



Air Quality Assessment

**Atlas Business Park, Simonsway, Wythenshawe,
Manchester, M22 5PR**

**Presented to: Ridge and Partners LLP c/o AVIVA
Investors**

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As part of Lucion Services, our combined team of 500 in the UK has a range of specialist skill sets in over 50 environmental consultancy specialisms including asbestos, hazardous materials, ecology, air and water services, geo-environmental and sustainability amongst others.

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Executive Summary

Site and Report Context	Delta-Simons Limited ('Delta-Simons'), was instructed by Ridge and Partners LLP on behalf of AVIVA Investors (the 'Client') to undertake an Air Quality Assessment to inform a full planning application for c.411,300sq. ft of B8 type use with ancillary offices, associated parking, vehicular access, landscaping and associated works (the 'Proposed Development'), located at Atlas Business Park, Simonsway, Wythenshawe in Manchester, M22 5PR (the 'Site'). The Site is located at its closest point approximately 125m west of one section of the Manchester Air Quality Management Area (AQMA), declared by Greater Manchester Combined Authority (GMCA), based on the modelled 35µg/m³ isopleths for annual mean nitrogen dioxide (NO₂) concentrations. The Site is also located in an area where air quality is mainly influenced by road traffic emissions along the adjacent B5166 Styal Road, Simonsway and the local road network and as such, elevated pollutant concentrations may be experienced at this location. Subsequently, the Proposed Development has the potential to cause adverse impacts to existing pollutant levels at nearby sensitive receptors, as a result of fugitive dust and plant/vehicle emissions during construction and road vehicle exhaust emissions during operation. Accordingly, an Air Quality Assessment is required to determine baseline conditions in the vicinity of the Site and to assess potential impacts associated with the Proposed Development, in accordance with the requirements of the National Planning Policy Framework (NPPF). The Air Quality Assessment will, therefore, consider ambient pollutant concentrations, namely nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}), across and in the vicinity of the Site. Furthermore, it is anticipated that, due to its scale and nature, the Proposed Development would be classified as 'Major' in line with the Manchester City Council (MCC) Air Quality and Planning Technical Guidance document (August 2022). As such, a Defra Emissions 'Damage' Cost Calculation is also required. This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational phases of the Proposed Development. For both phases, the type, source and significance of potential impacts were identified, and the measures that should be employed to minimise these proposed.
Summary	The assessment of construction phase impacts associated with emissions of fugitive dust and fine particulate matter (PM) with an aerodynamic diameter of less than 10 and 2.5 microns (PM₁₀ and PM_{2.5}, respectively), has been undertaken in line with the relevant Institute of Air Quality Management (IAQM) guidance. This identified that there is a medium risk of dust soiling impacts and a low risk of increases in PM, due to unmitigated construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM releases would be significantly reduced. The residual effects of the construction phase on air quality are considered to be not significant. The Proposed Development is expected to result in a negligible impact associated with the operational phase traffic on nearby receptors and the residual effects are considered to be not significant, in line with Environmental Protection UK (EPUK) and IAQM assessment criteria.
Conclusions and Recommendations	It is, therefore, concluded that the Proposed Development will not result in any significant loss of local residential amenity, without the inclusion of additional mitigation measures during the operational phase. Based on the results of the assessment and the implementation of the proposed mitigation measures during the construction phase, it is considered that, the Proposed Development complies with national and local planning policies and there are no air quality constraints considered to restrict planning consent.
This is intended as a summary only. Further detail and limitations of the assessment are provided within the main body of the report.	

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1.0 Introduction

1.1 Appointment

- 1.1.1 Delta-Simons Limited ('Delta-Simons'), was instructed by Ridge and Partners LLP on behalf of AVIVA Investors (the 'Client') to undertake an Air Quality Assessment to inform a full planning application for c.411,300sq. ft of B8 type use with ancillary offices, associated parking, vehicular access, landscaping and associated works (the 'Proposed Development'), located at Atlas Business Park, Simonsway, Wythenshawe in Manchester, M22 5PR (the 'Site').

1.2 Site Location and Context

- 1.2.1 Reference should be made to **Figure 1** for a map of the Site and surrounding area.
- 1.2.2 The Site is located at its closest point approximately 125m west of one section of the Manchester Air Quality Management Area (AQMA), declared by Greater Manchester Combined Authority (GMCA) based on the modelled $35\mu\text{g}/\text{m}^3$ isopleths for annual mean nitrogen dioxide (NO_2) concentrations. The Site is also located in an area where air quality is mainly influenced by road traffic emissions along the adjacent B5166 Styal Road, Simonsway and the local road network and as such, elevated pollutant concentrations may be experienced at this location. Subsequently, the Proposed Development has the potential to cause adverse impacts to existing pollutant levels at nearby sensitive receptors, as a result of fugitive dust and plant/vehicle emissions during construction and road vehicle exhaust emissions during operation.
- 1.2.3 Accordingly, an Air Quality Assessment is required to determine baseline conditions in the vicinity of the Site and to assess potential impacts associated with the Proposed Development, in accordance with the requirements of the National Planning Policy Framework (NPPF)¹. The Air Quality Assessment will, therefore, consider ambient pollutant concentrations namely NO_2 and particulate matter (PM_{10} and $\text{PM}_{2.5}$), across and in the vicinity of the Site.
- 1.2.4 Furthermore, it is anticipated that, due to its scale and nature, the Proposed Development would be classified as 'Major' in line with the Manchester City Council (MCC) Air Quality and Planning Technical Guidance document² (August 2022). As such, a Defra Emissions 'Damage' Cost Calculation is also required.
- 1.2.5 The main potential sources of air pollution were identified as emissions from road transport using the adjacent B5166 Styal Road, Simonsway and the local road network. There are potential commercial sources identified in the vicinity of the Site, that may also influence the local air quality, however, these would be characteristic of the mixed-use area in which the Site is located.
- 1.2.6 The report presents the findings of an assessment of the potential air quality impacts of the Proposed Development during both the construction and operational phases. For both phases, the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these described.
- 1.2.7 The standard limitations associated with this assessment are presented in **Appendix A**.
- 1.2.8 A glossary of terms used in this report is provided in **Appendix B**.

¹ Ministry of Housing, Communities & Local Government (2021) National Planning Policy Framework.

² Manchester City Council (2022) Manchester City Council Air Quality and Planning Technical Guidance [Online] Available at: https://www.manchester.gov.uk/download/downloads/id/28690/air_quality_and_planning_guidance.pdf [Accessed on 05/11/2022].

2.0 Legislation, Policy and Guidance

2.1 Air Quality Legislation

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

UK Air Quality Strategy (2007)

- 2.1.2 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)³. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation.
- 2.1.3 Under the European Union (Withdrawal) Act 2018 (as amended), domestic legislation derived from EU law, which was in force immediately prior to the end of the transition period on 31st December 2020, continues to form part of UK domestic law thereafter. This new body of law resulting from the Withdrawal Act is referred to as 'retained EU Law'.
- 2.1.4 The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C₆H₆), 1,3 butadiene (C₄H₆), carbon monoxide (CO), lead (Pb), NO₂, PM₁₀, PM_{2.5}, sulphur dioxide (SO₂), ozone (O₃), and polycyclic aromatic hydrocarbons (PAHs). The standards and objectives for the pollutants considered in this assessment are given in **Appendix C**.
- 2.1.5 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.
- 2.1.6 The air quality objectives (AQOs) are medium-term 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.
- 2.1.7 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.
- 2.1.8 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 (PM) within their administrative area. However, there is no statutory objective given in the AQS for PM_{2.5} at this time.

Air Quality Regulations (2016)

- 2.1.9 Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000⁴ and the Air Quality (England) (Amendment) Regulations 2002⁵ for the purpose of Local Air Quality Management (LAQM).
- 2.1.10 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 [...]

³ Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2).

⁴ The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928.

⁵ The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043.

- 2.1.11 The Air Quality Standards (Amendment) Regulations 2016⁶ amends the Air Quality Standards Regulations 2010 that 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 limit values for NO₂ and PM₁₀ are the same concentration levels as the relevant AQS objectives and the limit value for PM_{2.5} is a concentration of 20µg/m³.

Environmental Protection Act 1990 - Control of Dust and Particulates Associated with Construction

- 2.1.12 Section 79 of the Environmental Protection Act 1990 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'.

- 2.1.13 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.
- 2.1.14 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.

Environment Act 2021

- 2.1.15 Schedule 11 contains amendments of Part IV of the Environment Act 1995⁷ (air quality). Local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the AQOs defined in the Regulations. There is a requirement for local authorities to identify relevant sources of emissions that are likely to be responsible for any failure to achieve the AQOs within the area of jurisdiction, or to identify relevant sources within neighbouring authorities and to identify them. Where the objectives are not likely to be achieved within the relevant period, 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.

Clean Air Strategy (2019)

- 2.1.16 In 2019, the UK government released its Clean Air Strategy 2019⁸, part of its 25 Year Environment Plan⁹. The Strategy sets out the comprehensive action that is considered to be required from across all parts of government and society.
- 2.1.17 The primary focus of air quality management has primarily related to NO₂, and its principal source in the UK, road traffic. The 2019 Strategy aims to broaden the focus to other areas, including actions on clean growth, and emissions from domestic wood burning stoves, industry and agriculture.

2.2 Planning Policy

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

⁶ The Air Quality Standards (Amendment) Regulations 2016 - Statutory Instrument 2016 No. 1184.

⁷ Environment Act 2021 [Online] Available at: https://www.legislation.gov.uk/ukpga/2021/30/pdfs/ukpga_20210030_en.pdf?timeline=false [Accessed on 05/11/2022].

⁸ Department for Environment, Food and Rural Affairs (Defra) (2019) Clean Air Strategy 2019.

⁹ Department for Environment Food and Rural Affairs (Defra) (2018) A Green Future: Our 25 Year Plan to Improve the Environment.

National Planning Policy

National Planning Policy Framework (as revised 2021)

2.2.2 The Government's overall planning policies for England are described in the NPPF¹. 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.'

2.2.3 One of the three overarching objectives of the NPPF, is that the planning system should 'protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'

2.2.4 In relation to air quality, the following paragraphs in the document are relevant:

- Paragraph 55, 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 105, 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 174, 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 185, 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 186, 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 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.'; and
- Paragraph 188, 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'.

Local Planning Policy

- 2.2.5 A summary of relevant local policies is outlined below, however their compliance and soundness in relation to national policy has not been assessed in this instance.

Manchester's Local Development Framework (2012)

- 2.2.6 Manchester's Local Development Framework¹⁰ was adopted in July 2012 and contains policies and guidance to produce sustainable development in the local area for 15 years between 2012 to 2027. The following is relevant to this assessment.

- 2.2.7 Policy CC 5 'Transport' states transport requirements for proposed developments and how this relates to improving air quality.

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

- 2.2.8 Policy EN 16 'Air Quality' states the importance of improving air quality within the local area and how developments should contribute to this.

'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.'

- 2.2.9 Policy DM 1 'Development Management' reflects that developments should be considered in relation to the impact that they have on the surrounding area.

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

[...]

- Effects on amenity, including privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation [...]'

- 2.2.10 Policy T1 'Sustainable Transport' states how sustainable travel should be integrated into development to reduce emissions related to development, and therefore improve the air quality in the surrounding area.

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

- Facilitate modes of transport that reduce carbon emissions e.g by incorporating charging points for electric vehicles, subject to their appropriate design and location.
- Would reduce the negative impacts of road traffic, for example, congestion, air pollution and road accident casualties [...]'

¹⁰ Manchester City Council (2012) Manchester's Local Development Framework [Online] Available at: https://www.manchester.gov.uk/download/downloads/id/21363/core_strategy.pdf [Accessed on 05/11/2022].

Greater Manchester Places for Everyone - Joint Development Plan Document (2021)

2.2.11 The Greater Manchester 'Places for Everyone Joint Development Plan Document - Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, Wigan Publication Plan'¹¹, was considered at the Places for Everyone Joint Committee on 20th July 2021, and was subsequently approved by each of the nine districts for publication in August 2021.

2.2.12 Policy JP-S 6 'Clean Air' is relevant to the assessment:

'A comprehensive range of measures will be taken to support improvements in air quality, focusing particularly on locations where people live, where children learn and play, where there are impacts on the green infrastructure network and where air quality targets are not being met, including:

1. Locating and designing development, and focusing transport investment, so as to reduce reliance on forms of transport that generate air pollution;
2. Determining planning applications in accordance with the most recent development and planning control guidance published jointly by the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK), and the most recent IAQM Guidance on the Assessment of Dust from Demolition and Construction, or relevant successor guidance, including the requirement for developers to submit construction management plans as appropriate;
3. Requiring applications for developments that could have an adverse impact on air quality to submit relevant air pollution data and, if approved, to make appropriate provision for future monitoring of air pollution; [...]
5. Significantly expanding the network of electric vehicle charging points, both for public and private use, including as part of new developments; [...]
8. Designing streets to avoid trapping air pollution at ground level, including through the appropriate location and scale of buildings and trees; [...]
10. Promoting actions that help remove pollutants from the air, such as enhancing the green infrastructure network and using innovative building materials that capture air pollutants; and
11. Development should be located in areas that maximise the use of sustainable travel modes and be designed to minimise exposure to high levels of air pollution, particularly for vulnerable users.'

2.2.13 The above policies relating to air quality have been considered within this assessment.

2.3 Guidance

2.3.1 A summary of the publications referred to in the undertaking of this assessment is provided below.

Local Air Quality Management Technical Guidance (August 2022)

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 work¹². This guidance, referred to in this document as LAQM.TG22, has been used where appropriate in the assessment presented herein.

¹¹ Greater Manchester (2021) Places for Everyone Joint Development Plan Document - Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, Wigan [Online] Available at: <https://www.greatermanchester-ca.gov.uk/media/4838/places-for-everyone.pdf> [Accessed on 05/11/2022].

¹² Department for Environment, Food and Rural Affairs (Defra) (August 2022) Part IV of the Environment Act 1995 as amended by the Environment Act 2021 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG22.

Land-Use Planning & Development Control: Planning for Air Quality (2017)

- 2.3.3 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance¹³ 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.

Guidance on the Assessment of Dust from Demolition and Construction (2016)

- 2.3.4 This document¹⁴ published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM₁₀ impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

National Planning Practice Guidance - Air Quality (2019)

- 2.3.5 This guidance¹⁵ provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality, it 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.

Greater Manchester Air Quality Action Plan 2016-2021 (2016)

- 2.3.6 A joint Greater Manchester AQAP¹⁶ has been prepared, which identifies the sources of air pollution within the area and sets out the actions that GMCA plan to deliver between 2016-2021 (and beyond), in order to improve air quality. This AQAP aims to bring together a robust and meaningful set of actions and measures that will bring about an improvement in air quality, to benefit the health of the population. The measures fall into a number of categories, specifically: reducing emissions from road traffic, protection of air quality through enforcement of air pollution legislation, awareness raising, action through building design and land use planning, and increased energy efficiency.

Greater Manchester Low-Emission Strategy (2016)

- 2.3.7 This Low Emission Strategy¹⁷ takes a long-term, integrated approach to carbon emissions and air quality in the period up to 2040, allowing us to focus investment to the greatest effect. It establishes a framework within which we will develop detailed action plans to reduce carbon emissions and improve air quality.
- 2.3.8 The aims of this 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 Implementation Plan; and
 - Reduce air pollution as a contributor to ill-health in Greater Manchester.

¹³ Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017) Land Use Planning & Development Control: Planning for Air Quality.

¹⁴ Institute of Air Quality Management (Version 1.1 Updated June 2016) Guidance on the Assessment of Dust from Demolition and Construction.

¹⁵ Department of Communities and Local Government (DCLG) (Updated November 2019) National Planning Practice Guidance.

¹⁶ Greater Manchester Combined Authority (2016) Air Quality Action Plan 2016-2021 [Online] Available at: <https://greatermanchester-ca.gov.uk/media/1272/air-quality-action-plan-2016-21.pdf> [Accessed on 05/11/2022].

¹⁷ Greater Manchester Combined Authority (2020) Greater Manchester Low-Emission Strategy (2016) [Online] Available at: <https://assets.ctfassets.net/tlpgbv1k6h2/6wQl2dxjrXZ2SCVByUBdOf/a13a19c17cc61261cb5b808943358f84/low-emission-strategy-dec-2016.pdf> [Accessed on 05/11/2022].

