Ltd has been commissioned by AAIP Partnership to undertake an air quality assessment in support of the planning application for the development at Newton Street, Manchester (hereafter referred to as the 'Proposed Development' or 'Application Site').
- 1.1.2. The site is located at 55 Newton Street, Manchester, M1 1ED, at approximate National Grid Reference (NGR): 384658, 398423. The site is bound by the A665 Great Ancoats Street to the north, and is surrounded by a mix of residential apartments, commercial and office units. Reference should be made to **Figure 1** for a map of the site and surrounding area.

1.2. PROPOSALS

- 1.2.1. The Proposed Development is situated in Manchester City Council's (MCC) administrative boundary and is within an Air Quality Management Area (AQMA). The proposals include the conversion of the existing 4 floor office building into a single residential town house.
- 1.2.2. Due to the size of the proposals, including no associated parking, the proposed development is unlikely to generate additional vehicle movements onto the local road network. However, as the proposed development is within an AQMA, an exposure assessment will be required to determine the suitability of the site for residential use and define any requirement for mitigation. Potential impacts (construction and operation) associated with the scheme have also been considered using the standard screening methodologies.
- 1.2.3. It is considered that the Proposed Development may have a temporary impact on local air quality during the construction phase, with a potential for nuisance through the generation of dust and particulate matter. Further to this, the proposals may introduce future occupants to existing air quality issues at the site, given the Application Site is located in an urban setting surrounded by heavily trafficked roads and its location within the city-wide AQMA. However, as the Proposed Development will be car-free once operational, impacts of additional traffic are considered to be negligible.
- 1.2.4. An Air Quality Assessment was therefore undertaken to determine baseline conditions, consider location suitability for the proposed end-use and consider potential effects because of the proposals. This report outlines the methodology adopted and presents the findings of the assessment. A glossary of terms used in this report is provided in **Appendix A**.

2. LEGISLATION, POLICY & GUIDANCE

2.1.1. A summary of the relevant air quality legislation and policy is provided below.

2.2. AIR QUALITY LEGISLATION AND POLICY

UK AIR QUALITY STRATEGY

2.2.1. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)¹ sets out the Government's policy on air quality within the UK. In addition, the AQS sets out air quality objectives and policy options to further improve air quality in the UK and provides a framework for reducing air pollution in the UK, with the aim of meeting the requirements of European Union legislation and international commitments.

2.2.2. The AQS sets standards and objectives for the following nine key air pollutants to protect health, vegetation and ecosystems:

- benzene (C₆H₆);
- 1,3 butadiene (C₄H₆);
- carbon monoxide (CO);
- lead (Pb);
- nitrogen dioxide (NO₂);
- particulate matter (PM₁₀ and PM_{2.5});
- sulphur dioxide (SO₂);
- ozone (O₃); and
- polycyclic aromatic hydrocarbons (PAHs).

2.2.3. The standards and objectives for the pollutants considered in this assessment are shown in **Table 1**.

Table 1 - Air Quality Objectives

Pollutant	Air Quality Objective	
	Concentration (µg/m ³)	Averaging Period
NO ₂	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM ₁₀	40	Annual mean

¹ Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
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- 2.2.4. The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge about the effects of each pollutant on health and the environment.
- 2.2.5. The air quality objectives are policy-based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.
- 2.2.6. For the pollutants considered in this assessment, there are both long-term (annual mean) and short-term standards. In the case of NO₂, the short-term standard is for a 1-hour averaging period, whereas for PM₁₀ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.
- 2.2.7. The AQS contains a framework for considering the effects of a finer group of particles known as 'PM_{2.5}' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM₁₀. Local Authorities are required to work towards reducing emissions/concentrations of particulate matter within their administrative area. However, there is no statutory objective given in the AQS for PM_{2.5} at this time.

AIR QUALITY REGULATIONS

- 2.2.8. Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000² and the Air Quality (England) (Amendment) Regulations 2002³ for the purpose of Local Air Quality Management (LAQM).
- 2.2.9. These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:
 "...the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present..."
- 2.2.10. The Air Quality Standards Regulations 2010⁴ transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM₁₀, PM_{2.5} and NO₂. The annual mean limit

² The Air Quality (England) Regulations 2000, UK Statutory Instruments 2000 No.928

³ The Air Quality (England) (Amendment) Regulations 2002, UK Statutory Instruments 2002 No. 3043

⁴ The Air Quality Standards Regulations 2010, UK Statutory Instruments 2010 No. 1001

values for NO₂ and PM₁₀ are the same concentration levels as the relevant AQS objectives (40 µg/m³) and the annual mean limit value for PM_{2.5} is a concentration of 25µg/m³.

CLEAN AIR STRATEGY

- 2.2.11. Defra published the Government's Clean Air Strategy in 2019⁵ setting out measures which aim to reduce emissions from all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The Strategy also proposes tough new goals to cut public exposure to airborne particulate matter, as per the recommendation made by the WHO.
- 2.2.12. Furthermore, the Strategy confirms that the Government will set new legislation to 'create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.' New enforcement powers will also be given at a national and local level, across all sectors of society.

DUST LEGISLATION

- 2.2.13. Section 79 of Part III of the Environmental Protection Act (1990)⁶ gives the following definitions of statutory nuisance relevant to dust and particles:

 'Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance', and 'Any accumulation or deposit which is prejudicial to health or a nuisance'.
- 2.2.14. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.
- 2.2.15. There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is a subjective concept, and its perception is highly dependent upon the existing conditions and the change which has occurred.
- 2.2.16. Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

⁵ Defra (2019) Clean Air Strategy 2019

⁶ Environmental Protection Act (1990) – Part III

2.3. GUIDANCE

LOCAL AIR QUALITY MANAGEMENT

- 2.3.1. Under Section 82 (Part IV) of the Environment Act 1995, Local Authorities (LAs) are required to periodically review, assess and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.
- 2.3.2. The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work⁷. This guidance, referred to in this document as LAQM.TG(16), has been used where appropriate in the assessment presented herein.

LAND-USE PLANNING & DEVELOPMENT CONTROL: PLANNING FOR AIR QUALITY

- 2.3.3. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance⁸ that offers comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and, the possible mitigation measures that may be implemented to minimise these impacts.

NATIONAL PLANNING PRACTICE GUIDANCE – AIR QUALITY

- 2.3.4. This guidance⁹ provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality, and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated. It also provides information on how air quality is taken into account by Local Authorities in both the wider planning context of Local Plans and neighbourhood planning, and in individual cases where air quality is a consideration in a planning decision. This guidance was reviewed, and the relevant guidance considered as necessary throughout the undertaking of this assessment.

2.4. RELEVANT PLANNING POLICY CONTEXT

- 2.4.1. A summary of the national and local planning policy relevant to the Proposed Development and air quality is provided below.

⁷ Defra (2018) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG(16)

⁸ Environmental Protection UK and Institute of Air Quality Management (2017) Land-Use Planning & Development Control: Planning for Air Quality.

