



Air Quality Assessment

Proposed Construction of a New McDonalds Drive-Thru Restaurant at:

Molesworth Street, Rochdale

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ENVIRONMENTAL AND
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Executive Summary

Encon Associates were commissioned by McDonald's Restaurants Ltd (the 'Client') to carry out an air quality assessment in connection with the proposed new McDonalds Drive-Thru restaurant at Molesworth Street, Rochdale (the 'Site').

The Site falls within the Metropolitan Borough of Rochdale (RBC). In 2005, RBC declared an Air Quality Management Area (AQMA) due to exceedances of the annual mean nitrogen dioxide (NO₂) limit value. The designated area was amended in 2016 and incorporated into the Greater Manchester Combined Authority AQMA. The Site falls outside the AQMA, however during the operational phase the proposed development will increase traffic on road links within the designated area and therefore a detailed assessment of potential impacts on air quality is required.

It is inevitable that with any development, demolition and construction activities will cause some disturbance to those nearby. Dust arising from most construction activities tends to be of a coarse nature, which through dispersion by the wind can lead to soiling of property including windows, cars, external paintwork and laundry. However, as well as giving rise to annoyance due to soiling of surfaces from dust emissions, there is evidence of major construction activities causing increases in long term PM₁₀ concentrations and in the number of days exceeding the short term PM₁₀ objective of 50 µgm⁻³.

The IAQM guidance on assessing impacts on air quality from construction activities and determining the likely significance has been used to determine the risk of impacts occurring during the construction of the development and to identify appropriate mitigation measures to be implemented on site to reduce dust emissions and associated impacts.

Due to the proximity of nearby residential receptors the Site is considered to have a medium risk of impacts with regards to dust soiling and PM₁₀ concentrations. However, following the implementation of appropriate mitigation measures impacts associated with the construction of the development are likely to be insignificant.

Detailed modelling has been used to predict the impact of operational traffic on local air quality. The assessment has found that impacts associated with operational traffic will be negligible including within the AQMA.

The baseline assessment has shown that NO₂, PM₁₀ and PM_{2.5} are meeting the relevant UK air quality standards within the Site. The Site is deemed suitable for retail development and impacts in terms of exposure will be negligible.

The energy strategy will be from all electric sources therefore there will be no significant on-site emissions and impacts during operation of energy plant on local air quality will be negligible.

The proposed development would meet current national and local planning policy and based on the above, air quality does not pose a constraint to development of the site to provide a new drive-thru restaurant.

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1.1 Introduction

Encon Associates were commissioned by McDonald's Restaurants Ltd (the 'Client') to carry out an air quality assessment in connection with the proposed new McDonalds Drive-Thru restaurant at Molesworth Street, Rochdale (the 'Site').

The Site falls within the Metropolitan Borough of Rochdale (RBC). In 2005, RBC declared an Air Quality Management Area (AQMA) due to exceedances of the annual mean nitrogen dioxide (NO₂) limit value. The designated area was amended in 2016 and incorporated into the Greater Manchester Combined Authority AQMA.

The Site falls outside the AQMA, however during the operational phase, the proposed development will increase traffic on road links within the designated area and therefore a detailed assessment of potential impacts on air quality is required.

This report addresses the impact of the proposed development on local air quality. Potential sources of emissions are identified and assessed in the context of existing air quality and emission sources and the nature and location of receptors.

A glossary of air quality terminology is provided in Appendix A.

1.2 Scope of Assessment

The development will provide a new Drive-Thru restaurant. The potential impacts associated with operational traffic have been assessed against the current air quality planning guidance published by the Institute of Air Quality Management (IAQM) ¹.

Air quality at the Site has also been assessed to determine the suitability of the Site for commercial development. The assessment has concentrated on nitrogen dioxide (NO₂) and particulate matter with an aerodynamic diameter of less than 10 µm and 2.5 µm (PM₁₀ and PM_{2.5}), the pollutants most associated with traffic emissions and which can be harmful and cause discomfort to humans.

¹ EPUK & IAQM (May 2017) Land-Use Planning and Development Control: Planning for Air Quality v.1.2.

An assessment of air quality impacts associated with the construction of the proposed development has been undertaken following the methodology set out within the Institute of Air Quality Management (IAQM) guidance².