Greater Manchester's Clean Air Plan to Tackle Nitrogen Dioxide Exceedances at the Roadside (GM CAP) (2021)

2.3.9 In Greater Manchester, the 10 local authorities, the GMCA and Transport for Greater Manchester, have worked together to develop a Clean Air Plan (CAP) to tackle NO₂ Exceedances at the Roadside¹⁸, referred to as the GM CAP.

2.3.10 The GM CAP Policy document includes the following:

- It sets out the policy for each of the measures, which together constitute the GM CAP, namely:
- Greater Manchester Charging Clean Air Zone (Section 2);
- Clean Bus Fund (Section 6);
- Vehicle Finance (Section 7);
- Clean Commercial Vehicle Fund (Section 8);
- Clean Taxi Fund (Section 9);
- Includes reference to specific technical materials which are published as part of the evidence base for the GM CAP; and

2.3.11 It does not and is not intended to provide detailed information on the processes that underpin the delivery of the Policy for the GM CAP, e.g. how discounts and exemptions are applied for.

Manchester City Council Air Quality and Planning Technical Guidance (2022)

2.3.12 The MCC Air Quality and Planning Technical Guidance², published in August 2022, provides a strategy between 2016-2025 for improving air quality within Manchester.

2.3.13 According to this guidance document, 'Major' proposals require an Air Quality Assessment to be undertaken that includes an evaluation of changes in vehicle related emissions and monetisation of the impacts arising from these changes in line with the Defra IGCB Damage Costs. It is anticipated that, due to its scale and nature, the Proposed Development would be classified as 'Major' and as such, a Defra Emissions 'Damage' Cost Calculation is required to determine the cost to the local area of pollutant emissions attributable to new development.

2.3.14 The document includes the following relevant to this assessment.

'Increasingly, providing electric vehicle charging (EVC) infrastructure is considered an effective measure to mitigate local air quality impacts from road vehicle journeys created by proposed development. MCC encourages developers or their representatives to demonstrate that consideration of providing EVC infrastructure commensurate with the development's scale and MCC's best practice recommendations has taken place at the planning application stage.'

'Electric Vehicle Charging - MCC Best Practice Recommendations

Electric Vehicle (EV) chargepoints and infrastructure are recommended for the following applications:

[...]

- Non-residential development with any parking spaces'

'EV charging recommendations:

[...]

- Non-residential:

¹⁸ Greater Manchester Combined Authority (2021) Greater Manchester's Clean Air Plan to Tackle Nitrogen Dioxide Exceedances at the Roadside (GM CAP) [Online] Available at: https://assets.ctfassets.net/tlpgbvy1k6h2/2VNncC1zejAvGh3CrVn0oo/d45528de22e593c9be285ddf5b26373b/Appendix_1_-_GM_Clean_Air_Plan_Policy_following_Consultation.pdf [Accessed on 05/11/2022].

- 11 or more parking spaces: minimum 20% EV chargepoints, and cable routes for all staff spaces.
- Charging units dependent on end-use as follows:
 - Minimum 7kW*: offices, hotels, nursing homes, sheltered accommodation, industrial units, retail units.
 - Minimum 22kW*: supermarkets etc.
 - Minimum 50kW*: service stations etc.¹

Covid-19 Supplementary Guidance for LAQM Reporting in 2021

2.2.10 As a result of the impacts from Covid-19 and the associated restrictions on activity, supplementary guidance¹⁹ has been published to inform local authorities in England of the key changes and points of reference with respect to LAQM duties, as described in Part IV of the Environment Act 1995, for the 2021 reporting year. This supplementary guidance document should be read in conjunction with Defra's LAQM.TG22 document.

¹⁹ Department for Environment, Food and Rural Affairs (Defra) (2021) Covid-19 Supplementary Guidance Local Air Quality Management Reporting in 2021 [Online] Available at: <https://laqm.defra.gov.uk/documents/Covid-19%20-%20Supplementary%20Guidance%20for%20Local%20Air%20Quality%20Management%20Reporting%20in%202021%20v1.pdf> [Accessed on 05/11/2022].

3.0 Scope and Methodology

3.1 Scope

- 3.1.1 The scope of the assessment has been determined in the following way:
- Review of the latest available Air Quality Annual Status Reports (ASRs) from GMCA20 and Cheshire East Council (CEC)²¹, Defra²² and the Environment Agency (EA)²³;
 - Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality, as a result of the Proposed Development; and
 - Review of the traffic data provided by the Project Transport Consultant (the 'PTC') and the Department for Transport's (DfT) Road Traffic Statistics website²⁴, where applicable.
- 3.1.2 The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:
- Dust and PM generated by on-site activities during the construction phase;
 - Increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant; and
 - Increases in pollutant concentrations as a result of exhaust emissions arising from traffic generated by the Proposed Development once operational.

3.2 Methodology

Construction Phase Assessment

- 3.2.1 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. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust, therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.
- 3.2.2 The smaller particles of dust are known as PM, with less than $10\mu\text{m}$ in aerodynamic diameter (PM_{10}) representing only a small proportion of total dust released; this includes a finer fraction, known as $\text{PM}_{2.5}$ (with an aerodynamic diameter less than $2.5\mu\text{m}$). As these particles are at the smaller end of the size range of dust particles, they remain suspended in the atmosphere for a longer period of time than the larger dust particles, they can therefore be transported by wind over a wider area. PM_{10} and $\text{PM}_{2.5}$ are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health. However, it is worth noting that, according to the IAQM guidance, the majority of fugitive particulate emissions arising from construction sites are expected to relate to the coarser fractions (i.e. $\text{PM}_{2.5-10}$) with just 10-15% expected to comprise $\text{PM}_{2.5}$. The IAQM guidance therefore focusses on PM_{10} for the purposes of assessment.

²⁰ Greater Manchester Combined Authority (2022) 2021 Air Quality Annual Status Report [Online] Available at: https://assets.ctfassets.net/tlpgbvy1k6h2/5x3t00AUL4BX3MB4YJVgRI/9c731d8f31974e15a731b064f9625446/GM_Air_Quality_Annual_Status_Report_2021.pdf.pdf [Accessed on 05/11/2022].

²¹ Cheshire East Council (2022) 2022 Air Quality Annual Status Report [Online] Available at: <https://www.cheshireeast.gov.uk/pdf/environment/air-quality/cheshire-east-annual-status-report-2022.pdf> [Accessed on 05/11/2022].

²² Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management (LAQM) Support Pages [Online] Available at: <http://laqm.defra.gov.uk/> [Accessed on 05/11/2022].

²³ Environment Agency (2022) Pollution Inventory [Online] Available at: <https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory> [Accessed on 05/11/2022].

²⁴ Department for Transport (DfT) (2022) Road Traffic Statistics [Online] Available at: <https://roadtraffic.dft.gov.uk/#/55.254/-6.064/basemap-regions-countpoints> [Accessed on 05/11/2022].

- 3.2.3 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.
- 3.2.4 The IAQM methodology assesses the risk of potential dust and PM₁₀ impacts from the following four sources: demolition, earthworks, general construction activities and track-out. 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, then 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 D**.
- 3.2.5 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. As information on the number of vehicles and plant associated with the construction phase was 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 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

- 3.2.6 Of the pollutants included in the AQS, concentrations of NO₂, PM₁₀ and PM_{2.5} have been considered in this assessment as road traffic is a major source of these pollutants and their concentrations tend to be close to, or in exceedance of, the objectives in urban locations.
- 3.2.7 In accordance with the EPUK/IAQM guidance, a significant change would be described as a change in Light Duty Vehicle (LDV) flows of 500 Annual Average Daily Traffic (AADT) or more and/or Heavy Duty Vehicle (HDV) flows of 100AADT or more. Alternatively, a change in LDV flows of 100AADT or more and/or HDV flows of 25AADT on routes through an AQMA would also be considered a significant change in accordance with the guidance. Where these thresholds are exceeded, a detailed assessment of air quality is normally required.
- 3.2.8 In order to predict NO₂ and PM concentrations in the vicinity of the Site, the advanced dispersion model ADMS-Roads (version 5.0.1.3) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness and local meteorological conditions to predict pollutant concentrations. Details of the model input parameters are presented in **Appendix E**.

Impact of Travel Restrictions on Air Quality

- 3.2.9 Whilst 2020 data are reflective of real-world events, and encouraged to be presented within reports, the impacts of the recent Travel Restrictions and the associated reduction in pollutant emissions within the UK have resulted in the need to carefully consider the effect of baseline concentrations and potential impacts of developments on air quality.
- 3.2.10 In terms of model verification, the methodology as presented in LAQM.TG22, assumes that the relationships governing the derivation of pollutant concentrations within the verification year would remain true and therefore, be representative for future years. The recent Travel Restrictions, however, create uncertainty over this assumption and as such, careful consideration needs to be given to the reliability of the local monitoring data used in the model verification process.

- 3.2.11 Current LAQM tools used in road traffic emissions modelling, such as vehicle fleet turnover related forecasts and mapped background pollutant concentrations, do not currently take into account the noticeable variations in vehicular activity and emissions that were associated with the UK Travel Restrictions, which subsequently altered human behavioural patterns.
- 3.2.12 To avoid this uncertainty and underestimation of pollutant concentrations, the use of 2019 as a verification year is recommended as the most recent year available without the effects of these restrictions and so has been utilised within this assessment.

Meteorological Data

- 3.2.13 Meteorological data, such as wind speed and direction, are used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in this assessment were obtained from the observation station at Manchester Airport in 2019. This station is considered to provide representative data for the assessment. A wind rose generated from the meteorological data used for both the consideration of construction phase impacts and the operational phase dispersion modelling provided in **Appendix F**.

Traffic Data

Traffic Flows

- 3.2.14 A summary of traffic data and pollutant emission factors used in the assessment can be found in **Appendix E**. It includes details of the AADT flows, vehicle speeds (km/h) and the percentage of HDVs for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG22, and using professional judgement.
- 3.2.15 For the assessment, three scenarios were modelled, as follows:
- 2019 - Model Verification;
 - 2025 - Anticipated Opening Year Without Development; and
 - 2025 - Anticipated Opening Year With Development.

- 3.2.16 Reference should be made to **Figure 1** for a graphical representation of the modelled road link locations.

Vehicle Emission Factors

- 3.2.17 Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (EFT) (version 11.0), provided on the Defra website²⁵. This has been produced by Defra and incorporates COPERT 5.3 vehicle emission factors and fleet information.
- 3.2.18 2025 emission factors were utilised for the Site development year in order to provide realistic concentration predictions.

Selection of Background Concentrations

- 3.2.19 Background pollutant data for the operational phase assessment have been taken from the national maps provided on the Defra website²⁶, where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated background concentrations are available for all years between 2018 and 2030. 2025 background concentrations for oxides of nitrogen (NO_x), NO₂, PM₁₀ and PM_{2.5} have been utilised in this assessment for the anticipated opening year.

²⁵ Department for Environment, Food and Rural Affairs (Defra) (2021) Emissions Factor Toolkit (version 11.0) [Online] Available at: <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/> [Accessed on 05/11/2022].

²⁶ Department for Environment, Food and Rural Affairs (Defra) (2022) Background Concentrations [Online] Available at <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018> [Accessed on 05/11/2022].

Model Verification and Result Processing

- 3.2.20 The ADMS-Roads 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.
- 3.2.21 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 Chapter 7, Section 4, of LAQM.TG22.
- 3.2.22 Details of the verification factor calculations are presented in **Appendix E**. A factor of **0.81** was obtained during the verification process, indicating that the model was over-predicting. Therefore, in order to perform a robust assessment, a factor of **1.00** was applied to the modelled road-NO_x outputs prior to conversion to annual mean NO₂ concentrations utilising the NO_x to NO₂ Calculator (version 8.1, 26th June 2020) provided by Defra²⁷. The NO₂ diffusion tube monitoring results recorded by GMCA and CEC were subsequently used to derive an indicative baseline annual mean NO₂ concentration for each site in the vicinity of the Proposed Development. Reference should be made to **Figure 1**, which shows the diffusion tube monitoring locations within the assessment extents.
- 3.2.23 The local PM₁₀ adjustment factor was determined between the 'measured' road contribution and the model derived road contribution. This resulted in a factor of **1.60**, indicating that the model was under-predicting. This road-PM₁₀ adjustment factor was applied to the modelled road-PM₁₀ concentration for each monitoring site to provide adjusted modelled road-PM₁₀ concentrations.
- 3.2.24 As local roadside monitoring data within the assessment extents are not available for PM_{2.5}, the modelled road-PM_{2.5} components have been adjusted by the verification factor obtained for PM₁₀, before adding to the appropriate background concentration.
- 3.2.25 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.TG22.
- 3.2.26 Once processed, the predicted concentrations were compared against the relevant AQS objective levels for NO₂, PM₁₀ and PM_{2.5} set out in **Appendix C**.
- 3.2.27 The air quality modelling generates pollutant estimates of road source contributed NO_x, PM₁₀ and PM_{2.5} at specified receptors. To enable comparison with the relevant AQOs for NO₂, PM₁₀ and PM_{2.5} it has been necessary to combine the model outputs data with the background concentrations.
- 3.2.28 To consider compliance with the 1-hour mean AQO for NO₂, Defra's guidance suggests that in locations where the annual mean NO₂ concentration exceeds 60µg/m³ then the 1-hour mean objective may be exceeded. Where annual mean concentrations are less than 60µg/m³ then exceedance of the 1-hour mean objective is considered unlikely. The risk of non-compliance with the 1-hour mean objective, where up to 18 exceedances of a 1-hour mean concentration of 200µg/m³ are allowed in a calendar year, is therefore considered likely when the annual mean concentration is greater than 60µg/m³ but unlikely when not. This approach has been adopted for this assessment.
- 3.2.29 To estimate total annual mean concentrations for PM₁₀ and PM_{2.5}, for comparison with the annual mean AQOs (40 and 20µg/m³ respectively) the model output concentrations are simply added to the background concentrations for these pollutants.
- 3.2.30 To consider compliance with the 24-hour mean AQO for PM₁₀, Defra's guidance gives the following equation that relates the annual mean concentration to the number of exceedances of the 24-hour mean concentration of 50µg/m³, where up to 35 exceedances are allowed:
- No. 24-hour mean exceedances = $-18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$

²⁷ Department for Environment, Food and Rural Affairs (Defra) NO_x to NO₂ Calculator (26/06/2020) [Online] Available at: https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v8.1.xlsm [Accessed on 05/11/2022].

3.2.31 This approach has been adopted for 24-hour mean PM₁₀ for this assessment.

3.3 Selection of Sensitive Receptors

3.3.1 Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Development. These will include locations sensitive to an increase in dust deposition and PM₁₀ exposure as a result of on-site construction activities, and locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Development.

Construction Phase

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 PM in the ambient air will have the greatest impact on local air quality at sensitive receptors.

Operational Phase

3.3.3 In terms of locations that are sensitive to pollutants emitted from engine exhausts, these will include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24-hour mean or annual mean) may be more appropriate. Box 1-1 of LAQM.TG22 provides examples of the locations where the AQOs should/should not apply.

3.3.4 To complete the assessment of operational phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollutant concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO₂ and PM concentrations, as a result of the Proposed Development.