⁹ Ministry of Housing, Communities & Local Government (March 2014). National Planning Practice Guidance

NATIONAL PLANNING POLICY FRAMEWORK

- 2.4.2. The Government's overall planning policies for England are described in the National Planning Policy Framework¹⁰. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:
- *'... meeting the needs of the present without compromising the ability of future generations to meet their own needs'*
- 2.4.3. One of the three overarching objectives of the NPPF is that planning should *'to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'*
- 2.4.4. In relation to air quality, the following paragraphs in the document are relevant:
- Paragraph 54, which states *'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 102, which relates to the need to consider transport related issues at the earliest stages of plan making and development proposals, so that *'...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 103, which states *'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 170, which states *'Planning policies and decisions should contribute to and enhance the natural and local environment by: ...e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.'*
 - Paragraph 180, which states *'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.'*
 - Paragraph 181, which states *'Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the*

¹⁰ Ministry of Housing, Communities and Local Government (February 2019). National Planning Policy Framework.

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 183, which states ‘*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.*’

2.5. LOCAL PLANNING POLICY

MANCHESTER LOCAL PLAN CORE STRATEGY

- 2.5.1. The MCC Local Development Framework¹¹ includes strategies and objectives for the City until 2027. A review of the Development Framework indicates the following policy in relation to air quality that is relevant to this assessment:

Policy EN 16: Air Quality

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

- 2.5.2. The implications of these policies were taken into consideration throughout the undertaking of the assessment.

¹¹ Manchester City Council (2012) Manchester’s Local Development Framework Core Strategy Development Plan Document

3. SCOPE & METHODOLOGY

- 3.1.1. The proposed development has the potential to cause air quality impacts during the construction and operation phases, as well as expose future occupants to elevated pollution levels. These issues have been assessed in accordance with the following methodology.

3.2. SCOPE

- 3.2.1. The scope of the assessment has been determined in the following way:
- Review of MCC's latest review and assessment reports¹² and air quality data for the area surrounding the Application Site, including data from MCC and Defra¹³; and
 - Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality, and a review of the plans for the Proposed Development to establish the location of relevant sensitive receptors.

3.3. METHODOLOGY FOR PREDICITON OF IMPACTS

CONSTRUCTION PHASE DUST EMISSION ASSESSMENT

- 3.3.1. There is the potential for fugitive dust emissions to occur because of construction phase activities. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM₁₀ during the construction phase has been undertaken using: the relevant assessment methodology published by the IAQM; the available information for this phase of the Proposed Development provided by the Client and Project Team; and professional judgement.
- 3.3.2. The IAQM assessment is undertaken where there are: 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). It is within these distances that the impacts of dust soiling and increased PM₁₀ in the ambient air will have the greatest impact on local air quality at sensitive receptors.
- 3.3.3. The Proposed Development is located within the centre of Manchester and therefore there are a number of 'human receptors' located within the distances defined above. The effects at these receptors have therefore been considered within the following assessment. It should be noted that there are no relevant ecological receptors located within the distances defined above and therefore no further consideration has been given to ecological receptors.
- 3.3.4. The assessment considers the risk of potential dust and PM₁₀ impacts from the following four sources:
- demolition;

¹² Greater Manchester Combined Authority, 2019 Air Quality Annual Status Report

¹³ Defra Local Air Quality Management (LAQM) Support Pages. Available at: <http://laqm.defra.gov.uk/> Accessed in May 2021

- earthworks;
- general construction activities; and
- trackout.

- 3.3.5. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM₁₀ levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in **Appendix B**.
- 3.3.6. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself.
- 3.3.7. As information on the number of vehicles and plant associated with each part of the construction phase is not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:
- The number and type of construction traffic and plant likely to be generated by this phase of the Proposed Development;
 - The number and proximity of sensitive receptors to the Application Site and along the likely routes to be used by construction vehicles; and
 - The likely duration of the construction phase and the nature of the construction activities undertaken.

OPERATIONAL PHASE ASSESSMENT METHODOLOGY

- 3.3.8. The development has the potential to affect existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site, as well as expose future occupants to elevated pollution levels.
- 3.3.9. Of the pollutants included in the AQS, concentrations of NO₂ and PM₁₀ have been considered in this assessment as road traffic is a major source of both pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban locations, such as the location of the Application Site.

Potential Development Impacts

- 3.3.10. The development proposals have been screened against the following Institute of Air Quality Management (IAQM) indicative criteria for requiring an Air Quality Assessment.
1. A change in Light-Duty Vehicle¹⁴ (LDV) traffic flows on local roads with relevant receptors
 - more than 100 AADT within or adjacent to an AQMA
 - more than 500 AADT elsewhere

¹⁴ Cars and small vans <3.5t gross vehicle weight

2. A change in Heavy-Duty Vehicle¹⁵ (HDV) flows on local roads with relevant receptors
 - more than 25 AADT within or adjacent to an AQMA
 - more than 100 AADT elsewhere
3. A change in the alignment of roads by 5m or more and the road is within an AQMA
4. Introduction of a new junction or remove an existing junction near to relevant receptors
 - Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station
 - Where bus flows will change by:
 - (a) more than 25 AADT within or adjacent to an AQMA
 - (b) more than 100 AADT elsewhere
6. Has an underground car park with an extraction system within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Has one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.
 - includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.

- 3.3.11. Where IAQM indicative criteria for requiring an Air Quality Assessment was met, potential impacts were defined by predicting pollutant concentrations at sensitive locations using ADMS-Roads dispersion modelling.
- 3.3.12. The criteria provided within DEFRA guidance¹⁶ on where the AQOs apply was utilised to determine appropriate receptor positions.

DISPERSION MODELLING INPUT DATA

- 3.3.13. To assess pollutant concentrations across the development site, consideration was made of the proximity of the site to major roads and background pollution concentrations. In order to predict NO₂ and PM₁₀ concentrations across the Application Site, the advanced dispersion model ADMS Roads (version 5.0.0.1) has been used. ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.
- 3.3.14. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptors locations, as determined by the user. These are detailed in the following Sections.

¹⁵ Goods vehicles + buses >3.5t gross vehicle weight

¹⁶ Defra Local Air Quality Management (LAQM)), Technical Guidance 2016 (LAQM.TG (16)), Defra, 2018.

TRAFFIC FLOW DATA

- 3.3.15. Given that the Proposed Development is expected to be car-free with no new parking provision within the Site, no Transport Assessment has been prepared in support of the application. Site specific traffic data is therefore not available for use within the assessment. Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, was obtained from the Department for Transport (DfT) Road Traffic Statistics. Road traffic open data provides street-level data for every junction-to-junction link on the motorway and 'A' road network, and for some minor roads in Great Britain. This data is considered to provide a reasonable estimate of traffic flow in the vicinity of the site.
- 3.3.16. Operation traffic data were projected using the traffic growth projection factor derived by the Department for Transport (DfT)'S TEMPro model (version 7.2c). This software package has been developed by the DfT to calculate future traffic growth within the UK.
- 3.3.17. A summary of traffic data is provided in **Appendix D**. Road widths were estimated from aerial photography and UK highway design standards.

EMISSION FACTORS

- 3.3.18. The vehicle emission factors adopted for use in the assessment have been obtained using the Emission Factor Toolkit (EFT) version 10.1. This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information. Emission factors are available for all years between 2018 and 2030 and take into account the most recent evidence relating to factors such as advances in vehicle and exhaust technology and changes in composition of the vehicle fleet; the emission factors consequently reduce over time.