3.3.5 The locations of the assessment receptors are shown on **Figure 1** and listed in **Table 1**.

Table 1 - Receptor Locations Used in the Assessment

Receptor	Description / Address	Grid Reference		Height above Ground Level (m)
		X (m)	Y (m)	
R1	302 Styal Road, Heald Green, Cheadle	384150.1	386457.4	1.5
R2	225 Styal Road, Heald Green, Cheadle	384212.4	386330.8	1.5
R3	2 Daisy Bank Lane, Heald Green, Cheadle	384239.5	386028.8	1.5
R4	264 Finney Lane (above Heald Green Store), Heald Green, Cheadle	384411.2	385953.8	4.5
R5	195 Finney Lane, Heald Green, Cheadle	384579.5	385916.5	1.5
R6	9 Emerald Road, Wythenshawe	383992.0	385430.7	1.5
R7	1 Boundary Terrace, Wythenshawe	383843.2	384926.3	1.5
R8	Holme Lea, Hollin Lane, Wythenshawe	383861.2	384791.3	1.5
R9	Keepers Cottage, Thorley Lane, Ringway	380848.4	386202.3	1.5
R10	5 Garron Walk, Wythenshawe, Manchester	381249.4	386576.7	1.5
R11	83 Rowarth Road, Wythenshawe, Manchester	381220.9	386799.5	1.5
R12	5 Hurst Walk, Wythenshawe, Manchester	381469.4	386917.2	1.5
R13	27 Kennett Road, Wythenshawe, Manchester	381459.4	387097.4	1.5
R14	50 Tuffley Road, Wythenshawe, Manchester	381220.4	387319.3	1.5
R15	101 Tuffley Road, Wythenshawe, Manchester	381299.9	387337.3	1.5
R16	Shore Green Care Centre, Wythenshawe, Manchester	381452.6	387297.2	1.5

Receptor	Description / Address	Grid Reference		Height above Ground Level (m)
		X (m)	Y (m)	
R17	51 Peterswood Close, Wythenshawe, Manchester	381692.5	387327.8	1.5
R18	13 Flaxcroft Road, Wythenshawe, Manchester	381757.3	387155.8	1.5
R19	546 Greenwood Road, Wythenshawe, Manchester	381916.0	387139.1	1.5
R20	Manchester Enterprise Academy, Wythenshawe, Manchester	382084.8	387098.6	1.5
R21	9 Hockenhull Close, Wythenshawe, Manchester	383206.1	386575.1	1.5
R22	212 Peel Hall Road, Wythenshawe, Manchester	383478.0	386359.8	1.5
R23	38 Patch Croft Road, Wythenshawe	383692.9	386220.8	1.5
R24	64 Patch Croft Road, Wythenshawe	383858.1	386171.7	1.5

3.4 Significance Criteria

Construction Phase

- 3.4.1 The IAQM assessment methodology recommends that significance criteria are 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 For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Site on local concentrations of NO₂ and PM, the significance of residual effects has been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance, which are described below.

Operational Phase

- 3.4.3 The approach provided in the EPUK/IAQM guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Development once operational.
- 3.4.4 This guidance recommends that 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 and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in **Table 2**.

Table 2 - Road Vehicle Exhaust Emissions - Significance of Impact

Long Term Average Concentration at Receptors in Assessment Year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% or more of AQO	Moderate	Substantial	Substantial	Substantial

Notes

AQAL = air quality assessment level, which for this assessment related to the UK Air Quality Strategy objectives.

Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration.

When defining the concentration as a percentage of the AQAL, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme,' concentration where there is an increase.

Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

- 3.4.5 The matrix shown in **Table 2** is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as negligible.
- 3.4.6 Following the prediction of impacts at discrete receptor locations, the EPUK/IAQM document provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:
- The existing and future air quality in the absence of the development;
 - The extent of current and future population exposure to the impacts; and
 - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.
- 3.4.7 The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the 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.
- 3.4.8 The EPUK/IAQM guidance says that 'Where the air quality is such that an AQO 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. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.'
- 3.4.9 The EPUK/IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is significant, or it is not significant.

4.0 Baseline

4.1 Introduction

- 4.1.1 Existing air quality conditions in the vicinity of the Site were identified in order to provide a baseline for consideration. These are detailed in the following sections.

4.2 Local Air Quality Management

- 4.2.1 According to the latest available Air Quality ASR from GMCA²⁰ and Defra²⁸, the Greater Manchester AQMA covers the ten districts of Greater Manchester, including arterial routes, district centres and the airport, and was declared based on the modelled 35µg/m³ isopleths for annual mean NO₂ concentrations. The Site is located at its closest point approximately 125m west of one section of the Manchester AQMA. As such, potential effects associated with the Proposed Development have been considered at sensitive receptor locations within the AQMA.

4.3 Local Emission Sources

- 4.3.1 The Site is located in an area where air quality is mainly influenced by emissions from road transport using the adjacent B5166 Styal Road, Simonsway and the local road network. Potential commercial sources were identified in the vicinity of the Site that may also influence the local air quality, however, these would be characteristic of the mixed-use area in which the Site is located.

4.4 Air Quality Monitoring

- 4.4.1 Monitoring of pollutant concentrations is undertaken throughout both MCC and CEC's areas of jurisdiction utilising non-automatic (passive) methods and automatic (continuous) methods. The closest monitoring location with available data, diffusion tube MA90BNO, MA91BNO, MA92BNO, is located approximately 135m north-east of the Site.
- 4.4.2 Recent diffusion tube monitoring results, recorded by GMCA and CEC, in the vicinity of the Proposed Development are shown in **Table 3**.

Table 3 - Diffusion Tube Monitoring Results

Monitoring Site			Monitored NO ₂ Concentration (µg/m ³)*				
ID	Location	Site Type	2017	2018	2019	2020	2021
GMCA							
MA8ANO	St Pauls School	Urban Background	29.2	26.6	28.0	18.2	20.6
MA94BNO	Greenwood Road	Roadside	-	-	32.1	25.2	26.0
MA90BNO, MA91BNO, MA92BNO	Manchester Sharston	Suburban	21.7	20.1	18.9	13.7	14.1
ST13NO	Prospect Vale	Urban Background	18.4	18.3	18.8	11.6	13.6
ST28NO	Finney Lane	Roadside	42.4	41.3	38.6	25.7	30.3
ST2NO, ST12NO, ST14NO	A34 Kingsway	Roadside	42.5	37.3	38.9	26.3	38.4
CEC							
CE92	A555 Roundabout, Clay Lane	Roadside	29.5	25.8	27.4	-	-
CE265	108 Wilmslow Road	Roadside	24.9	26.6	24.5	-	-
CE279	183 Wilmslow Road	Roadside	27.8	27.7	28.4	19.4	22.0

* Exceedances of the relevant AQO are highlighted in **bold**.

- 4.4.3 As shown in **Table 3**, the annual mean NO₂ concentrations did not exceed the relevant AQO at any of the diffusion tube monitoring sites during the most recent monitoring year, 2021. However, monitoring location ST2NO, ST12NO, ST14NO did record exceedances of the 35µg/m³ guideline, during 2021, though this diffusion tube is located within the Manchester AQMA and as such, is not representative of the Site location.

²⁸ Department for Environment, Food and Rural Affairs (Defra) (undated) Local Authority Details Manchester City Council [Online] Available at: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=155 [Accessed on 05/11/2022].

- 4.4.4 The diffusion tube located closest to the Site, MA90BNO, MA91BNO, MA92BNO, did not record any exceedances of the relevant AQO in the most relevant monitoring years.
- 4.4.5 GMCA also undertake automatic pollutant monitoring within the vicinity of the Site. Recent monitoring results recorded at the closest automatic monitoring station are shown in **Table 4**.

Table 4 - Continuous Pollutant Monitoring Results

Monitoring Site			Pollutant	Monitored Pollutant Concentrations (µg/m³)*				
ID	Site Location	Site Type		2017	2018	2019	2020	2021
STK7	Stockport Cheadle A34	Roadside	NO ₂	43.0	37.0	36.0	26.0	28.0
			PM ₁₀	18.0	19.0	17.0	15.0	16.0
MAHG	Manchester Sharston	Suburban	NO ₂	24.0	24.0	23.0	14.0	16.0
			PM ₁₀	13.4	14.2	14.2	11.9	12.0
			PM _{2.5}	7.6	8.1	-	-	6.3

* Exceedances of the relevant AQO are highlighted in bold.

- 4.4.6 As shown in **Table 4**, the annual mean NO₂, PM₁₀ and PM_{2.5} pollutant concentrations did not exceed the relevant AQO at either of the automatic monitoring sites during the most recent monitoring years, 2018 to 2021.
- 4.4.7 One exceedance of the NO₂ AQO was recorded at monitoring location STK7 during 2017, with exceedances of the 35µg/m³ guideline also observed during 2018 and 2019, however, this monitor is located within the AQMA and as such, is not representative of the Site.
- 4.4.8 The closest automatic monitor, located approximately 135m north-east of the Site, MAHG, did not record any exceedances of the relevant AQO for NO₂, PM₁₀ or PM_{2.5} during the most recent monitoring years, 2017 to 2021.
- 4.4.9 Reference should be made to **Figure 1** for a map of the closest monitoring locations to the Site.

4.5 Background Pollutant Concentrations

- 4.5.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by Defra for the entire UK to assist Local Authorities in their Review and Assessment of air quality. The Site is located within grid squares NGR: 383500,3850500, 383500, 386500, 384500, 385500 and 384500, 386500. Data for this location and the assessment extents were downloaded from the Defra website²⁶ for the purpose of the project. These data are summarised in **Table 5** below.

Table 5 - Predicted Background Pollutant Concentrations

OS Grid Reference (X, Y; m)	2019				2025			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}	NO ₂	NO _x	PM ₁₀	PM _{2.5}
380500, 386500	23.2	33.9	12.6	8.2	17.6	24.7	11.9	7.6
381500, 386500	25.1	37.6	13.4	8.7	19.5	27.9	12.6	8.1
381500, 387500	22.5	32.8	13.6	8.9	17.1	23.9	12.8	8.3
382500, 387500	18.3	25.9	11.7	7.9	14.5	19.9	10.9	7.4
383500, 384500	15.1	20.9	9.8	6.6	12.9	17.6	9.1	6.1
383500, 385500	17.1	24.3	10.4	7.1	14.6	20.2	9.7	6.6
383500, 386500	17.2	24.2	11.2	7.8	14.3	19.7	10.5	7.2
384500, 385500	14.9	20.5	10.2	7.0	12.3	16.6	9.5	6.5
384500, 386500	15.7	21.7	10.7	7.4	12.8	17.4	10.0	6.8

- 4.5.2 As shown in **Table 5**, predicted background NO₂, PM₁₀ and PM_{2.5} concentrations in 2019, were below the relevant AQOs across the assessment extents, and are predicted to be below the relevant AQO assessment criteria in 2025.

5.0 Assessment

5.1 Introduction

- 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;
 - Preparation of temporary access/egress to the Site and haulage routes;
 - Earthworks;
 - Materials handling, storage, stockpiling, spillage and disposal;
 - Movement of vehicles and construction traffic within the Site (including excavators and dumper trucks);
 - Use of crushing and screening equipment/plant;
 - Exhaust emissions from plant, especially when used at the extremes of their capacity and during mechanical breakdown;
 - Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
 - Internal and external finishing and refurbishment;
 - Trackout, whereby earth is carried from the Site on vehicle tyres, deposited on roads and may later become suspended in the air as a result of vehicle movements; and
 - Site landscaping after completion.
- 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 methodology 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 It is understood that the Proposed Development is currently vacant. Therefore, the associated demolition activities are not considered further in this assessment.

Earthworks

- 5.2.5 The total area of the Site is greater than 10,000m² and it is assumed that more than 10 heavy earth moving vehicles will be active at any one time. Therefore, the potential dust emission magnitude is considered to be **large** for earthwork activities.

Construction

- 5.2.6 The total volume of buildings to be constructed on the Site is assumed to be greater than 100,000m³. Therefore, the potential dust emission magnitude is considered to be **large** for construction activities.

Trackout

- 5.2.7 Information on the number of HDVs associated with this phase of the Proposed Development is not available and therefore professional judgement has been used. The unpaved road length in the Site assumed to be greater than 100m. As such, it is considered that the potential dust emission magnitude is **large** for trackout.
- 5.2.8 **Table 6** provides a summary of the potential dust emission magnitude determined for each construction activity considered.

Table 6 - Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	Large
Trackout	Large

Assessment of Sensitivity of the Study Area

- 5.2.9 A wind rose generated using the meteorological data used for the consideration of construction phase impacts is provided in **Appendix F**. This shows that the prevailing wind direction is mainly from the south through to the west. Therefore, receptors located to the north through to the east of the Site are more likely to be affected by dust and PM emitted and re-suspended during the construction phase.
- 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. Receptors to the north through to the east of the Site have the greatest potential to be affected the most as a result of the prevailing wind direction.
- 5.2.11 There are no ecological receptors within the vicinity of the Site considered to be sensitive to dust or PM, and as such, these effects are not considered further within this assessment.
- 5.2.12 Taking the above into account and following the IAQM assessment methodology, 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 7**.

Table 7 - Sensitivity of the Study Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Medium	Medium	Medium
Human Health	N/A	Low	Low	Low

Risk of Impacts

- 5.2.13 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 8** below provides a summary of the risk of dust impacts for the Proposed Development. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 8 - Summary Dust Risk Table to Define Site Specific Mitigation

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Medium	Medium	Medium
Human Health	N/A	Low	Low	Low

Construction Vehicles and Plant

- 5.2.14 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 road. Construction traffic will access the Site via Simonsway and the local road network.
- 5.2.15 Final details of the exact plant and equipment likely to be used on-site will be determined by the appointed contractor, it is considered likely to comprise dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors and trucks. The number of plant and their location within the Site are likely to be variable over the construction period.
- 5.2.16 Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts are therefore considered to be **negligible** according to the assessment significance criteria.

5.3 Operational Phase Assessment

- 5.3.1 Vehicle movements associated with the operation of the Proposed Development will generate exhaust emissions on the local and regional road networks which have the potential to affect existing sensitive receptors. An assessment was, therefore, undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at existing sensitive locations in the vicinity of the Site.
- 5.3.2 The assessment considered the following three scenarios:
- 2019 - Model Verification;
 - 2025 - Anticipated Opening Year Without Development; and
 - 2025- Anticipated Opening Year With Development.
- 5.3.3 The 2025 scenarios included anticipated baseline traffic data, inclusive of anticipated growth for the relevant assessment year, calculated using the UK Government's Trip End Model Presentation Program (TEMPro) version 7.2c, where applicable, and predicted vehicle trips associated with the operation of the Proposed Development, provided by the PTC.
- 5.3.4 For the purpose of the assessment, traffic data, emission factors and background concentrations for 2025 were utilised in the dispersion model, for the anticipated development opening year. The use of 2025 traffic data and 2025 emission factors and background concentrations is considered to provide realistic concentration predictions.

Road Vehicle Exhaust Emission Impacts

- 5.3.5 Full results of the dispersion modelling are presented in **Appendix G** and a summary is provided below.
- 5.3.6 It should be noted that all presented results have been verified in accordance with the methodology outlined within **Appendix E**.

Nitrogen Dioxide (NO₂)

Annual Mean

- 5.3.7 Annual mean NO₂ concentrations were predicted to be below the AQO of 40µg/m³ at all sensitive receptor locations in each of the modelled 2025 scenarios, with no new exceedances predicted as a result of the Proposed Development. There were also no exceedances of the 35µg/m³ GMCA threshold, predicted at sensitive receptor during both the 'Without Development' and 'With Development' scenarios.
- 5.3.8 In 2025, the anticipated opening year of the Proposed Development, the highest NO₂ concentrations of 31.5µg/m³ and 31.6µg/m³ were predicted at receptor R11 '83 Rowarth Road, Wythenshawe, Manchester', in the 'Without Development' and 'With Development' scenarios, respectively. This resulted in a **negligible** impact from the additional traffic associated with the operation of the Proposed Development.

- 5.3.9 The maximum predicted increase as a result of the Proposed Development was $0.5\mu\text{g}/\text{m}^3$ at receptors R19 '546 Greenwood Road, Wythenshawe, Manchester' and R22 '212 Peel Hall Road, Wythenshawe, Manchester', resulting in a **negligible** impact on annual mean NO_2 concentrations.
- 5.3.10 Based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean NO_2 concentrations is considered to be **negligible**, with the resulting effect considered to be **not significant**.
- 5.3.11 Based on the extent of predicted population exposure to the impacts on annual mean NO_2 concentrations and the guidance provided by the IAQM, the overall effect of the Proposed Development is considered to be **not significant**.

1-hour Mean

- 5.3.12 The annual mean NO_2 concentrations predicted by the model were all below $60\mu\text{g}/\text{m}^3$, and therefore, hourly mean NO_2 concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO_2 concentrations at existing sensitive receptors is considered to be **negligible**, with the resulting effect considered to be **not significant**.

Particulate Matter (PM_{10})

Annual Mean

- 5.3.13 Annual mean PM_{10} concentrations were predicted to be well below the AQO of $40\mu\text{g}/\text{m}^3$ at all existing sensitive receptor locations in each of the modelled 2025 scenarios. The highest PM_{10} concentration of $17.1\mu\text{g}/\text{m}^3$ was predicted at receptor R11 '83 Rowarth Road, Wythenshawe, Manchester' in both the 'Without Development' and 'With Development' scenarios, respectively. This resulted in a **negligible** impact from the additional traffic associated with the operation of the Proposed Development.
- 5.3.14 The maximum predicted increase as a result of the Proposed Development was $0.1\mu\text{g}/\text{m}^3$ at receptor R15, R16 and R19 - R24. This resulted in a **negligible** impact on annual mean PM_{10} concentrations.
- 5.3.15 The predicted changes in annual mean PM_{10} concentrations were all less than $<0.5\%$ of the relevant AQO. Based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean PM_{10} concentrations is considered to be **negligible**, with the resulting effect considered to be **not significant**.
- 5.3.16 Based on the extent of predicted population exposure to the impacts on annual mean PM_{10} concentrations and the guidance provided by the IAQM, the overall effect of the Proposed Development is considered to be **not significant**.

24-hour Mean

- 5.3.17 There has been no predicted increase in the number of days exceeding the daily PM_{10} limit in the 'With Development' scenario, without the risk of exceedance of the AQS objective. As such, the impacts of increased emissions associated with the operational phase of the Proposed Development are **negligible**.

Particulate Matter ($\text{PM}_{2.5}$)

Annual Mean

- 5.3.18 Annual mean $\text{PM}_{2.5}$ concentrations were predicted to be well below the AQO of $20\mu\text{g}/\text{m}^3$ in each of the modelled 2025 scenarios at all existing sensitive receptors. The highest predicted annual mean $\text{PM}_{2.5}$ concentration of $12.6\mu\text{g}/\text{m}^3$ was predicted at receptor R11 '83 Rowarth Road, Wythenshawe, Manchester' in the 'Without Development' and 'With Development' scenarios, respectively.
- 5.3.19 The maximum predicted increase as a result of the Proposed Development was $0.1\mu\text{g}/\text{m}^3$ at receptors R19-R24, resulting in a **negligible** impact on annual mean $\text{PM}_{2.5}$ concentrations from the additional traffic associated with the operation of the Proposed Development.

5.3.20 The predicted changes in annual mean PM_{2.5} concentrations were all less than <0.5% of the relevant AQO. Based on the EPUK/IAQM guidance, the impact of the increased emissions associated with the Proposed Development on annual mean PM_{2.5} concentrations is considered to be **negligible**, with the resulting effect considered to be **not significant**.

5.3.21 Based on the extent of predicted population exposure to the impacts on annual mean PM_{2.5} concentrations and the guidance provided by the IAQM, the overall effect of the Proposed Development is considered to be **not significant**.

Defra Emissions 'Damage' Cost Calculation

5.3.22 A Defra Emissions 'Damage' Cost Calculation was undertaken to assess the local emissions from the Proposed Development and to determine the appropriate level of mitigation (a damage cost value) required to help reduce the potential effect on health and/or the local environment. This was undertaken in accordance with the MCC Air Quality Planning and Technical Guidance² and Defra Guidance (2021)²⁹, utilising the following calculation:

- Cost of Road Transport Emission Increase = $\sum$ [Estimated trip rate for 5 years × Emission rate per 10km per vehicle type × Damage Costs]

5.3.23 The inputs to the calculation are detailed in **Table 9**.

Table 9 - Emissions Cost Calculation Inputs

Input	Value
Trip Rate of Proposed Development	3,520 AADT (6.00 %HDV)
Link length (km)	10
Average speed (km/h)	48
Emissions year	2025
Area / road type	Urban (not London)
Defra cost per tonne per pollutant (road transport urban medium, central estimate) ²⁹	NO _x : £7,614
	PM _{2.5} : £66,797
Development vehicle emissions from EFT (Tonnes/year)	NO _x : 2.420
	PM _{2.5} : 0.262

5.3.24 The link length was assumed to be 10km in accordance with the MCC Air Quality Planning and Technical Guidance² and the average speed was estimated, taking into account congestion on nearby roads.

5.3.25 The Emissions Cost Calculation for the Proposed Development is detailed in **Table 10**.

Table 10 - Emissions Cost Calculation

Emissions Year	Calculated Cost by Pollutant	
	NO _x	PM _{2.5}
2025	£7,614 × 2.420 = £18,424.36	£66,797 × 0.262 = £17,500.81
2026	× 102% = £18,792.84	× 102% = £17,850.83
2027	× 102% = £19,168.70	× 102% = £18,207.85
2028	× 102% = £19,552.08	× 102% = £18,572.00
2029	× 102% = £19,943.12	× 102% = £18,943.44
Total Cost	£186,956.03	

5.3.26 The calculated emissions cost value in **Table 10** gives an indication as to the cost of the Proposed Development to local air quality over a 5-year period.

²⁹ Department for Environment, Food and Rural Affairs (Defra) (2021) Air Quality Appraisal: Damage Cost Guidance [Online] Available at: <https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance> [Accessed on 05/11/2022].

Summary

- 5.3.27 Based on the extent of predicted population exposure to the impacts on pollutant concentrations and the guidance provided by the IAQM, the overall effect of the Proposed Development is considered to be **not significant**.
- 5.3.28 Predicted concentrations of all pollutants considered during both assessment scenarios for the operational phase, were below the relevant objectives without the risk of exceedance at sensitive receptor locations.
- 5.3.29 Based on the assessment results, the Site is considered suitable for the Proposed Development without the implementation of mitigation measures during the operational phase.

6.0 Mitigation and Residual Effects

6.1 Construction Phase

Mitigation

- 6.1.1 Based on the assessment results, mitigation will be required during the construction phase of the Proposed Development. Recommended mitigation measures are given below.

General Communication

- A stakeholder communications plan that includes informing the community before work commences on-site should be developed and implemented.
- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the Site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

Site Management

- All dust and air quality complaints should be recorded, and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence.
- The complaints log should be made available to the Local Authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on or off-site should be recorded, and then the action taken to resolve the situation recorded in the logbook.

Monitoring

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of the Site boundary, with cleaning to be provided if necessary.
- The frequency of Site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

Preparing and Maintaining the Site

- Plan the Site layout so that machinery and dust causing activities are located away from receptors, as far as is practicable.
- Where practicable, erect solid screens or barriers around dusty activities or the Site boundary that are at least as high as any stockpiles on-site.
- Where practicable, 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 on-site cover appropriately.

Operating Vehicle/Machinery and Sustainable Travel

- Make sure that all vehicle operators 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.
- A Construction Logistics Plan should be produced to manage the sustainable delivery of goods and materials.

Vehicle Management

- Detailed mitigation measures to control construction traffic should be discussed with the Local Authority to establish the most suitable access and haul routes for the Site traffic. The most effective mitigation would be achieved by making sure that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible, and that vehicles are kept clean and sheeted when on public highways.
- Timing of large-scale vehicle movements to avoid peak hours on the local road network would also be beneficial and this can be incorporated into a Construction Environmental Management Plan (CEMP) for the Proposed Development.

Site 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.
- Make sure that an adequate water supply is available on the Site for effective dust/PM suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Make sure that 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.

Measures Specific to Earthworks

- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

Measures Specific to Construction

- Make sure that 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 make sure that that appropriate additional control measures are in place.

- For smaller supplies of fine powder materials make sure that bags are sealed after use and stored appropriately to prevent dust.
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

Measures Specific to Trackout

- Make sure that vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site logbook.
- Detailed mitigation measures to control construction traffic should be discussed with the Local Authority to establish the most suitable access and haul routes for the Site traffic. The most effective mitigation will be achieved by making sure that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

Residual Effects

- 6.1.2 The residual effects of dust and PM₁₀ generated by construction activities following the application of the mitigation measures described above and good site practice are considered to be **not significant**.
- 6.1.3 The residual effects of emissions to air from construction vehicles and plant on local air quality are considered to be **not significant**.

6.2 Operational Phase

Mitigation

- 6.2.1 The changes in pollutant concentrations attributable to traffic emissions associated with the operational phase of the Proposed Development (i.e. impacts on local air quality) are **negligible** and therefore, in accordance with the assessment criteria, mitigation is not required.
- 6.2.2 Nevertheless, the Manchester's Local Development Framework¹¹ and the Greater Manchester 'Places for Everyone Joint Development Plan Document - Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, Wigan Publication Plan'¹¹ suggests the inclusion of electric vehicles within new developments.
- '• Facilitate modes of transport that reduce carbon emissions e.g by incorporating charging points for electric vehicles, subject to their appropriate design and location.'
 - '5. Significantly expanding the network of electric vehicle charging points, both for public and private use, including as part of new developments; [...]'
- 6.2.3 Furthermore, the Proposed Development is assumed to be classified as a 'Major' development, in accordance with the MCC Air Quality and Planning Technical Guidance². As such, the following mitigation measures are suggested.

'Increasingly, providing electric vehicle charging (EVC) infrastructure is considered an effective measure to mitigate local air quality impacts from road vehicle journeys created by proposed development. MCC encourages developers or their representatives to demonstrate that consideration of providing EVC infrastructure commensurate with the development's scale and MCC's best practice recommendations has taken place at the planning application stage.'

'Electric Vehicle Charging - MCC Best Practice Recommendations

Electric Vehicle (EV) chargepoints and infrastructure are recommended for the following applications:

[...]

- Non-residential development with any parking spaces'

'EV charging recommendations:

[...]

- Non-residential:
 - 11 or more parking spaces: minimum 20% EV chargepoints, and cable routes for all staff spaces.
 - Charging units dependent on end-use as follows:
 - Minimum 7kW*: offices, hotels, nursing homes, sheltered accommodation, industrial units, retail units.;
 - Minimum 22kW*: supermarkets etc; and
 - Minimum 50kW*: service stations etc.'

'Examples of contributions to:

- Car clubs;
- Low emission vehicle refuelling infrastructure;
- Uptake of low emission vehicles;
- Low emission public transport options; and
- Cycling and walking infrastructure.

Measures to offset emissions may also be applied as post assessment mitigation.'

- 6.2.4 It is anticipated that the proposed mitigation measures will have the potential to reduce emissions of air pollutants during the operation of the Proposed Development, and to offset the Defra Emissions 'Damage' Cost, calculated in the previous section.

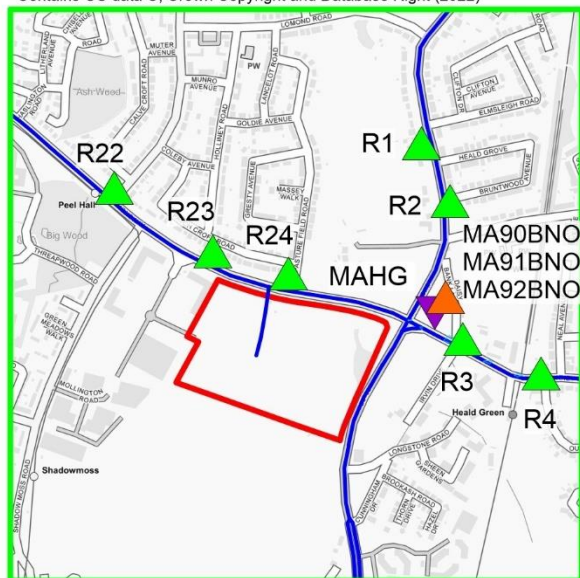
Residual Effects

- 6.2.5 The Proposed Development is expected to result in a **negligible** impact associated with the operational phase traffic on nearby receptors. As such, no significant effects on air quality are anticipated at existing receptors.
- 6.2.6 Based on the extent of predicted population exposure to the impacts on pollutant concentrations and the guidance provided by the IAQM, the overall effect of the Proposed Development is considered to be **not significant**.
- 6.2.7 The residual effects of the Proposed Development on air quality are **not significant** for NO₂, PM₁₀ and PM_{2.5} according to the EPUK/IAQM assessment criteria.

7.0 Summary and Conclusions

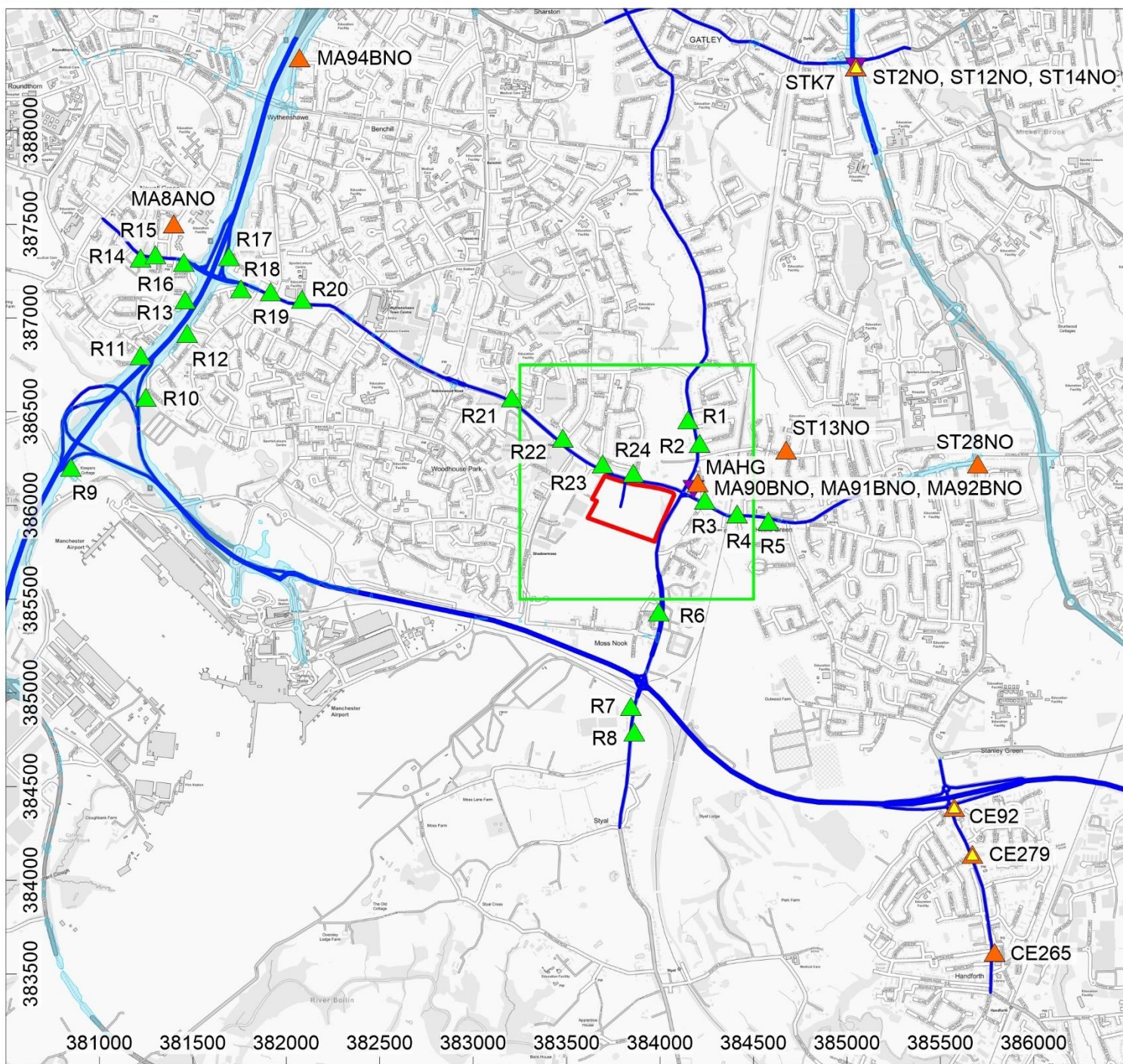
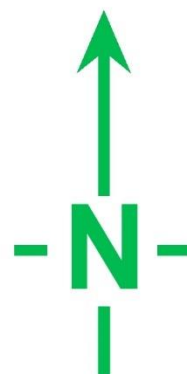
- 7.1.1 Delta-Simons was appointed to prepare this Air Quality Assessment to inform a full planning application for 411,300sq. ft of B8 type use with ancillary offices, associated parking, vehicular access, landscaping and associated works, located at Atlas Business Park, Simonsway, Wythenshawe in Manchester, M22 5PR.
- 7.1.2 A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology. This identified that there is a **medium risk** of dust soiling impacts and a **low risk** of increases in PM concentrations due to unmitigated construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM₁₀ releases would be significantly reduced. The residual effects of dust and PM₁₀ generated by construction activities on air quality are, therefore, considered to be **not significant**. The residual effects of emissions to air from construction vehicles and plant on local air quality are considered to be **not significant**.
- 7.1.3 The Site lies within an area where air quality is mainly influenced by emissions associated with traffic along B5166 Styal Road, Simonsway and the local road network. Pollutants considered in this assessment were NO₂, PM₁₀ and PM_{2.5}.
- 7.1.4 The Proposed Development is expected to result in a **negligible** impact associated with the operational phase traffic on nearby receptors and the residual effects are considered to be **not significant**. As such, in accordance with the assessment criteria, additional mitigation is not required.
- 7.1.5 Additionally, pollutant concentrations within the assessment extents are predicted to be below the relevant AQOs without the risk of exceedance.
- 7.1.6 Based on the assessment significance criteria, the residual effects of the Proposed Development are considered to be **not significant** for all pollutants assessed, and therefore, in accordance with the assessment criteria, additional mitigation is not required.
- 7.1.7 Furthermore, it is considered that, the Proposed Development complies with national and local policy for air quality.
- 7.1.8 Based on the assessment results, air quality is not considered a constraint to planning consent.