METEOROLOGICAL DATA

- 3.3.19. Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at Manchester Airport. This station is located approximately 14.5km south of the Application Site and is considered to provide representative data for the assessment. The meteorological data used for this assessment was from 2019.
- 3.3.20. Reference should be made to **Appendix C** for a wind rose of utilised meteorological data.

ROUGHNESS LENGTH

- 3.3.21. The z_0 is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1.0m was used to describe the modelling extents. This value of z_0 is considered right for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'Cities and Woodlands'.
- 3.3.22. A z_0 of 0.5m was used to describe the meteorological site. This value of z_0 is considered right for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parkland and open suburbia'.

MONIN-ObukHOV LENGTH

- 3.3.23. The Monin-Obukhov length supplies a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents. This value is considered right for the

nature of both areas and is suggested within ADMS-Roads as being suitable for the nature of both areas and is suggested within ADMS-Roads as being suitable for 'Cities and Large Towns'.

BACKGROUND CONCENTRATIONS

- 3.3.24. Annual mean NO₂ and PM₁₀ background concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the development site, as shown in **Table 3**. These maps provide estimated background concentrations for the whole of the UK at a grid resolution of 1km x1km, for all years between 2018 and 2030.

NO_x TO NO₂ CONVERSION

- 3.3.25. Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance¹⁷.

MODEL VERIFICATION AND PROCESSING OF RESULTS

- 3.3.26. The ADMS Roads advanced dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Proposed Development. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results and was carried out following the methodology specified in LAQM.TG(16).
- 3.3.27. Further details of the verification calculations are presented in Appendix D. A factor of 2.254 was obtained during the verification process; this indicates that the model is under-predicting pollutant concentrations. This factor has therefore been applied to the modelled road-NO_x component for each receptor; prior to conversion to annual mean NO₂ concentrations utilising the NO_x from NO₂ calculator (version 8.1, released August 2020) provided by DEFRA.
- 3.3.28. Once processed, the predicted concentrations were compared against the current statutory limit values and objectives for NO₂ and PM₁₀. LAQM.TG(16) advises that an exceedance of the 1 hour mean NO₂ objective is unlikely to occur where the annual mean concentration is below 60µg/m³, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.
- 3.3.29. As local roadside monitoring data are not available for PM₁₀, the modelled road-PM₁₀ component has been adjusted using the factor calculated for road-NO_x, before adding to the appropriate background concentration. The number of days with PM₁₀ concentrations greater than 50µg/m³ was then estimated using the relationship with the annual mean concentration described in LAQM.TG(16).

¹⁷ DEFRA, Technical Guidance 2016 (LAQM.TG (16)), DEFRA, 2018.

3.4. ASSESSMENT CRITERIA

CONSTRUCTION PHASE

- 3.4.1. The IAQM assessment methodology recommends that significance is only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.
- 3.4.2. The significance of effects of exhaust emissions (NO₂ and PM₁₀) arising from construction vehicles and on-site plant during the construction phase of the Proposed Development have been evaluated qualitatively using professional judgement and the principles of the EPUK significance criteria described below for operational phase impacts.

OPERATIONAL PHASE

- 3.4.3. The EPUK/IAQM air quality planning document provides guidance on how to assess the effect of additional emissions from development generated traffic on local air quality. Where detailed assessment/modelling is undertaken, the guidance provides a method for describing impacts at individual receptors. Notably, the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level; this change is then examined in the context of the new total concentration and its relationship with the assessment criterion¹⁸. However, the guidance states that this merely represents a starting point, and that the overall significance of effects should be determined using professional judgement and taking into account a range of additional factors including:
- The existing air quality;
 - The future air quality in the absence of the development;
 - The extent of current and future population exposure to impacts; and
 - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.
- 3.4.4. This general approach can also be adopted where modelling is not undertaken. The guidance goes on to state that the judgement of significance will relate to the consequence of the impact. Areas where the air quality is likely to be close to or in exceedance of an air quality objective will be considered of greater sensitivity and therefore the significance of any subsequent impact will also be greater.
- 3.4.5. The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the severity of impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO₂ concentrations or daily mean PM₁₀ concentrations. The significance of effects of hourly mean NO₂ and daily mean PM₁₀ concentrations arising from the operational phase have therefore been determined qualitatively using professional judgement and the principles described above.