Figures



LEGEND

-  GMCA and CEC Diffusion Tube Location
-  GMCA Automatic Monitor Location
-  Modelled Verification Location
-  Proposed Sensitive Receptor Location
-  Site Boundary
-  GMCA AQMA
-  Modelled Road Link



Appendices

Appendix A - Limitations

Limitations

The recommendations contained in this Report represent Delta-Simons' professional opinions, based upon the information listed in the Report, exercising the duty of care required of an experienced Environmental Consultant. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons obtained, reviewed and evaluated information in preparing this Report from the Client and others. Delta-Simons' conclusions, opinions and recommendations have been determined using this information. Delta-Simons does not warrant the accuracy of the information provided to it and will not be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

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Please note that Air Quality Assessment reports are generally considered valid for a period of two years, or potentially less, if the baseline on which the report is based changes significantly. Accordingly, reliance on this report beyond this period is not afforded.

Appendix B - Glossary

Glossary

Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24hrs), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model.
Accuracy	A measure of how well a set of data fits the true value.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive subgroups (see also air quality objective).
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
AQO	Air Quality Objective
AURN	Automatic Urban and Rural (air quality monitoring) Network, managed by contractors on behalf of Defra.
CEC	Cheshire East Council
Conservative	Tending to over-predict the impact rather than under-predict.
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emissions Factor Toolkit
Emission rate	The quantity of a pollutant released from a source over a given period of time.
EQS	Environmental Quality Standard
EPUK	Environmental Protection (UK)
Exceedance	A period of time where the concentration of a pollutant is greater than the appropriate air quality standard.
GMCA	Greater Manchester Combined Authority
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
MCC	Manchester City Council
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.



Term	Definition
Road link	A length of road which is considered to have the same flow of traffic along it. Usually, a link is the road from one junction to the next.
$\mu\text{g}/\text{m}^3$ micrograms 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.
Uncertainty	A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy' and has replaced it on recent European legislation.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

Appendix C - Relevant UK Air Quality Strategy Objectives

Relevant UK Air Quality Strategy Objectives

National Air Quality Objectives and European Directive Limit Values for the Protection of Human Health						
Pollutant	Applies To	Objective	Measured As	Date to be achieved by and maintained thereafter	European Obligations	Date to be achieved by and maintained thereafter
Nitrogen dioxide (NO ₂)	UK	40µg/m ³	annual mean	31.12.2005	40µg/m ³	01.01.2010
	UK	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005	200µg/m ³ not to be exceeded more than 18 times a year	01.01.2010
Particulate Matter (PM ₁₀) (gravimetric) ^A	UK (except Scotland)	40µg/m ³	annual mean	31.12.2005	40µg/m ³	01.01.2010
	UK (except Scotland)	50µg/m ³ not to be exceeded more than 35 times a year	24-hour mean	31.12.2004	50µg/m ³ not to be exceeded more than 35 times a year	01.01.2005
Particulate Matter (PM _{2.5})	UK (except Scotland)	20µg/m ³	annual mean	01.01.2020	Stage 1 Limit - 25µg/m ³ Stage 2 Limit - 20µg/m ³	01.01.2015 01.01.2020

^A Measured using the European gravimetric transfer sampler or equivalent

µg/m³ = micrograms per cubic metre

Appendix D - IAQM Construction Assessment Methodology

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 D1 - Examples of Potential Dust Emission Magnitude

Magnitude	Activity	Criteria
Large	Demolition	>50,000m ³ building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks	Total site area greater than 10,000m ² Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 8m in height More than 100,000 tonnes of material moved
	Construction	Total building volume greater than 100,000m ³ On-site concrete batching Sandblasting
	Trackout	More than 50 Heavy Duty Vehicle (HDV) trips per day Potentially dusty surface material (e.g. high clay content) Unpaved road length greater than 100m
Medium	Demolition	20,000 - 50,000m ³ building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks	Total site area 2,500m ² to 10,000m ² ; Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 4m to 8m in height Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	Total building volume 25,000m ³ to 100,000m ³ Potentially dusty construction material (e.g. concrete) On-site concrete batching
	Trackout	10 to 50 HDV trips per day Moderately dusty surface material (e.g. high clay content) Unpaved road length 50m to 100m
Small	Demolition	<20,000m ³ building demolished, non-dusty material (e.g. metal cladding), <10m above ground level, work during wetter months



Magnitude	Activity	Criteria
Small	Earthworks	Total site area less than 2,500m ² ; Soil type with large grain size (e.g. sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 4m in height Total material moved less than 20,000 tonnes Earthworks during wetter months
	Construction	Total building volume less than 25,000m ³ Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	Less than 10 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

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 D2- 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 D3 - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentrations (µg/m ³)	Number of Receptors	Distance from the Source (m)				
			<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

Receptor Sensitivity	Annual Mean PM ₁₀ Concentrations (µg/m ³)	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
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 D4 - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (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 D5 - 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 E - Dispersion Model Details

Model Input Parameters

Traffic Flow Data

2019 is the most recent year for which monitoring data and meteorological data are available to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2025 is the anticipated opening year of the Proposed Development.

Baseline traffic data for use in the assessment, including 24-hour AADT flows and fleet composition as HDV proportion, were obtained from the PTC and DfT's Road Traffic Statistics website²⁴, where applicable. The DfT web tool enables the user to view and download available traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 2000 to 2021. It should be noted that the DfT web tool is referenced in Defra's LAQM.TG22 guidance as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the Site.

The 2019 traffic data obtained from DfT were converted to the anticipated operational year utilising a factor obtained from TEMPro (version 7.2c). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

Table E1 - 2019 Verification Traffic Data

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)
1	Site Access	-	-	-	-
2	Simonsway, East of Site Access	15,279	1.83	30	0.068855
3	Simonsway, Access/Exit onto Finney Road/ B5166 Styal Road Traffic Lights, Slow Down Phase	15,279	1.83	5	0.133628
4	B5166 Styal Road, South of Finney Road/ B5166 Styal Road Traffic Lights, Slow Down Phase	17,485	1.14	5	0.137757
5	B5166 Styal Road, South of Finney Road/ B5166 Styal Road Traffic Lights, North of Longstone and Cunningham Drive Road Junctions	17,485	1.14	30	0.076147
6	B5166 Styal Road, North of Longstone and Cunningham Drive Road Junctions	17,485	1.14	30	0.076147
7	B5166 Styal Road Northbound, North of A555 Manchester Airport Relief Road/ A555 Manchester Airport Eastern Link Road B5166 Styal Road Junction	8,743	1.14	30	0.038076
8	B5166 Styal Road Northbound, South of Longstone and Cunningham Drive Road Junctions	8,743	1.14	30	0.038076
9	B5166 Styal Road, North of A555 Manchester Airport Relief Road/ A555 Manchester Airport Eastern Link Road B5166 Styal Road Junction	17,485	1.14	15	0.098418
10	B5166 Styal Road, North of A555 Manchester Airport Relief Road/ A555 Manchester Airport Eastern Link Road B5166 Styal Road Junction, Slow Down Phase	11,540	1.14	5	0.090919
11	B5166 Styal Road, Slip Road Exit onto A555 Manchester Airport Relief Road	5,945	1.14	5	0.046838
12	B5166 Styal Road Northbound, Exit onto A555 Manchester Airport Relief Road/ A555 Manchester Airport Eastern Link Road B5166 Styal Road Junction, Slow Down Phase	2,706	2.94	5	0.027442
13	A555 Manchester Airport Relief Road/ A555 Manchester Airport Eastern Link Road B5166 Styal Road Junction, Access onto B5166 Styal Road Southbound, Slow Down Phase	5,412	2.94	5	0.054883

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)
14	B5166 Styal Road, South of A555 Manchester Airport Relief Road/ A555 Manchester Airport Eastern Link Road B5166 Styal Road Junction	10,824	2.94	20	0.061301
15	B5358 Wimslow Road, North of Kingston Road Junction	5,757	1.25	30	0.025211
16	Winslow Road, Access/Exit onto A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout	5,757	1.25	5	0.046153
17	A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout	7,374	2.30	10	0.052953
18	A555 Westbound Slip Road Exit onto A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout, Slow Down Phase	7,244	3.35	5	0.077194
19	A555 Westbound Slip Road Exit onto A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout	7,244	3.35	30	0.035064
20	A555 Westbound Slip Road Access from A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout, Slow Down Phase	9,416	2.54	5	0.090754
21	A555 Westbound Slip Road Access from A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout	9,416	2.54	30	0.043902
22	B5358 Wimslow Road, North of A555 Westbound Slip Road/ B5358 Wimslow Road Roundabout, South of A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout	5,757	1.25	10	0.037747
23	A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout	7,528	2.40	10	0.054507
24	A555 Eastbound Slip Road Access from A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout, Slow Down Phase	8,056	3.32	5	0.085544
25	A555 Eastbound Slip Road Access from A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout	8,056	3.32	30	0.038941
26	A555 Eastbound Slip Road Exit onto A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout, Slow Down Phase	9,416	2.54	5	0.090754
27	A555 Eastbound Slip Road Exit onto A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout	9,416	2.54	30	0.043902
28	B5358 Wimslow Road, North of A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout, Slow Down Phase	5,757	1.25	5	0.046153
29	B5358 Wimslow Road, North of A555 Eastbound Slip Road/ B5358 Wimslow Road Roundabout, South of B5094 Stanley Road	5,757	1.25	30	0.025211
30	A555 Eastbound, between Slip Roads	18,833	2.54	80	0.066733
31	A555 Westbound, between Slip Roads	18,833	2.54	80	0.066733
32	A555 Eastbound, East of B5166 Styal Road	18,833	2.54	80	0.066733
33	A555 Westbound, East of B5166 Styal Road	18,833	2.54	80	0.066733
34	A555 Manchester Airport Eastern Link Road Eastbound, East of Wimslow Road Roundabout	16,111	3.32	80	0.058000
35	A555 Manchester Airport Eastern Link Road Westbound, East of Wimslow Road Roundabout	14,488	3.35	80	0.052189
36	A555 Westbound, Slip Road Exit onto B5166 Styal Road	9,416	2.54	5	0.090754
37	A555 Westbound, East of B5166 Styal Road, Slow Down Phase	9,416	2.54	5	0.090754
38	A555 Eastbound, East of B5166 Styal Road, Slow Down Phase	18,833	2.54	5	0.181517

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO_x Emission Factor (g/km/s)
39	B5166 Styal Road, North of Simonsway/ Finney Lane, Slow Down Phase	12,334	1.29	5	0.099500
40	B5166 Styal Road, North of Simonsway/ Finney Lane, South of Brown Lane	12,334	1.29	30	0.054121
41	B5166 Styal Road, North of Brown Lane, South of Elmsleigh Road	12,334	1.29	30	0.054121
42	B5166 Styal Road, North of Elmsleigh Road, South of Yew Tree Grove	12,334	1.29	30	0.054121
43	B5166 Styal Road, North of Yew Tree Grove, South of Styal Grove	12,334	1.29	30	0.054121
44	B5166 Styal Road, North of Styal Grove, South of South Drive	12,334	1.29	30	0.054121
45	B5166 Styal Road, North of South Drive, South of Hollyhedge Road	12,334	1.29	30	0.054121
46	B5166 Styal Road, East of Hollyhedge Road, West of Stonepail Road	12,334	1.29	30	0.054121
47	B5166 Styal Road, West of Stonepail Road, South of Altrincham Road	12,334	1.29	30	0.054121
48	B5166 Styal Road, South of Altrincham Road, Slow Down Phase	12,334	1.29	5	0.099500
49	A560 Northenden Road, East of B5166 Styal Road, Slow Down Phase	8,295	2.44	5	0.078907
50	A560 Northenden Road, East of B5166 Styal Road, West of Church Road	8,295	2.44	30	0.038493
51	A560 Gatley Road, East of Church Road, West of Train Track	8,295	2.44	30	0.038493
52	A560 Gatley Road, East of Train Track, West of A34 Kingsway	8,295	2.44	30	0.038493
53	A560 Gatley Road, West of A34 Kingsway, Slow Down Phase	8,295	2.44	5	0.078907
54	A34 Kingsway Northbound, North of A560 Gatley Road, Slow Down Phase	30,619	2.38	5	0.288956
55	B5166 Longley Lane, North of A560 Altrincham Road, Slow Down Phase	9,677	0.98	5	0.074295
56	B5166 Longley Lane, North of A560 Altrincham Road	9,677	0.98	30	0.041803
57	A560 Altrincham Road, West of B5166 Longley Lane/ Park Road, Slow Down Phase	4,589	3.73	5	0.051094
58	A560 Altrincham Road, West of B5166 Longley Lane/ Park Road	4,589	3.73	30	0.022596
59	A34 Kingsway Northbound, North of A560 Gatley Road	30,619	2.38	30	0.141685
60	A34 Kingsway Southbound, North of A560 Gatley Road, Slow Down Phase	31,240	2.58	5	0.30267
61	A34 Kingsway Southbound, North of A560 Gatley Road	31,240	2.58	30	0.145931
62	A560 Gatley Road, East of A34 Kingsway, Slow Down Phase	9,376	3.21	5	0.098264
63	A560 Gatley Road, East of A34 Kingsway	9,376	3.21	30	0.045095
64	A34 Kingsway Northbound, South of A560 Gatley Road, Slow Down Phase	28,583	2.69	5	0.280879
65	A34 Kingsway Northbound, South of A560 Gatley Road	28,583	2.69	45	0.11262
66	A34 Kingsway Southbound, South of A560 Gatley Road Junction	27,761	2.49	45	0.108588
67	A34 Kingsway Southbound, South of A560 Gatley Road	27,761	2.49	45	0.108588