¹⁸ See Table 6.3 of the EPUK/IAQM Guidance

4. BASELINE CONDITIONS

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

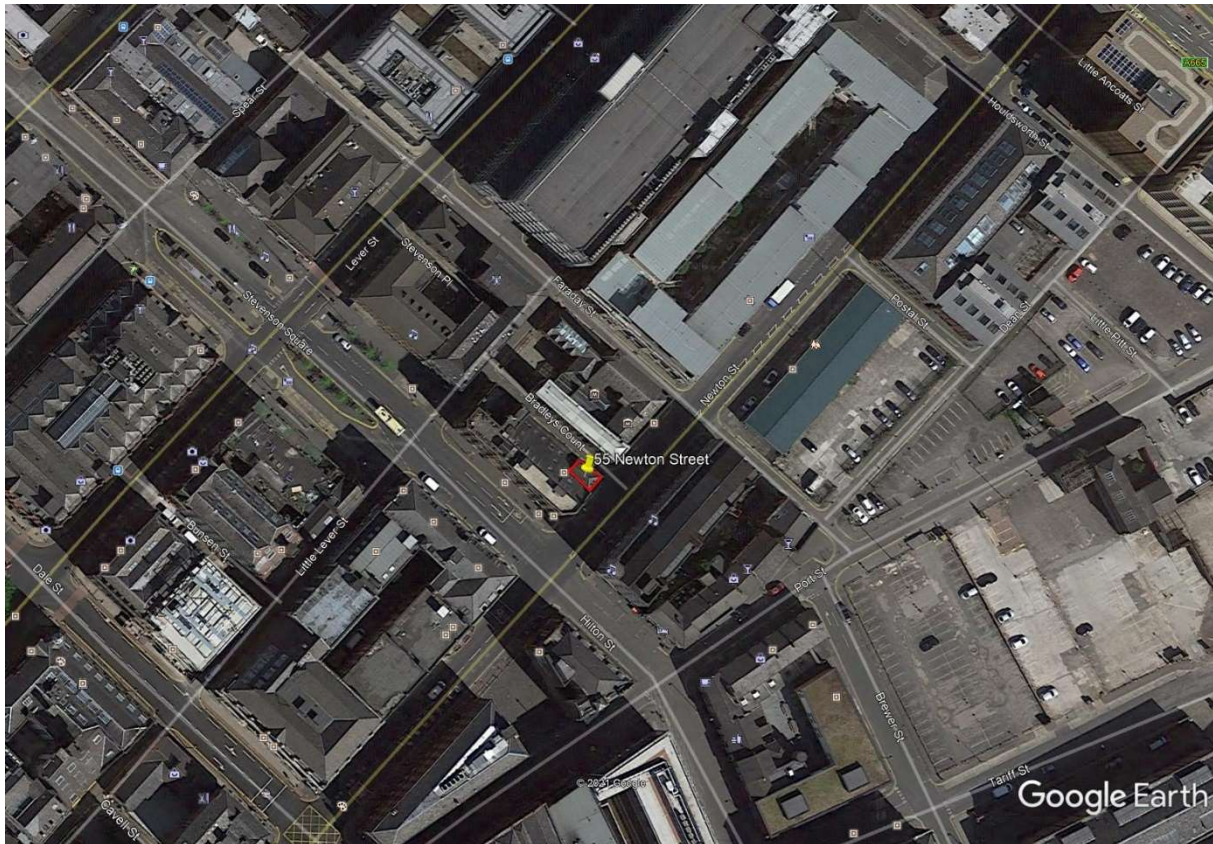
4.2. MCC'S REVIEW & ASSESSMENT OF AIR QUALITY

- 4.2.1. The Greater Manchester Combined Authority (GMCA) has declared an area wide AQMA which covers the 10 districts of Greater Manchester, including Manchester City Council, as a consequence of their Review and Assessment work. The AQMA has been designated due to exceedances of the AQS objectives for NO₂ annual mean concentrations.
- 4.2.2. GMCA published its Air Quality Action Plan 2016-2021 (AQAP) which presents several measures to reduce concentrations of annual mean NO₂ within the administrative area, with the primary objectives of the Plan to improve air quality across Greater Manchester.
- 4.2.3. As required by the Environment Act (1995), MCC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO₂ are above AQOs within the council's administrative extents. The proposed development is located within the AQMA; therefore, there is the potential for the site to be affected by elevated pollutant concentrations and any emissions from the proposals to impact on this sensitive area. These issues have been considered throughout the assessment.
- 4.2.4. MCC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMA's have been designated.

4.3. LOCAL EMISSION SOURCES

- 4.3.1. The Application Site is located in an area where air quality is mainly influenced by emissions from road transport. There are a number of key roads in the vicinity of the Site which will influence concentrations within the Proposed Development, notably the A665 Great Ancoats Street, which runs to the north of the Application Site.
- 4.3.2. There are no industrial pollution sources in the immediate vicinity of the site that will influence the air quality within the Site that requires specific consideration within the assessment.
- 4.3.3. The red line boundary of the site is shown in
- 4.3.4. **Figure 1** below.

Figure 1 – Site Red Line Boundary



4.4. LOCAL AUTHORITY AIR QUALITY MONITORING

- 4.4.1. Monitoring of pollutant concentrations is undertaken by MCC throughout their area of jurisdiction. Annual mean NO₂ results recorded in the vicinity of the development taken from readily available information online are shown in **Table 2**. Exceedances of the relevant AQOs are shown in **bold**.

Table 2 – Monitoring Results – Annual Mean NO₂

Monitoring Site	Distance to Site (m)	Monitor Type	Monitored NO ₂ Concentration (µg/m ³)		
			2017	2018	2019
MAN 9AB	128	Diffusion Tube	51.1	45.8	44.9
MAN 71	511	Diffusion Tube	50.4	46.1	45.3

- 4.4.2. As shown in **Table 2**, the closest monitoring sites to the development, located roadside at Newton Road (MAN 9AB) and A665 Great Ancoats Street (MAN 71) have been exceeding the AQS objective for annual mean NO₂ in recent years, however, have shown decreasing concentrations since 2017.

4.5. BACKGROUND AIR QUALITY DATA

- 4.5.1. Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR: 384500, 398500. Data for this location was downloaded from the DEFRA website for the purpose of this assessment and is summarised in **Table 3**.

Table 3 – Background Concentrations ($\mu\text{g}/\text{m}^3$)

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	2019	2022
NO₂	29.3	26.3
PM₁₀	13.6	13.0
PM_{2.5}	8.8	8.4

- 4.5.2. As shown in **Table 3**, predicted background concentrations are below the relevant AQOs at the development site.

4.6. SENSITIVE RECEPTORS

- 4.6.1. A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for dust and road vehicle exhaust emission impacts in the following Sections.

5. ASSESSMENT OF IMPACTS

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

5.2. CONSTRUCTION PHASE ASSESSMENT

DUST AND PM₁₀ ARISING FROM ON-SITE ACTIVITIES

- 5.2.1. Construction activities that have the potential to generate and/or re-suspend dust and PM₁₀ include:
- Site clearance and preparation including potential demolition activities;
 - Preparation of temporary access/egress to the Application Site and haulage routes;
 - Materials handling, storage, spillage and disposal;
 - Movement of vehicles and construction traffic within the Application Site;
 - Use of crushing and screening equipment/plant;
 - Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
 - Construction alongside fabrication processes; and
 - Internal and external finishing and refurbishment.
- 5.2.2. The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

- 5.2.3. The IAQM assessment methodology¹⁹ has been used to determine the potential dust emission magnitude for the following four different dust and PM₁₀ sources: demolition; earthworks; construction; and trackout. The findings of the assessment are presented below.

Demolition

- 5.2.4. The total volume of building to be demolished on site is assumed to be minimal (substantially less than 20,000m³) and construction material to be used is expected to have a low potential for dust release (e.g. metal cladding or timber). Therefore, the potential dust emission magnitude is considered to be **small** for demolition activities.

Earthworks

- 5.2.5. There are no earth work activities expected to take place at the Proposed Development.

¹⁹ Institute of Air Quality Management (2016). Guidance on the assessment of dust from demolition and construction.

Construction

- 5.2.6. The total volume of building to be constructed on the Application Site will be substantially less than 25,000m³ with material with a low potential for dust release being used. Therefore, the potential dust emission magnitude is considered to be **small** for construction activities.

Trackout

- 5.2.7. Information on the number of HDV associated with this phase of the Proposed Development is not available and therefore professional judgement has been used. It has been assumed that given the size of the development there are likely to be less than 10 HDV outward movements in any one day. Therefore, the potential dust emission magnitude is considered to be **small** for construction activities.
- 5.2.8. A summary of the potential dust emission magnitude determined for each construction activity is presented in **Table 4**.

Table 4 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	n/a
Construction Activities	Small
Trackout	Small

ASSESSMENT OF SENSITIVITY OF THE STUDY AREA

- 5.2.9. The prevailing wind direction is from the south and southwest. Therefore, receptors located to the north and north-east of the Proposed Development are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase. The land to the north and north-east of the Proposed Development is occupied by residential (apartments) and commercial properties.
- 5.2.10. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The closest highly sensitive receptors to the Proposed Development are the apartment buildings located adjacent to 55 Newton Street. These receptors are situated within 20m of the site boundary.
- 5.2.11. Taking the above into account and following the IAQM assessment methodology¹⁹, the sensitivity of the area to changes in dust and PM₁₀ has been derived for each of the construction activities considered. The results are shown in **Table 5**.

Table 5 - Sensitivity of the Study Area

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

Risk of Impacts

- 5.2.12. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. **Table 6** below provides a summary of the risk of dust impacts for the Proposed Development.
- 5.2.13. The risk category identified for each construction activity has been used to determine the level of mitigation required.
- 5.2.14. Overall, there is a **medium** to **low risk** of dust impacts relating to the expected construction phase activities, prior to mitigation being applied.

Table 6 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition (small)	Earthworks (n/a)	Construction (small)	Trackout (small)
Dust Soiling (high)	Medium Risk	n/a	Low Risk	Low Risk
Human Health (low)	Negligible	n/a	Negligible	Negligible

CONSTRUCTION VEHICLES & PLANT

- 5.2.15. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the site via Newton Street. Due to the size of the Proposed Development and nature of construction works; construction traffic volumes will be low within the context of existing traffic flows on this road.
- 5.2.16. Existing background levels of relevant pollutants (NO₂, PM₁₀ and PM_{2.5}, see **Section 4.5**) are predicted to be well under the respective annual mean Objectives.
- 5.2.17. Therefore, based on the available information and professional judgement, the local air quality impact associated with emissions from construction vehicles and plant are expected to be **negligible**.

5.3. OPERATION PHASE ASSESSMENT

IMPACTS OF OPERATIONAL PHASE TRAFFIC EMISSIONS ON LOCAL AIR QUALITY

- 5.3.1. The development proposals have been screened against the following IAQM indicative criteria for requiring an Air Quality Assessment. In accordance with the IAQM criteria, the development has less than 10 residential units, and there should be no requirement to carry out an Air Quality Assessment for the impact of the proposed development on the local area, and the impacts is considered to have insignificant effects. It is considered unlikely that the development will generate significant traffic.
1. Light-Duty Vehicle traffic flows on local roads with relevant receptors are likely to be less than 100 AADT within or adjacent to an AQMA
 2. Heavy-Duty Vehicle flows on local roads with relevant receptors are likely to be less than 25 AADT within or adjacent to an AQMA

3. There is no proposal to change in the alignment of roads by 5m or more, and the road is within an AQMA
4. There is no proposal to introduce a new junction or remove an existing junction near to relevant receptors or introduce or change a bus station
5. There is no proposal to have an underground car park or one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.

5.3.2. In accordance with the IAQM indicative criteria an air quality assessment of operation phase road traffic emissions is not required, and impacts are considered **not significant**.

EXPOSURE OF FUTURE RESIDENTS TO POOR AIR QUALITY

5.3.3. Development of the Site for residential use will introduce new sensitive receptors into the local area. As noted in the baseline section, the Site lies within an existing AQMA, therefore air quality concentrations may be above the air quality objectives due to the location of the Site.

5.3.4. Following the guidance provided within the DMRB²⁰ locations sensitive to road traffic emissions within 200m of the highway network are likely to be within the limits of pollutant dispersion from road sources.

5.3.5. The annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at the façade of the development were calculated using dispersion modelling for an opening year of 2022. Predicted annual mean NO₂, PM₁₀ and PM_{2.5} concentrations at receptors are shown in **Table 7**,

5.3.6. **Table 8 and Table 9.**

Table 7 – Annual Mean NO₂ Concentrations at Discrete Receptor Locations

Receptors	Predicted Annual Mean NO ₂ Concentration (µg/m ³)	% of AQS Objective
R1 Ground Floor (Front)	36.9	92
R2 First Floor (Front)	31.6	79
R3 Second Floor (Front)	28.7	72
R4 Ground Floor (Rear)	32.4	81
R5 First Floor (Rear)	30.6	77
R6 Second Floor (Rear)	28.9	72

²⁰ DMRB Volume 11, Section 3, Part 1, LA 105, Highways England, 2019.

Table 8 - Annual Mean PM₁₀ Concentrations at Discrete Receptor Locations

Receptors	Predicted Annual Mean PM ₁₀ Concentration (µg/m ³) (Days Exceedance)	% of AQS Objective
R1 Ground Floor (Front)	15.4 (0)	39
R2 First Floor (Front)	14.2 (0)	36
R3 Second Floor (Front)	13.6 (0)	34
R4 Ground Floor (Rear)	14.4 (0)	36
R5 First Floor (Rear)	14.0 (0)	35
R6 Second Floor (Rear)	13.6 (0)	34

Table 9 - Annual Mean PM_{2.5} Concentrations at Discrete Receptor Locations

Receptors	Predicted Annual Mean PM _{2.5} Concentration (µg/m ³)	% of AQS Objective
R1 Ground Floor (Front)	9.8	39
R2 First Floor (Front)	9.1	36
R3 Second Floor (Front)	8.7	35
R4 Ground Floor (Rear)	9.2	37
R5 First Floor (Rear)	8.9	36
R6 Second Floor (Rear)	8.7	35

- 5.3.7. Based on the assessment results, future occupant exposure to exceedances of the annual mean NO₂ and PM₁₀ objective is unlikely at all floor levels. All results are not anticipated to exceed the AQS objective for annual mean NO₂ and PM₁₀. In addition, predicted concentrations of PM_{2.5} are also unlikely to exceed the indicative 25µg/m³ threshold.
- 5.3.8. The annual mean NO₂ concentrations predicted by the model were all well below 60µg/m³, and therefore exceedances of the hourly mean NO₂ concentration objective are unlikely to occur within the Proposed Development.
- 5.3.9. The objective for 24 hourly mean PM₁₀ concentrations is 50µg/m³ to be exceeded no more than 35 times a year. The results of the dispersion modelling indicate that this objective will be met at all receptor locations considered within the Proposed Development Site as there are no predicted days exceedance.

6. MITIGATION & RESIDUAL EFFECTS

6.1. CONSTRUCTION PHASE

MITIGATION AND RESIDUAL EFFECTS

- 6.1.1. Based on the construction phase air quality assessment results, there is a **medium to low risk** of dust impacts occurring at identified sensitive receptors throughout the construction phase. Appropriate mitigation is required to further prevent or minimise the release of dust entering the atmosphere and/or being deposited on nearby receptors. Particular attention should be paid to operations that unavoidably take place in the immediate vicinity of sensitive receptors.
- 6.1.2. The IAQM's guidance¹⁹ provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in **Table 10**.
- 6.1.3. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

Table 10 – IAQM Potential Mitigation Measures

Issue / Control Measure	Site Risk		
	Low	Medium	High
General			
Display the head or regional office contact information	Committed		
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM ₁₀ continuous monitoring and/or visual inspections.	As required	Recommended	
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.	Committed		

Make the complaints log available to the local authority when asked	Committed	
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.	Committed	
Monitoring		
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	Committed	
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.	Committed	
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period	As required	Recommended
Avoid site runoff of water or mud.	Committed	
Keep site fencing, barriers and scaffolding clean using wet methods.	As required	Recommended
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 on-site cover as described below	As required	Recommended
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all vehicles switch off engines when stationary - no idling vehicles.	Committed	
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable	Committed	
Operations		
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or	Committed	

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	Committed	
Use enclosed chutes and conveyors and covered skips.	Committed	
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Committed	
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.	As required	Recommended
Waste Management		
Avoid bonfires and burning of waste materials	Committed	
Measures Specific to Demolition		
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	As required	Recommended
Bag and remove any biological debris or damp down such material before demolition.	Committed	
Measures Specific to Construction		
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	-	Recommended

- 6.1.4. The residual effects of dust and PM₁₀ generated by construction activities following the application of the appropriate site mitigation measures described above, combined with good site practice, are expected to be **not significant**.
- 6.1.5. The residual effects of emissions to air from construction vehicles and plant on local air quality is expected to be **not significant**.