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)
68	A555 Manchester Airport Relief Road Eastbound, East of B5166 Styal Road, Slow Down Phase	10,196	3.25	5	0.107370
69	A555 Manchester Airport Relief Road Westbound, East of B5166 Styal Road, Slow Down Phase	20,392	3.25	5	0.214741
70	A555 Manchester Airport Relief Road Eastbound, East of B5166 Styal Road	20,392	3.25	80	0.073308
71	A555 Manchester Airport Relief Road Eastbound	20,392	3.25	80	0.073308
72	B5166 Styal Road, Slip Road Access onto A555 Manchester Airport Relief Road Westbound, Slow Down Phase	2,706	2.94	5	0.027442
73	A555 Manchester Airport Relief Road Westbound, West of B5166 Styal Road	20,392	3.25	80	0.073308
74	A555 Manchester Airport Relief Road Eastbound, Slip Road Access onto B5166 Styal Road, Slow Down Phase	10,196	3.25	5	0.10737
75	B5166 Hollin Lane, South of B5166 Styal Road, North of Holly Lane	10,824	2.94	45	0.043034
76	Simonsway, West of Site Access	13,269	2.50	30	0.06175
77	Simonsway	13,269	2.50	30	0.06175
78	Simonsway at Shadow Moss Road Junction, Slow Down Phase	13,269	2.50	5	0.127223
79	Simonsway, West of Shadow Moss Road	13,269	2.50	30	0.06175
80	Simonsway at Haslington Road Junction	13,269	2.50	30	0.06175
81	Simonsway, West of Haslington Road Junction	13,269	2.50	30	0.06175
82	Simonsway, East of Brownley Road/ Ruddpark Road	13,269	2.50	30	0.06175
83	Simonsway Westbound, East of Brownley Road/ Ruddpark Road, Slow Down Phase	6,635	2.50	5	0.063616
84	Simonsway Eastbound, East of Brownley Road/ Ruddpark Road, Slow Down Phase	6,635	2.50	5	0.063616
85	Simonsway Westbound, West of Brownley Road/ Ruddpark Road, Slow Down Phase	6,727	3.45	5	0.072531
86	Simonsway Eastbound, West of Brownley Road/ Ruddpark Road, Slow Down Phase	6,727	3.45	5	0.072531
87	Simonsway, West of Brownley Road/ Ruddpark Road	13,453	3.45	30	0.065413
88	Simonsway at Rowlandsway Junction, Slow Down Phase	13,453	3.45	5	0.145051
89	Simonsway, West of Rowlandsway Junction	13,453	3.45	30	0.065413
90	Simonsway, East of Fleming Road, Slow Down Phase	13,453	3.45	5	0.145051
91	Simonsway, West of Fleming Road, Slow Down Phase	13,453	3.45	5	0.145051
92	Simonsway, West of Fleming Road, East of St Petersburg Way	13,453	3.45	30	0.065413
93	Simonsway, at St Petersburg Way Junction, Slow Down Phase	13,453	3.45	5	0.145051
94	Simonsway, East of Poundswick Lane, Slow Down Phase	13,453	3.45	5	0.145051
95	Simonsway, West of Poundswick Lane, Slow Down Phase	14,171	2.90	5	0.142996
96	Simonsway, West of Poundswick Lane, East of Greenwood Road	14,171	2.90	20	0.080072
97	Simonsway, West of Greenwood Road, East of Portway	14,171	2.90	30	0.067193
98	Simonsway, West of Portway	14,171	2.90	30	0.067193
99	Simonsway Westbound, East of M56 North Cheshire Motorway Wythenshawe Junction	7,086	2.90	20	0.040039
100	Simonsway Westbound, East of M56 North Cheshire Motorway Wythenshawe Junction, Slow Down Phase	7,086	2.90	5	0.071503

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO_x Emission Factor (g/km/s)
101	Simonsway Eastbound, East of M56 North Cheshire Motorway Wythenshawe Junction	7,086	2.90	20	0.040039
102	Simonsway Eastbound, East of M56 North Cheshire Motorway Wythenshawe Junction, Slow Down Phase	7,086	2.90	10	0.053414
103	A555 Manchester Airport Relief Road Westbound, West of B5166 Styal Road, East of Ringway Road Traffic Light Junction	20,392	3.25	80	0.073308
104	A555 Manchester Airport Relief Road Westbound, at Ringway Road Traffic Light Junction, Slow Down Phase	20,392	3.25	5	0.214741
105	A555 Manchester Airport Relief Road Westbound, West of Ringway Road Traffic Light Junction	20,392	3.25	80	0.073308
106	A555 Manchester Airport Relief Road Westbound, East of A555 Airport Spur	17,480	3.68	60	0.064125
107	A555 Manchester Airport Relief Road Westbound, East of A555 Airport Spur, Slow Down Phase	17,480	3.68	20	0.103212
108	A555 Manchester Airport Relief Road Westbound, Access onto A555 Airport Spur, Slow Down Phase	20,392	3.25	5	0.214741
109	A555 Manchester Airport Relief Road Eastbound, West of B5166 Styal Road, East of Ringway Road Traffic Light Junction	20,392	3.25	80	0.073308
110	A555 Manchester Airport Relief Road Eastbound, East of Ringway Road Traffic Light Junction, Slow Down Phase	20,392	3.25	10	0.157957
111	A555 Manchester Airport Relief Road Eastbound, West of Ringway Road Traffic Light Junction, Slow Down Phase	20,392	3.25	5	0.214741
112	A555 Manchester Airport Relief Road Eastbound, East of Enterprise Way	20,392	3.25	80	0.073308
113	A555 Manchester Airport Relief Road Eastbound, at Enterprise Way Traffic Light Junction, Slow Down Phase	20,392	3.25	10	0.157957
114	A555 Manchester Airport Relief Road Eastbound, West of Enterprise Way Traffic Light Junction, Slow Down Phase	17,480	3.68	5	0.193523
115	A555 Manchester Airport Relief Road Eastbound, West of Enterprise Way Traffic Light Junction	17,480	3.68	40	0.075198
116	A555 Manchester Airport Relief Road Eastbound, Access from A555 Airport Spur, Slow Down Phase	17,480	3.68	5	0.193523
117	Finney Lane, East of B5166 Styal Road, Slow Down Phase	9,051	1.45	5	0.074836
118	Finney Lane, Access onto B5166 Styal Road, South of Junction, Slow Down Phase	4,663	1.45	5	0.038555
119	Finney Lane, East of B5166 Styal Road	13,714	1.45	30	0.060658
120	Finney Lane	13,714	1.45	30	0.060658
121	Tuffley Road, East of Greenbrow Road, Slow Down Phase	12,888	3.19	5	0.134747
122	Tuffley Road, East of Greenbrow Road	12,888	3.19	20	0.074041
123	Tuffley Road, East of Greenbrow Road, West of M56 North Cheshire Motorway Wythenshawe Junction	12,888	3.19	30	0.06193
124	Simonsway Westbound, over M56 at Wythenshawe Junction, Slow Down Phase	7,086	2.90	5	0.071503
125	Simonsway Westbound, west of M56 North Cheshire Motorway Wythenshawe Junction, Slow Down Phase	6,444	3.19	10	0.049686
126	Simonsway Eastbound, over M56 at Wythenshawe Junction, Slow Down Phase	7,086	2.90	5	0.071503
127	Simonsway Eastbound, west of M56 North Cheshire Motorway Wythenshawe Junction, Slow Down Phase	6,444	3.19	5	0.067374

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO_x Emission Factor (g/km/s)
128	Simonsway Eastbound, Access onto M56 North Cheshire Motorway Northbound, Slow Down Phase	20,771	5.31	5	0.272512
129	Simonsway Westbound, Access onto M56 North Cheshire Motorway Northbound, Slow Down Phase	20,771	5.31	5	0.272512
130	Access from Wythenshawe Junction onto M56 North Cheshire Motorway Northbound, Slow Down Phase	41,542	5.31	60	0.159367
131	M56 North Cheshire Motorway Northbound, North of Wythenshawe Junction	83,084	5.31	80	0.311102
132	M56 North Cheshire Motorway Northbound	83,084	5.31	80	0.311102
133	Access from M56 North Cheshire Motorway Southbound onto Simonsway Eastbound, Slow Down Phase	20,771	5.31	5	0.272512
134	Access from M56 North Cheshire Motorway Southbound onto Simonsway Westbound, Slow Down Phase	20,771	5.31	5	0.272512
135	Access from M56 North Cheshire Motorway Southbound onto Simonsway Slip Road, Slow Down Phase	41,542	5.31	30	0.218964
136	Access from M56 North Cheshire Motorway Southbound onto Simonsway Slip Road	41,542	5.31	60	0.159367
137	M56 North Cheshire Motorway Southbound North of Simonsway Slip Road	83,084	5.31	80	0.311102
138	M56 North Cheshire Motorway Southbound	83,084	5.31	80	0.311102
139	M56 North Cheshire Motorway Southbound	83,084	5.31	80	0.311102
140	M56 North Cheshire Motorway Southbound, South of Wythenshawe Junction, North of A555 Airport Spur Slip Road	83,084	5.31	80	0.311102
141	M56 North Cheshire Motorway Northbound, South of Wythenshawe Junction, North of A555 Airport Spur Slip Road	83,084	5.31	80	0.311102
142	M56 North Cheshire Motorway Northbound, between A555 Airport Spur Slip Roads	83,084	5.31	80	0.311102
143	M56 North Cheshire Motorway Southbound, between A555 Airport Spur Slip Roads	83,084	5.31	80	0.311102
144	M56 North Cheshire Motorway Northbound, South of A555 Airport Spur Slip Road	65,755	6.65	80	0.252608
145	M56 North Cheshire Motorway Southbound, South of A555 Airport Spur Slip Road	65,755	6.65	80	0.252608
146	M56 North Cheshire Motorway Southbound, A555 Airport Spur Slip Road	65,755	6.65	60	0.261325
147	M56 North Cheshire Motorway Northbound, A555 Airport Spur Slip Road	65,755	6.65	60	0.261325
148	M56 North Cheshire Motorway Northbound, A555 Airport Spur Slip Road, bridge over M56 North Cheshire Motorway	65,755	6.65	60	0.261325
149	M56 North Cheshire Motorway Northbound, A555 Airport Spur Slip Road, East of bridge over M56 North Cheshire Motorway	65,755	6.65	60	0.261325
150	A555 Airport Spur Eastbound, South of combined M56 North Cheshire Motorway Slip Roads	29,097	2.42	80	0.10285
151	A555 Airport Spur Westbound, West of Terminal 2 Roundabout Slip Roads	29,097	2.42	80	0.10285
152	A555 Airport Spur Westbound, Access onto M56 North Cheshire Motorway Southbound	29,097	2.42	60	0.102968

Road Link	Description	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)
153	A555 Airport Spur Westbound, Access onto M56 North Cheshire Motorway Northbound, East of bridge over M56 North Cheshire Motorway	29,097	2.42	60	0.102968
154	A555 Airport Spur Westbound, Access onto M56 North Cheshire Motorway Northbound, bridge over M56 North Cheshire Motorway	29,097	2.42	60	0.102968
155	A555 Airport Spur Westbound, Access onto M56 North Cheshire Motorway Northbound, West of bridge over M56 North Cheshire Motorway	29,097	2.42	60	0.102968
156	A555 Airport Spur Eastbound, East of Terminal 2 Roundabout Slip Roads	29,097	2.42	40	0.119216
157	A555 Airport Spur Eastbound, Access onto A555 Ringway Road West	14,548	2.42	20	0.079927
158	A555 Airport Spur Eastbound, Access onto A555 Ringway Road West, Traffic Light Junction Slow Down Phase	14,548	2.42	5	0.138023
159	A555 Airport Spur Westbound, West of Outwood Lane	14,548	2.42	40	0.059606
160	A555 Airport Spur Eastbound, West of Outwood Lane, Slow Down Phase	14,548	2.42	5	0.138023
161	B5358 Wimslow Road, at Kingston Road Junction, Slow Down Phase	5,757	1.25	5	0.046153
162	B5358 Wimslow Road, South of Kingston Road Junction	5,757	1.25	30	0.025211

Table E2 - 2025 Without Development Traffic Data

Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
1	-	-	-	-	-	-
2	16,705	1.83	30	0.040862	0.006471	0.003633
3	16,705	1.83	5	0.087250	0.006794	0.003956
4	19,117	1.14	5	0.088291	0.007618	0.004435
5	19,117	1.14	30	0.045884	0.007263	0.004080
6	19,117	1.14	30	0.045884	0.007263	0.004080
7	9,559	1.14	30	0.022943	0.003632	0.002040
8	9,559	1.14	30	0.022943	0.003632	0.002040
9	19,117	1.14	15	0.058742	0.007429	0.004247
10	12,617	1.14	5	0.058271	0.005028	0.002927
11	6,500	1.14	5	0.030020	0.002590	0.001508
12	2,959	2.94	5	0.018333	0.001242	0.000724
13	5,917	2.94	5	0.036659	0.002484	0.001447
14	11,834	2.94	20	0.035183	0.004789	0.002714
15	6,223	1.25	30	0.014982	0.002372	0.001332
16	6,223	1.25	5	0.029340	0.002488	0.001448
17	8,015	2.30	10	0.030590	0.003276	0.001896
18	7,830	3.35	5	0.051324	0.003326	0.001937
19	7,830	3.35	30	0.019944	0.003162	0.001773
20	10,295	2.54	5	0.060175	0.004274	0.002489
21	10,295	2.54	30	0.025669	0.004067	0.002282
22	6,223	1.25	10	0.022250	0.002466	0.001426
23	8,181	2.40	10	0.031411	0.003354	0.001941
24	8,708	3.32	5	0.056850	0.003696	0.002152

Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
25	8,708	3.32	30	0.022163	0.003513	0.001970
26	10,295	2.54	5	0.060175	0.004274	0.002489
27	10,295	2.54	30	0.025669	0.004067	0.002282
28	6,223	1.25	5	0.029340	0.002488	0.001448
29	6,223	1.25	30	0.014982	0.002372	0.001332
30	20,357	2.54	80	0.038831	0.007874	0.004344
31	20,357	2.54	80	0.038831	0.007874	0.004344
32	20,591	2.54	80	0.039278	0.007964	0.004394
33	20,591	2.54	80	0.039278	0.007964	0.004394
34	17,414	3.32	80	0.033345	0.006877	0.003791
35	15,660	3.35	80	0.029990	0.006190	0.003411
36	10,295	2.54	5	0.060175	0.004274	0.002489
37	10,295	2.54	5	0.060175	0.004274	0.002489
38	20,591	2.54	5	0.120356	0.008548	0.004978
39	13,486	1.29	5	0.064057	0.005398	0.003143
40	13,486	1.29	30	0.032503	0.005145	0.002890
41	13,486	1.29	30	0.032503	0.005145	0.002890
42	13,486	1.29	30	0.032503	0.005145	0.002890
43	13,486	1.29	30	0.032503	0.005145	0.002890
44	13,486	1.29	30	0.032503	0.005145	0.002890
45	13,486	1.29	30	0.032503	0.005145	0.002890
46	13,486	1.29	30	0.032503	0.005145	0.002890
47	13,486	1.29	30	0.032503	0.005145	0.002890
48	13,486	1.29	5	0.064057	0.005398	0.003143
49	8,966	2.44	5	0.051621	0.003711	0.002161
50	8,966	2.44	30	0.022295	0.003532	0.001982
51	8,966	2.44	30	0.022295	0.003532	0.001982
52	8,966	2.44	30	0.022295	0.003532	0.001982
53	8,966	2.44	5	0.051621	0.003711	0.002161
54	33,096	2.38	5	0.188809	0.013676	0.007964
55	10,460	0.98	5	0.046843	0.004148	0.002415
56	10,460	0.98	30	0.024995	0.003956	0.002223
57	4,960	3.73	5	0.034163	0.002129	0.001240
58	4,960	3.73	30	0.012759	0.002023	0.001134
59	33,096	2.38	30	0.082166	0.013017	0.007304
60	33,767	2.58	5	0.198554	0.014034	0.008172
61	33,767	2.58	30	0.084281	0.013354	0.007492
62	10,135	3.21	5	0.065189	0.004288	0.002497
63	10,135	3.21	30	0.025721	0.004077	0.002286
64	30,895	2.69	5	0.184644	0.012881	0.007501
65	30,895	2.69	45	0.065519	0.012116	0.006736
66	30,007	2.49	45	0.063412	0.011704	0.006509
67	30,007	2.49	45	0.063412	0.011704	0.006509
68	11,148	3.25	5	0.072096	0.004722	0.002750
69	22,296	3.25	5	0.144191	0.009444	0.005500
70	22,296	3.25	80	0.042678	0.008789	0.004845
71	22,296	3.25	80	0.042678	0.008789	0.004845
72	2,959	2.94	5	0.018333	0.001242	0.000724
73	22,296	3.25	80	0.042678	0.008789	0.004845



Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
74	11,148	3.25	5	0.072096	0.004722	0.002750
75	11,834	2.94	45	0.025207	0.004672	0.002597
76	14,507	2.50	30	0.036132	0.005725	0.003212
77	14,507	2.50	30	0.036132	0.005725	0.003212
78	14,507	2.50	5	0.084286	0.006015	0.003503
79	14,507	2.50	30	0.036132	0.005725	0.003212
80	14,507	2.50	30	0.036132	0.005725	0.003212
81	14,507	2.50	30	0.036132	0.005725	0.003212
82	14,507	2.50	30	0.036132	0.005725	0.003212
83	7,254	2.50	5	0.042146	0.003008	0.001752
84	7,254	2.50	5	0.042146	0.003008	0.001752
85	7,355	3.45	5	0.048855	0.003133	0.001825
86	7,355	3.45	5	0.048855	0.003133	0.001825
87	14,709	3.45	30	0.037564	0.005955	0.003339
88	14,709	3.45	5	0.097702	0.006265	0.003649
89	14,709	3.45	30	0.037564	0.005955	0.003339
90	14,709	3.45	5	0.097702	0.006265	0.003649
91	14,709	3.45	5	0.097702	0.006265	0.003649
92	14,709	3.45	30	0.037564	0.005955	0.003339
93	14,709	3.45	5	0.097702	0.006265	0.003649
94	14,709	3.45	5	0.097702	0.006265	0.003649
95	15,494	2.90	5	0.095450	0.006498	0.003784
96	15,494	2.90	20	0.045999	0.006264	0.003550
97	15,494	2.90	30	0.039002	0.006181	0.003467
98	15,494	2.90	30	0.039002	0.006181	0.003467
99	7,747	2.90	20	0.022999	0.003132	0.001775
100	7,747	2.90	5	0.047725	0.003249	0.001892
101	7,747	2.90	20	0.022999	0.003132	0.001775
102	7,747	2.90	10	0.030634	0.003222	0.001865
103	22,296	3.25	80	0.042678	0.008789	0.004845
104	22,296	3.25	5	0.144191	0.009444	0.005500
105	22,296	3.25	80	0.042678	0.008789	0.004845
106	19,112	3.68	60	0.037288	0.007644	0.004223
107	19,112	3.68	20	0.058333	0.007892	0.004470
108	22,296	3.25	5	0.144191	0.009444	0.005500
109	22,296	3.25	80	0.042678	0.008789	0.004845
110	22,296	3.25	10	0.089959	0.009367	0.005422
111	22,296	3.25	5	0.144191	0.009444	0.005500
112	22,296	3.25	80	0.042678	0.008789	0.004845
113	22,296	3.25	10	0.089959	0.009367	0.005422
114	19,112	3.68	5	0.130800	0.008193	0.004772
115	19,112	3.68	40	0.043339	0.007720	0.004298
116	19,112	3.68	5	0.130800	0.008193	0.004772
117	9,897	1.45	5	0.048397	0.003980	0.002317
118	5,098	1.45	5	0.024930	0.002050	0.001194
119	14,995	1.45	30	0.036300	0.005747	0.003228
120	14,995	1.45	30	0.036300	0.005747	0.003228
121	14,092	3.19	5	0.090394	0.005959	0.003470
122	14,092	3.19	20	0.042273	0.005742	0.003254



Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
123	14,092	3.19	30	0.035745	0.005666	0.003177
124	7,747	2.90	5	0.047725	0.003249	0.001892
125	7,046	3.19	10	0.028332	0.002955	0.001711
126	7,747	2.90	5	0.047725	0.003249	0.001892
127	7,046	3.19	5	0.045197	0.002980	0.001735
128	22,710	5.31	5	0.187857	0.010176	0.005927
129	22,710	5.31	5	0.187857	0.010176	0.005927
130	45,420	5.31	60	0.090236	0.018944	0.010447
131	90,841	5.31	80	0.175635	0.037766	0.020771
132	90,841	5.31	80	0.175635	0.037766	0.020771
133	22,710	5.31	5	0.187857	0.010176	0.005927
134	22,710	5.31	5	0.187857	0.010176	0.005927
135	45,420	5.31	30	0.121614	0.019302	0.010804
136	45,420	5.31	60	0.090236	0.018944	0.010447
137	90,841	5.31	80	0.175635	0.037766	0.020771
138	90,841	5.31	80	0.175635	0.037766	0.020771
139	90,841	5.31	80	0.175635	0.037766	0.020771
140	90,841	5.31	80	0.175635	0.037766	0.020771
141	90,841	5.31	80	0.175635	0.037766	0.020771
142	90,841	5.31	80	0.175635	0.037766	0.020771
143	90,841	5.31	80	0.175635	0.037766	0.020771
144	71,894	6.65	80	0.139903	0.030896	0.016970
145	71,894	6.65	80	0.139903	0.030896	0.016970
146	71,894	6.65	60	0.144941	0.030999	0.017072
147	71,894	6.65	60	0.144941	0.030999	0.017072
148	71,894	6.65	60	0.144941	0.030999	0.017072
149	71,894	6.65	60	0.144941	0.030999	0.017072
150	31,813	2.42	80	0.060648	0.012265	0.006767
151	31,813	2.42	80	0.060648	0.012265	0.006767
152	31,813	2.42	60	0.061191	0.012303	0.006806
153	31,813	2.42	60	0.061191	0.012303	0.006806
154	31,813	2.42	60	0.061191	0.012303	0.006806
155	31,813	2.42	60	0.061191	0.012303	0.006806
156	31,813	2.42	40	0.070343	0.012423	0.006926
157	15,907	2.42	20	0.046409	0.006346	0.003597
158	15,907	2.42	5	0.091305	0.006581	0.003832
159	15,907	2.42	40	0.035172	0.006212	0.003463
160	15,907	2.42	5	0.091305	0.006581	0.003832
161	6,223	1.25	5	0.029340	0.002488	0.001448
162	6,223	1.25	30	0.014982	0.002372	0.001332

Table E3 - 2025 With Development Traffic Data

Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO_x Emission Factor (g/km/s)	PM₁₀ Emission Factor (g/km/s)	PM_{2.5} Emission Factor (g/km/s)
1	3,520	6.00	5	0.031245	0.001606	0.000936
2	17,949	2.81	30	0.045075	0.007143	0.004007
3	17,949	2.81	5	0.109159	0.007509	0.004373
4	19,761	1.72	5	0.101307	0.008011	0.004664
5	19,761	1.72	30	0.048192	0.007631	0.004285
6	19,761	1.72	30	0.048192	0.007631	0.004285
7	9,881	1.72	30	0.024097	0.003816	0.002143
8	9,881	1.72	30	0.024097	0.003816	0.002143
9	19,761	1.72	15	0.062386	0.007810	0.004464
10	13,042	1.72	5	0.066861	0.005287	0.003078
11	6,521	1.72	5	0.033431	0.002643	0.001539
12	3,012	2.94	5	0.018661	0.001265	0.000736
13	6,025	2.94	5	0.037328	0.002530	0.001473
14	12,049	2.94	20	0.035823	0.004877	0.002763
15	6,223	1.25	30	0.014982	0.002372	0.001332
16	6,223	1.25	5	0.029340	0.002488	0.001448
17	8,035	2.30	10	0.030666	0.003284	0.001901
18	7,830	3.35	5	0.051324	0.003326	0.001937
19	7,830	3.35	30	0.019944	0.003162	0.001773
20	10,348	2.54	5	0.060485	0.004296	0.002501
21	10,348	2.54	30	0.025801	0.004088	0.002294
22	6,223	1.25	10	0.022250	0.002466	0.001426
23	8,200	2.40	10	0.031484	0.003362	0.001945
24	8,708	3.32	5	0.056850	0.003696	0.002152
25	8,708	3.32	30	0.022163	0.003513	0.001970
26	10,348	2.54	5	0.060485	0.004296	0.002501
27	10,348	2.54	30	0.025801	0.004088	0.002294
28	6,223	1.25	5	0.029340	0.002488	0.001448
29	6,223	1.25	30	0.014982	0.002372	0.001332
30	20,357	2.54	80	0.038831	0.007874	0.004344
31	20,357	2.54	80	0.038831	0.007874	0.004344
32	20,697	2.54	80	0.039480	0.008005	0.004416
33	20,697	2.54	80	0.039480	0.008005	0.004416
34	17,414	3.32	80	0.033345	0.006877	0.003791
35	15,660	3.35	80	0.029990	0.006190	0.003411
36	10,348	2.54	5	0.060485	0.004296	0.002501
37	10,348	2.54	5	0.060485	0.004296	0.002501
38	20,697	2.54	5	0.120975	0.008592	0.005003
39	13,978	1.29	5	0.066394	0.005595	0.003257
40	13,978	1.29	30	0.033689	0.005333	0.002996
41	13,978	1.29	30	0.033689	0.005333	0.002996
42	13,978	1.29	30	0.033689	0.005333	0.002996
43	13,978	1.29	30	0.033689	0.005333	0.002996
44	13,978	1.29	30	0.033689	0.005333	0.002996
45	13,978	1.29	30	0.033689	0.005333	0.002996
46	13,978	1.29	30	0.033689	0.005333	0.002996
47	13,978	1.29	30	0.033689	0.005333	0.002996

Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
48	13,978	1.29	5	0.066394	0.005595	0.003257
49	8,966	2.44	5	0.051621	0.003711	0.002161
50	8,966	2.44	30	0.022295	0.003532	0.001982
51	8,966	2.44	30	0.022295	0.003532	0.001982
52	8,966	2.44	30	0.022295	0.003532	0.001982
53	8,966	2.44	5	0.051621	0.003711	0.002161
54	33,096	2.38	5	0.188809	0.013676	0.007964
55	10,460	0.98	5	0.046843	0.004148	0.002415
56	10,460	0.98	30	0.024995	0.003956	0.002223
57	4,960	3.73	5	0.034163	0.002129	0.001240
58	4,960	3.73	30	0.012759	0.002023	0.001134
59	33,096	2.38	30	0.082166	0.013017	0.007304
60	33,767	2.58	5	0.198554	0.014034	0.008172
61	33,767	2.58	30	0.084281	0.013354	0.007492
62	10,135	3.21	5	0.065189	0.004288	0.002497
63	10,135	3.21	30	0.025721	0.004077	0.002286
64	30,895	2.69	5	0.184644	0.012881	0.007501
65	30,895	2.69	45	0.065519	0.012116	0.006736
66	30,007	2.49	45	0.063412	0.011704	0.006509
67	30,007	2.49	45	0.063412	0.011704	0.006509
68	11,203	3.50	5	0.074905	0.004779	0.002783
69	22,406	3.50	5	0.149810	0.009557	0.005566
70	22,406	3.50	80	0.042941	0.008891	0.004900
71	22,406	3.50	80	0.042941	0.008891	0.004900
72	3,012	2.94	5	0.018661	0.001265	0.000736
73	22,406	3.50	80	0.042941	0.008891	0.004900
74	11,203	3.50	5	0.074905	0.004779	0.002783
75	12,049	2.94	45	0.025665	0.004757	0.002644
76	16,791	3.26	30	0.042669	0.006764	0.003792
77	16,791	3.26	30	0.042669	0.006764	0.003792
78	16,791	3.26	5	0.108737	0.007114	0.004143
79	16,791	3.26	30	0.042669	0.006764	0.003792
80	16,791	3.26	30	0.042669	0.006764	0.003792
81	16,791	3.26	30	0.042669	0.006764	0.003792
82	16,791	3.26	30	0.042669	0.006764	0.003792
83	8,396	3.26	5	0.054372	0.003557	0.002072
84	8,396	3.26	5	0.054372	0.003557	0.002072
85	8,429	4.21	5	0.061601	0.003667	0.002136
86	8,429	4.21	5	0.061601	0.003667	0.002136
87	16,857	4.21	30	0.043902	0.006963	0.003901
88	16,857	4.21	5	0.123195	0.007333	0.004271
89	16,857	4.21	30	0.043902	0.006963	0.003901
90	16,857	4.21	5	0.123195	0.007333	0.004271
91	16,857	4.21	5	0.123195	0.007333	0.004271
92	16,857	4.21	30	0.043902	0.006963	0.003901
93	16,857	4.21	5	0.123195	0.007333	0.004271
94	16,857	4.21	5	0.123195	0.007333	0.004271
95	17,641	3.62	5	0.119805	0.007550	0.004397
96	17,641	3.62	20	0.053730	0.007273	0.004120



Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
97	17,641	3.62	30	0.045252	0.007175	0.004022
98	17,641	3.62	30	0.045252	0.007175	0.004022
99	8,821	3.62	20	0.026867	0.003637	0.002060
100	8,821	3.62	5	0.059906	0.003775	0.002199
101	8,821	3.62	20	0.026867	0.003637	0.002060
102	8,821	3.62	10	0.036340	0.003745	0.002168
103	22,406	3.50	80	0.042941	0.008891	0.004900
104	22,406	3.50	5	0.149810	0.009557	0.005566
105	22,406	3.50	80	0.042941	0.008891	0.004900
106	19,221	3.97	60	0.037623	0.007746	0.004278
107	19,221	3.97	20	0.059262	0.007999	0.004530
108	22,406	3.50	5	0.149810	0.009557	0.005566
109	22,406	3.50	80	0.042941	0.008891	0.004900
110	22,406	3.50	10	0.091689	0.009480	0.005488
111	22,406	3.50	5	0.149810	0.009557	0.005566
112	22,406	3.50	80	0.042941	0.008891	0.004900
113	22,406	3.50	10	0.091689	0.009480	0.005488
114	19,221	3.97	5	0.136430	0.008306	0.004838
115	19,221	3.97	40	0.043836	0.007823	0.004355
116	19,221	3.97	5	0.136430	0.008306	0.004838
117	9,966	1.45	5	0.048734	0.004008	0.002334
118	5,134	1.45	5	0.025106	0.002065	0.001202
119	15,100	1.45	30	0.036554	0.005787	0.003250
120	15,100	1.45	30	0.036554	0.005787	0.003250
121	14,162	3.19	5	0.090843	0.005989	0.003487
122	14,162	3.19	20	0.042483	0.005771	0.003270
123	14,162	3.19	30	0.035922	0.005694	0.003193
124	8,821	3.62	5	0.059906	0.003775	0.002199
125	7,081	3.19	10	0.028472	0.002970	0.001719
126	8,821	3.62	5	0.059906	0.003775	0.002199
127	7,081	3.19	5	0.045422	0.002994	0.001744
128	22,970	5.37	5	0.191215	0.010309	0.006005
129	22,970	5.37	5	0.191215	0.010309	0.006005
130	45,940	5.37	60	0.091330	0.019190	0.010582
131	91,879	5.37	80	0.177693	0.038255	0.021039
132	91,879	5.37	80	0.177693	0.038255	0.021039
133	22,970	5.37	5	0.191215	0.010309	0.006005
134	22,970	5.37	5	0.191215	0.010309	0.006005
135	45,940	5.37	30	0.123190	0.019552	0.010944
136	45,940	5.37	60	0.091330	0.019190	0.010582
137	91,879	5.37	80	0.177693	0.038255	0.021039
138	91,879	5.37	80	0.177693	0.038255	0.021039
139	91,879	5.37	80	0.177693	0.038255	0.021039
140	90,841	5.31	80	0.175635	0.037766	0.020771
141	90,841	5.31	80	0.175635	0.037766	0.020771
142	91,879	5.37	80	0.177693	0.038255	0.021039
143	91,879	5.37	80	0.177693	0.038255	0.021039
144	72,004	6.73	80	0.140171	0.031004	0.017028
145	72,004	6.73	80	0.140171	0.031004	0.017028



Road Link	AADT (Total vehicles)	%HDV	Speed (km/h)	NO _x Emission Factor (g/km/s)	PM ₁₀ Emission Factor (g/km/s)	PM _{2.5} Emission Factor (g/km/s)
146	72,004	6.73	60	0.145289	0.031107	0.017130
147	72,004	6.73	60	0.145289	0.031107	0.017130
148	72,004	6.73	60	0.145289	0.031107	0.017130
149	72,004	6.73	60	0.145289	0.031107	0.017130
150	31,923	2.59	80	0.060909	0.012364	0.006820
151	31,923	2.59	80	0.060909	0.012364	0.006820
152	31,923	2.59	60	0.061521	0.012403	0.006860
153	31,923	2.59	60	0.061521	0.012403	0.006860
154	31,923	2.59	60	0.061521	0.012403	0.006860
155	31,923	2.59	60	0.061521	0.012403	0.006860
156	31,923	2.59	40	0.070829	0.012524	0.006981
157	15,961	2.59	20	0.046856	0.006398	0.003626
158	15,961	2.59	5	0.093992	0.006635	0.003864
159	15,961	2.59	40	0.035413	0.006262	0.003490
160	15,961	2.59	5	0.093992	0.006635	0.003864
161	6,223	1.25	5	0.029340	0.002488	0.001448
162	6,223	1.25	30	0.014982	0.002372	0.001332

Roughness Length

The roughness length (z_0) is a modelling parameter applied to allow consideration of surface height roughness elements. A z_0 of 1m was used to describe the modelling extents and 0.2m for the meteorological station site. These values of z_0 are considered appropriate for the morphology of these areas and are suggested within ADMS-Roads as being suitable for 'cities, woodlands' and 'agricultural areas (min)', respectively.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents and a length of 10m for the meteorological station site. These values are considered appropriate for the nature of these areas and are suggested within ADMS-Roads as being suitable for 'cities and large towns' and 'small towns <50,000'.