6.2. OPERATIONAL PHASE

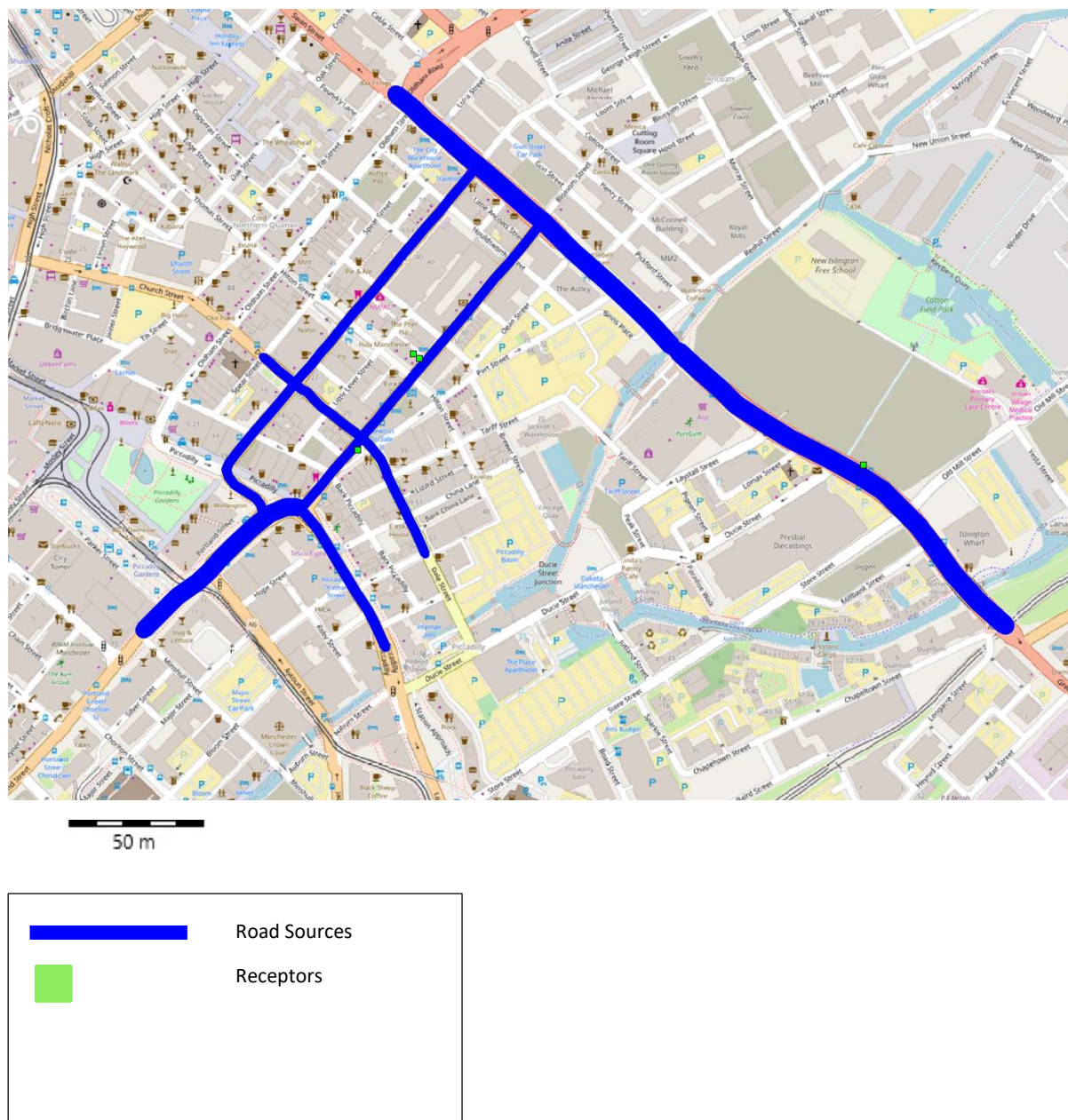
MITIGATION AND RESIDUAL EFFECTS

- 6.2.1. The assessment has shown that air quality for future residents will be acceptable across the Proposed Development site; no specific mitigation measures are therefore deemed necessary for future residents. Therefore, the effect of the Proposed Development on local air quality is expected to be **not significant**.

7. CONCLUSIONS

- 7.1.1. The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation, as well as expose future occupants to any existing air quality issues. As such, an air quality assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.
- 7.1.2. This report presents the outcomes of an air quality impact assessment for the proposed residential development off Newton Road, Manchester. The assessment has considered potential local air quality impacts associated with both the construction phase and operational phase of the Proposed Development.
- 7.1.3. During the construction phase of the development there is the potential for air quality impacts because of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by demolition, earthworks, construction and trackout activities was predicted to be **not significant**.
- 7.1.4. The proposed development is anticipated be a small-scale development and the trip generations are considered to be minimal. In accordance with the IAQM indicative criteria an air quality assessment of operation phase road traffic emissions is not required, and impacts are considered **not significant**.
- 7.1.5. The proposed development has the potential to expose future users to elevated pollution levels in the vicinity of the site during operation. Dispersion modelling was therefore undertaken using ADMS-Roads to predict pollutant concentrations because of emissions from the local highway network. Results were then verified using local monitoring data. Model results indicates that future users are unlikely to be exposed to pollutant concentrations (NO₂ and PM₁₀) that exceed air quality objectives. As such the site would not require any additional mitigation measures.
- 7.1.6. Based on the assessment results, air quality factors are not considered to be a constraint to planning consent for the development.

Figure 2 – Modelled Network and Receptors



Appendix A

GLOSSARY



Term	Definition
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
Conservative	Tending to over-predict the impact rather than under-predict.
Defra	Department for Environment, Food and Rural Affairs.
Dust	Dust comprises particles typically in the size range 1-75 micrometres (μm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
LAQM	Local Air Quality Management.
Minor roads	Non-A roads of Motorways.
NO₂	Nitrogen dioxide.
NO_x	Nitrogen oxides.
PM₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PM_{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
Trackout	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.
$\mu\text{g}/\text{m}^3$ microgrammes per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu\text{g}/\text{m}^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Appendix B

IAQM CONSTRUCTION ASSESSMENT METHODOLOGY



STEP 1 – SCREENING THE NEED FOR A DETAILED ASSESSMENT

An assessment will normally be required where there are:

- ‘Human receptors’ within 350m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- ‘Ecological receptors’ within 50m of the site boundary; or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is “negligible”.

STEP 2A – DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment.

Table 2A: Examples of Human Receptor Sensitivity to Construction Phase Impacts

Dust Emission Magnitude	Activity
Large	Demolition >50,000m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m ² site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m ³ building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads
Medium	Demolition 20,000 - 50,000m ³ building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m ² site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m ³ building volume, dusty material e.g. concrete, on site concrete batching

	Trackout 10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads
Small	Demolition <20,000m ³ building demolished, non-dusty material (e.g. metal cladding), <10m above ground level, work during wetter months
	Earthworks <2,500m ² site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m ³ , non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

STEP 2B – DEFINE THE SENSITIVITY OF THE AREA

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table 2Ba: Sensitivity of the Area to Dust Soiling Effects

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 2Bb: Sensitivity of the Area to Human Health Impacts

			Distance from the Source (m)
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Receptor Sensitivity	Annual Mean PM ₁₀ Concentration (µg/m ³)	Number of Receptors	<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table 2Bc: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Sources (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

STEP 2C – DEFINE THE RISK OF IMPACTS

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is ‘negligible’ no mitigation measures beyond those required by legislation will be required.

Table 2C: Risk of Dust Impacts

Sensitivity of surrounding area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks and Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

STEP 3 –SITE SPECIFIC MITIGATION

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high-risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

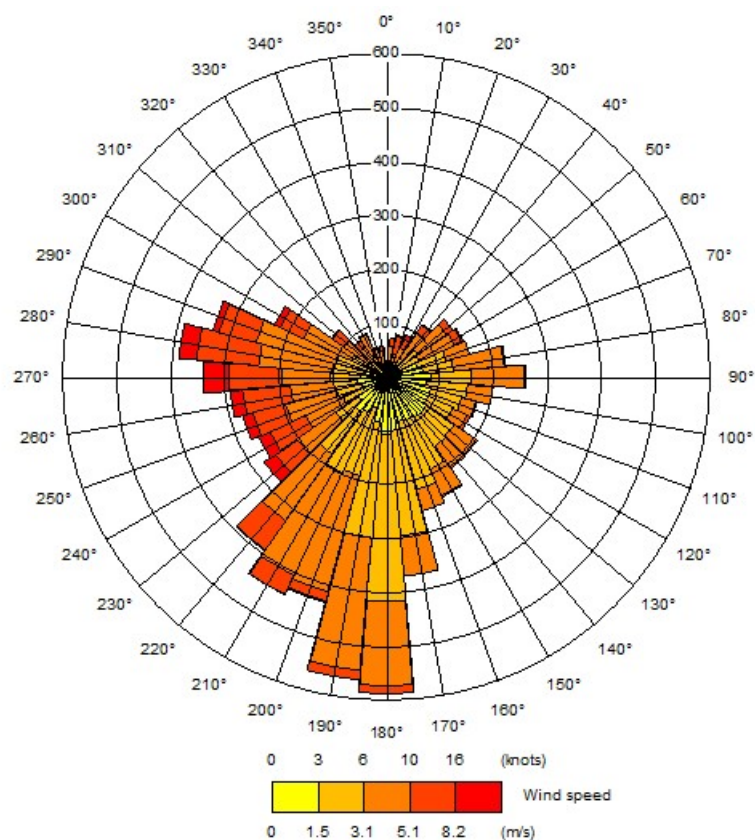
STEP 4 – DETERMINE SIGNIFICANT EFFECTS

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.

Appendix C

WIND ROSE FOR MANCHESTER 2019





Appendix D

LIMITATIONS AND ASSUMPTIONS



LIMITATIONS AND ASSUMPTIONS

The assessment of the operational phase of the Proposed Development has adopted the following limitations and assumptions:

- Roads modelling has used traffic data provided by the DfT;
- Local monitoring data available for 2019, same as verification year; and
- 2019 and 2022 Defra background pollution concentrations and Defra's vehicle emission rates have been assumed to provide a very conservative estimate for baseline and future years of assessment.

WORST CASE RECEPTOR

Worst case receptors have been assumed, which represent the anticipated location of maximum exposure of air pollutants within the development. Details of the receptors are summarised in **Table 11**.

Table 11 Traffic Data Used in the Dispersion Modelling Assessment

ID	Representative	X	Y	Z
R1	R1 Ground Floor (Front)	384664	398414	1.5
R2	R2 First Floor (Front)	384664	398414	4.5
R3	R3 Second Floor (Front)	384664	398414	7.5
R4	R4 Ground Floor (Rear)	384657	398419	1.5
R5	R5 First Floor (Rear)	384657	398419	4.5
R6	R6 Second Floor (Rear)	384657	398419	7.5

TRAFFIC DATA

The derived traffic data from the LAEI are summarised in **Table 12** and **Table 13**.

Table 12 Traffic Data Used in the Dispersion Modelling Assessment

Road Count Point	Road Name	2019 AADT	2022 AADT	Mean Vehicle Speed (km/h)	%HGV
8563	Newton Street	11756	12228	24.2	3.5
70156	A665 Great Ancoats St	43555	45305	48.3	3.1
70155	Lever Street	4354	4529	32.2	10.0
70163	Dale Street	2316	2409	32.2	13.7
38649	Newton Street South of Hilton	2208	2297	32.2	8.8
77003	A6 Portland Street	11531	11994	32.2	27.5
70154	A62 Lever Street South Dale Street	4354	4529	32.2	10.0
70158	A6 Piccadilly	7397	7694	32.2	11.7
47457	A665 Ancoats (Verification)	31264	32520	48.3	3.4

Table 13 TemPRO Factor (2016 to 2019)

Level	Name	Average (Origin/Destination)
E02006902	Manchester 054	1.037350
E02006912	Manchester 055	1.043000
Average 054/055 (used to growth data)		1.040175

VERIFICATION

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG (16) identifies several statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. The statistical parameters used in this assessment are:

- root mean square error (RMSE);
- fractional bias (FB); and
- correlation coefficient (CC).

A brief explanation of each statistic is provided in Table 14, and further details can be found in LAQM.TG (16) Box A3.7 (Defra, 2016).

Table 14 Model Performance Statistics

Statistical Parameter	Comments	Ideal Value
RMSE	RMSE is used to define the average error or uncertainty of the model. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if model predictions are of an annual mean NO₂ objective of 40µg/m³ and the RMSE is 10µg/m³ or above, it is advised to revisit the model parameters and model verification. Ideally an RMSE within 10% of the air quality objective would be derived, which equates to 4µg/m³ for the annual mean NO₂ objective.	0.01
FB	It is used to identify if the model shows a systematic tendency to over or under predict. FB values vary between +2 and -2 and has an ideal value of zero. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.	0.00

CC	It is used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship. This statistic can be particularly useful when comparing a large number of model and observed data points.	1.00
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These parameters estimate how the model results agree or diverge from observations.

These calculations have been conducted prior to, and after, model adjustment and provide information on the improvement of the model predictions as a result of the application of the adjustment factor.

The verification process involves a review of the annual mean modelled pollutant concentrations against corresponding monitoring data to determine how closely the air quality model corresponds. The acceptable limits of model verification are set out in LAQM.TG (16). Depending on the outcome it may be considered that there is no need to adjust any of the modelled results (LAQM.TG (16)).

Alternatively, the model may not correlate against the monitoring data. There is then a need to check all the input data to ensure that it is reasonable and accurately represented in the air quality modelling process.

Where all input data, such as traffic data, emissions rates, and background concentrations have been checked and considered reasonable, then the model requires adjustment to best align with the monitoring data. This may either be a single adjustment factor to be applied to the modelled concentrations across the study area, or a range of different adjustment factors to account for different zones in the study area e.g., motorways, local roads. Suitable monitoring locations were selected and used in the verification process, considering the site types, position of the diffusion tubes and representation of local air quality environment.