Model Verification

Introduction

The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations, which can arise due to the presence of inaccuracies and/or uncertainties in model input data, modelling and monitoring data assumptions. The following are examples of potential causes of such discrepancy:

- Estimates of background pollutant concentrations;
- Meteorological data uncertainties;
- Traffic data uncertainties;
- Model input parameters, such as 'roughness length'; and
- Overall limitations of the dispersion model.

Nitrogen Dioxide (NO₂)

Most NO₂ is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of the primary pollutant emissions of nitrogen oxides (NO_x = NO + NO₂), in line with the guidance provided within LAQM.TG22.

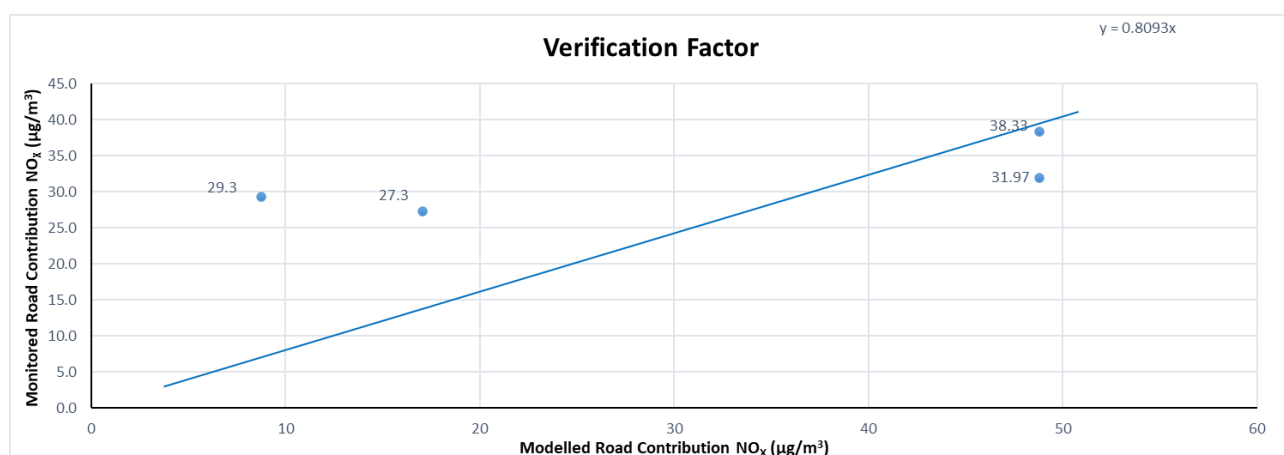
The model has been run to predict the 2019 annual mean road-NO_x contribution at three roadside diffusion tubes and at one automatic monitor, within the modelled road network at the verification locations with suitable monitoring data and traffic data for the 2019 verification year. The model outputs of road-NO_x have been compared with the 'measured' road-NO_x, which was determined from the NO₂ concentration measured using the diffusion tubes at the monitoring locations, utilising the NO_x to NO₂ Calculator provided by Defra and the NO₂ background concentration (from the Defra background map). As discussed in the methodology section, the most recent suitable data available for model verification purposes is 2019 data.

Table E4 - Model Verification

Site ID	2019 Monitored Total NO ₂ (µg/m ³)	2019 Background NO ₂ (µg/m ³)	2019 Monitored Road Contribution NO _x (µg/m ³)	2019 Modelled Road Contribution NO _x (µg/m ³)	Ratio
CE92	27.4	10.8	27.3	17.1	1.597
STK7	36.0	15.5	31.97	48.8	0.655
ST2NO, ST12NO, ST14NO	38.9	15.5	38.33	48.8	0.785
CE279	28.4	10.8	29.3	8.8	3.348

The road-NO_x adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (**Figure E1**). This resulted in a factor of **0.81**, indicating that the model was over-predicting. Therefore, in order to perform a robust assessment, a factor of **1.00** was applied to the modelled road-NO_x concentration for each monitoring site to provide adjusted modelled road-NO_x concentrations. The total NO₂ concentration was then determined by inputting the adjusted modelled road-NO_x concentration and the background NO₂ concentration into the NO_x to NO₂ Calculator.

Figure E1 - Comparison of Measured Road-NO_x with Unadjusted Modelled Road-NO_x



Particulate Matter (PM₁₀ and PM_{2.5})

The local PM₁₀ adjustment factor was determined between the 'measured' road contribution and the model derived road contribution. This resulted in a factor of **1.60**, indicating that the model was under-predicting. This road-PM₁₀ adjustment factor was applied to the modelled road-PM₁₀ concentration for each monitoring site to provide adjusted modelled road-PM₁₀ concentrations.

There is no local PM_{2.5} monitoring data against which the model could be verified. Consequently, the verification factor determined above for adjusting the road-PM₁₀ contribution has been applied to the predicted road -PM_{2.5} contributions, consistent with guidance set out in LAQM.TG22.

Model Uncertainty

An evaluation of model performance has been undertaken to establish confidence in model results. LAQM.TG22 identifies a number of statistical procedures that are appropriate to evaluate model performance and assess the uncertainty. These include:

- a) Root mean square error (RMSE);
- b) Fractional bias (FB); and
- c) Correlation coefficient (CC).

These parameters estimate how the model results agree or diverge from the observations. These calculations can be carried out prior to, and after adjustment, or based on different options for adjustment, and can provide useful information on model improvement. Further details can be found in Box 7-17 of LAQM.TG22.

Table E5 - Methods for Describing Model Uncertainty

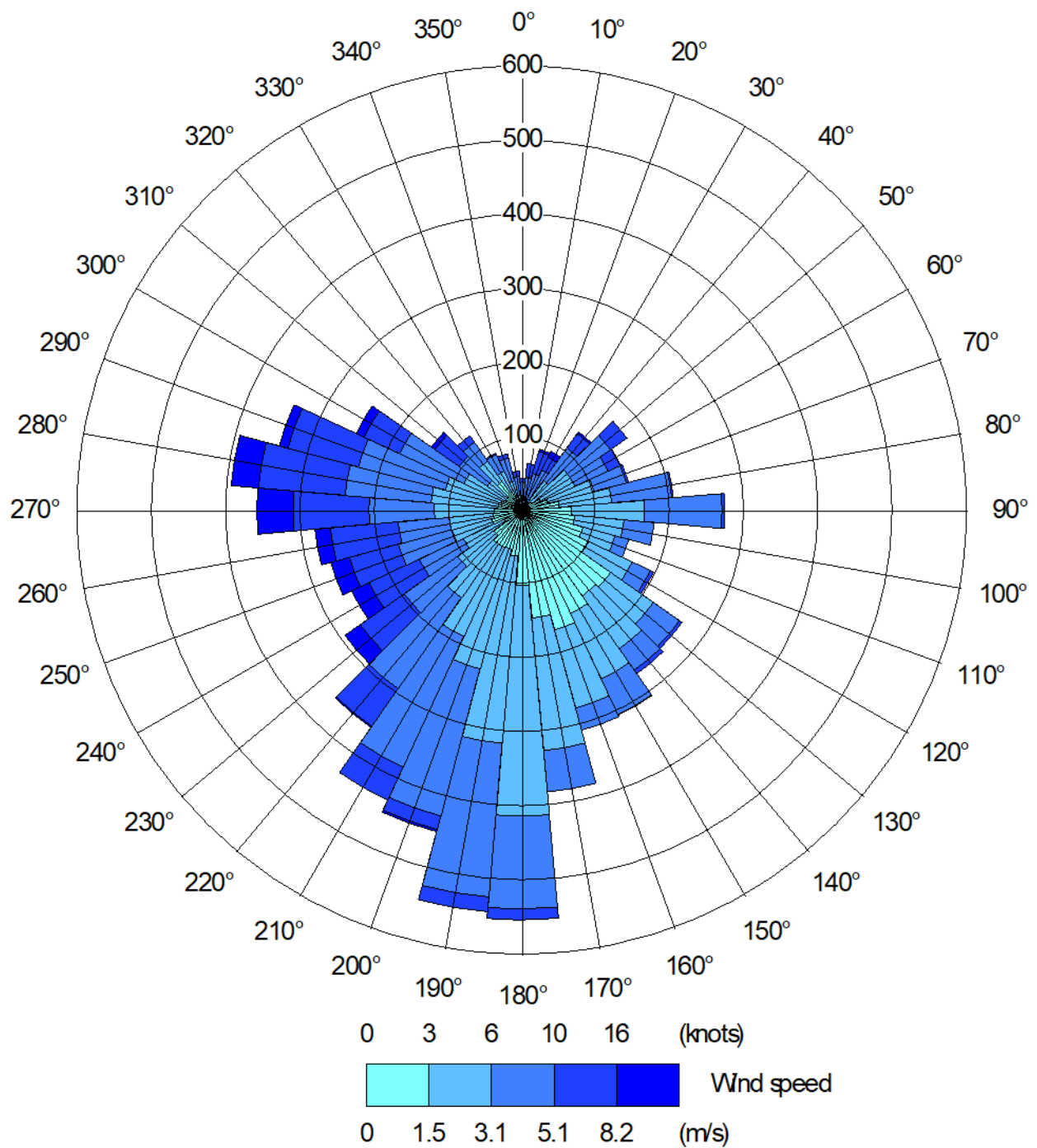
Statistical Parameter	Comments
RMSE	RMSE is used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared. If the RMSE values are higher than 25% of the objective being assessed, it is recommended that the model inputs and verification should be revisited in order to make improvements. For example, if the model predictions are for the annual mean NO₂ objective of 40µg/m³, if an RMSE of 10µg/m³ or above is determined for a model 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.
Fractional Bias	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.
Correlation Coefficient	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.

To assess the uncertainty of a model, the RMSE is the simplest parameter to calculate providing an estimate of the average error of the model in the same units as the modelled predictions. It is also often easier to interpret the RMSE than the other statistical parameters and therefore it has been calculated in this assessment to understand the model uncertainty.

The overall weighted RMSE value calculated after verification was below 25% and, therefore, the final predictions are considered to be acceptable.

Appendix F - Wind Rose for Manchester Airport (2019)

Wind Rose for Manchester (2019)



Appendix G - Dispersion Modelling Results

Table G1 - Annual Mean NO₂ Concentration

Receptor	Future Without Dev. (µg/m ³)	Future With Dev. (µg/m ³)	% of AQAL	Change (µg/m ³)	% of AQO	Impact
R1	14.8	14.9	37.3	0.1	<0.5	Negligible
R2	15.6	15.7	39.3	0.1	<0.5	Negligible
R3	16.1	16.2	40.5	0.1	<0.5	Negligible
R4	15.1	15.1	37.8	<0.1	<0.5	Negligible
R5	14.0	14.1	35.3	0.1	<0.5	Negligible
R6	18.0	18.1	45.3	0.1	<0.5	Negligible
R7	15.4	15.5	38.8	0.1	<0.5	Negligible
R8	14.6	14.7	36.8	0.1	<0.5	Negligible
R9	24.3	24.3	60.8	<0.1	<0.5	Negligible
R10	25.9	25.9	64.8	<0.1	<0.5	Negligible
R11	31.5	31.6	79.0	0.1	<0.5	Negligible
R12	24.5	24.6	61.5	0.1	<0.5	Negligible
R13	25.9	26.0	65.0	0.1	<0.5	Negligible
R14	20.4	20.5	51.3	0.1	<0.5	Negligible
R15	23.1	23.1	57.8	<0.1	<0.5	Negligible
R16	23.9	23.9	59.8	<0.1	<0.5	Negligible
R17	29.2	29.4	73.5	0.2	0.5	Negligible
R18	20.3	20.5	51.3	0.2	0.5	Negligible
R19	21.4	21.9	54.8	0.5	1.3	Negligible
R20	18.0	18.4	46.0	0.4	1.0	Negligible
R21	16.9	17.3	43.3	0.4	1.0	Negligible
R22	16.8	17.3	43.3	0.5	1.3	Negligible
R23	16.5	16.9	42.3	0.4	1.0	Negligible
R24	16.5	16.9	42.3	0.4	1.0	Negligible

* Results are rounded to 0.1µg/m³

Table G2 - Annual Mean PM₁₀ Concentration

Receptor	Future Without Dev. (µg/m³)	Future With Dev. (µg/m³)	% of AQAL	Change (µg/m³)	% of AQO	Impact
R1	10.5	10.5	26.3	<0.1	<0.5	Negligible
R2	10.7	10.7	26.8	<0.1	<0.5	Negligible
R3	10.8	10.8	27.0	<0.1	<0.5	Negligible
R4	10.2	10.2	25.6	<0.1	<0.5	Negligible
R5	10.0	10.0	25.0	<0.1	<0.5	Negligible
R6	10.6	10.6	26.5	<0.1	<0.5	Negligible
R7	9.7	9.7	24.3	<0.1	<0.5	Negligible
R8	9.6	9.6	24.0	<0.1	<0.5	Negligible
R9	14.3	14.3	35.8	<0.1	<0.5	Negligible
R10	14.9	14.9	37.3	<0.1	<0.5	Negligible
R11	17.1	17.1	42.8	<0.1	<0.5	Negligible
R12	14.4	14.4	36.0	<0.1	<0.5	Negligible
R13	16.0	16.0	40.0	<0.1	<0.5	Negligible
R14	13.8	13.8	34.5	<0.1	<0.5	Negligible
R15	14.4	14.5	36.3	0.1	<0.5	Negligible
R16	14.7	14.8	37.0	0.1	<0.5	Negligible
R17	16.4	16.4	41.0	<0.1	<0.5	Negligible
R18	13.7	13.7	34.3	<0.1	<0.5	Negligible
R19	14.0	14.1	35.3	0.1	<0.5	Negligible
R20	11.8	11.9	29.8	0.1	<0.5	Negligible
R21	11.2	11.3	28.3	0.1	<0.5	Negligible
R22	11.1	11.2	28.0	0.1	<0.5	Negligible
R23	11.0	11.1	27.8	0.1	<0.5	Negligible
R24	11.0	11.1	27.8	0.1	<0.5	Negligible

* Results are rounded to 0.1µg/m³

Table G3 - Annual Mean PM_{2.5} Concentration

Receptor	Future Without Dev.(µg/m ³)	Future With Dev. (µg/m ³)	% of AQAL	Change (µg/m ³)	% of AQO	Impact
R1	7.3	7.3	29.4	<0.1	<0.5	Negligible
R2	7.5 (7.50)	7.6 (7.55)	30.2	<0.1	<0.5	Negligible
R3	7.6	7.6	30.6	<0.1	<0.5	Negligible
R4	7.2	7.2	28.8	<0.1	<0.5	Negligible
R5	6.9	6.9	27.7	<0.1	<0.5	Negligible
R6	7.5	7.5	30.0	<0.1	<0.5	Negligible
R7	6.7	6.7	26.9	<0.1	<0.5	Negligible
R8	6.6	6.6	26.4	<0.1	<0.5	Negligible
R9	10.0	10.0	40.1	<0.1	<0.5	Negligible
R10	10.4	10.4	41.7	<0.1	<0.5	Negligible
R11	12.6	12.6	50.6	<0.1	<0.5	Negligible
R12	9.9	9.9	39.6	<0.1	<0.5	Negligible
R13	11.4 (11.40)	11.5 (11.45)	45.8	<0.1	<0.5	Negligible
R14	9.3	9.3	37.2	<0.1	<0.5	Negligible
R15	9.9 (9.90)	10.0 (9.95)	39.8	<0.1	<0.5	Negligible
R16	10.2	10.2	41.0	<0.1	<0.5	Negligible
R17	11.9	11.9	47.7	<0.1	<0.5	Negligible
R18	9.2	9.2	36.9	<0.1	<0.5	Negligible
R19	9.5	9.6	38.3	0.1	<0.5	Negligible
R20	8.2	8.3	33.2	0.1	<0.5	Negligible
R21	7.9	8.0	31.9	0.1	<0.5	Negligible
R22	7.8	7.9	31.5	0.1	<0.5	Negligible
R23	7.7	7.8	31.3	0.1	<0.5	Negligible
R24	7.7	7.8	31.2	0.1	<0.5	Negligible

* Results are rounded to 0.1µg/m³