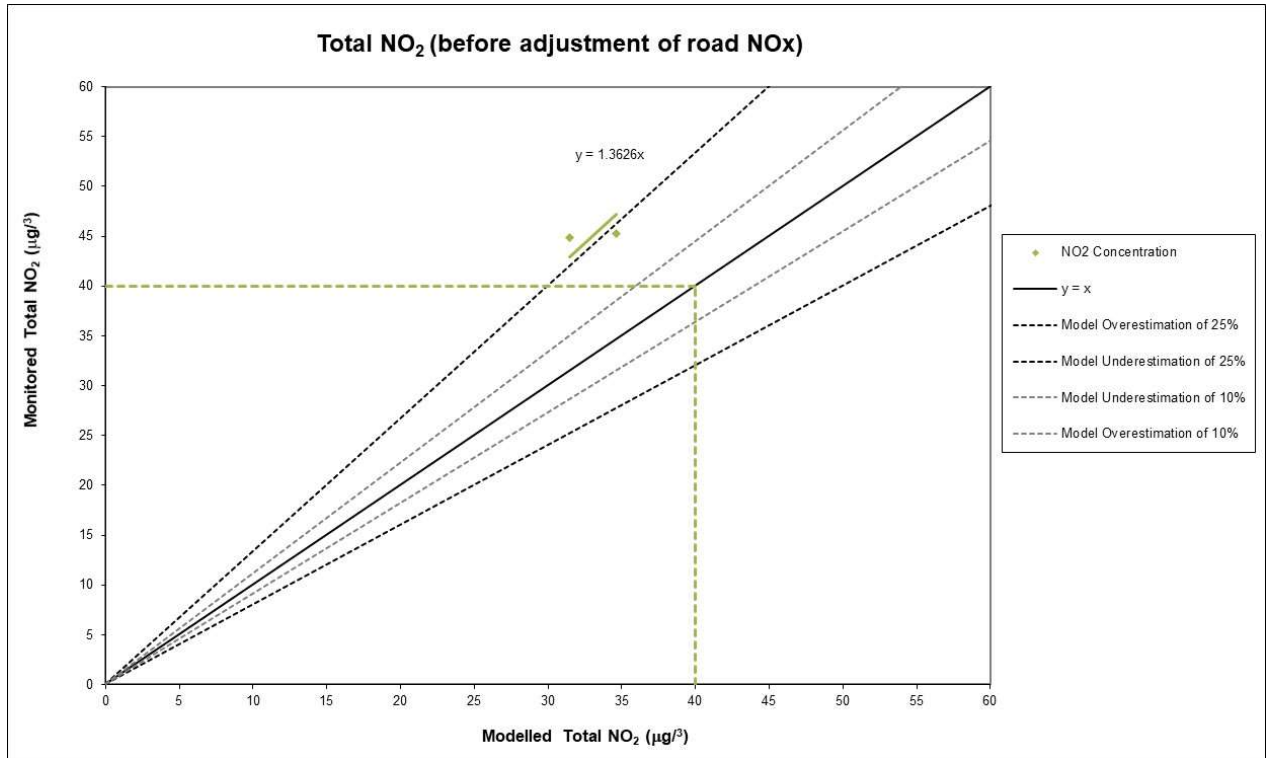
There are two monitoring sites at the study area available for traffic emission verification with suitable data capture. The non-adjusted modelled versus monitored NO₂ concentrations at those locations determined as suitable for the verification process are presented in **Table 15**.

Table 15 Model Performance Statistics

Statistical Parameter	No Adjustment	NO _x Roads Adjustment
Adjustment a	-	2.254
Correlation Co-efficient	1.0	1.0
RMSE	12.1	7.8
Fractional Bias	0.3	0.1
Within +10%	0	1
Within -10%	0	0
Within +/-10%	0	1
Within +10 to 25%	1	0
Within -10 to 25%	1	1
Within +/-10 to 25%	1	1
Over +25%	1	0

The initial comparison between the predicted concentrations and monitoring data illustrates that the model tends to under predict NO₂ concentrations over the modelled area.

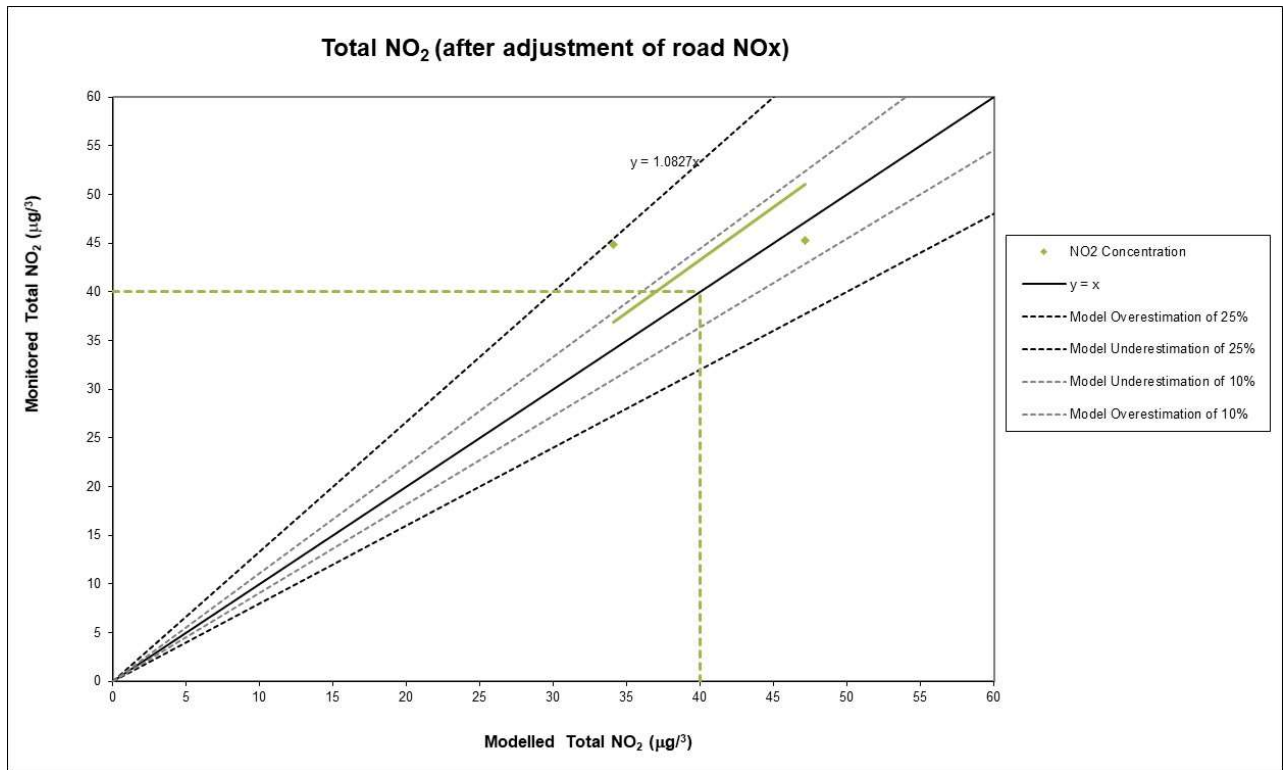
Figure 3 Modelled NO₂ vs Monitoring NO₂ before Adjustment



Model adjustment was undertaken in accordance with DEFRA guidance²¹. Modelled Road NO_x concentrations predicted at sensitive receptors in the base and opening year scenarios were multiplied by the adjustment factor (2.254) to account for the under-prediction of Road NO_x by the model. As shown in **Figure 3**.

²¹ Local Air Quality Management (LAQM), Technical Guidance 2016 (LAQM.TG (16)), DEFRA, 2018

Figure 4 Modelled NO₂ vs Monitoring NO₂ after Adjustment



The model performance statistics show that the uncertainty in the predictions of adjusted total NO₂ was acceptable, as the RMSE reduces to 7.8, which is less than 10 µg/m³.



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