² IAQM (2024) Guidance on the Assessment of Dust from Demolition and Construction. Version 2.2

2 Site Description

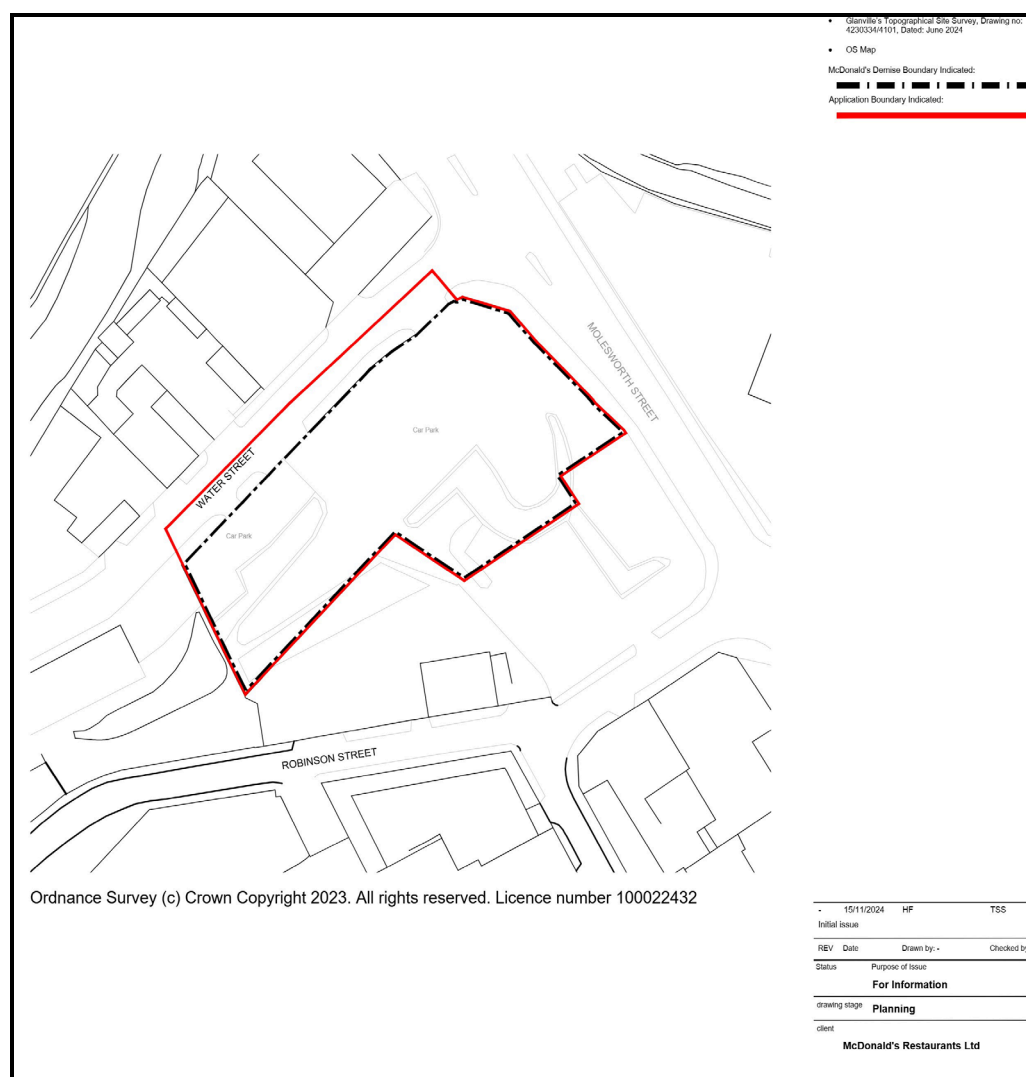
2.1 The Existing Site

The Site is located at the junction of Water Street and Molesworth Street, approximately 500m east of Rochdale town centre.

The Site is in a predominantly commercial area. There is a car dealership opposite the Site on Water Street and retail uses to the east beyond Molesworth Street. The Site is bounded to the south by an existing car park and scrap yard. The nearest residential properties are 160m northeast of the Site on Entwisle Road.

The location of the Site is shown in Figure 2.1.

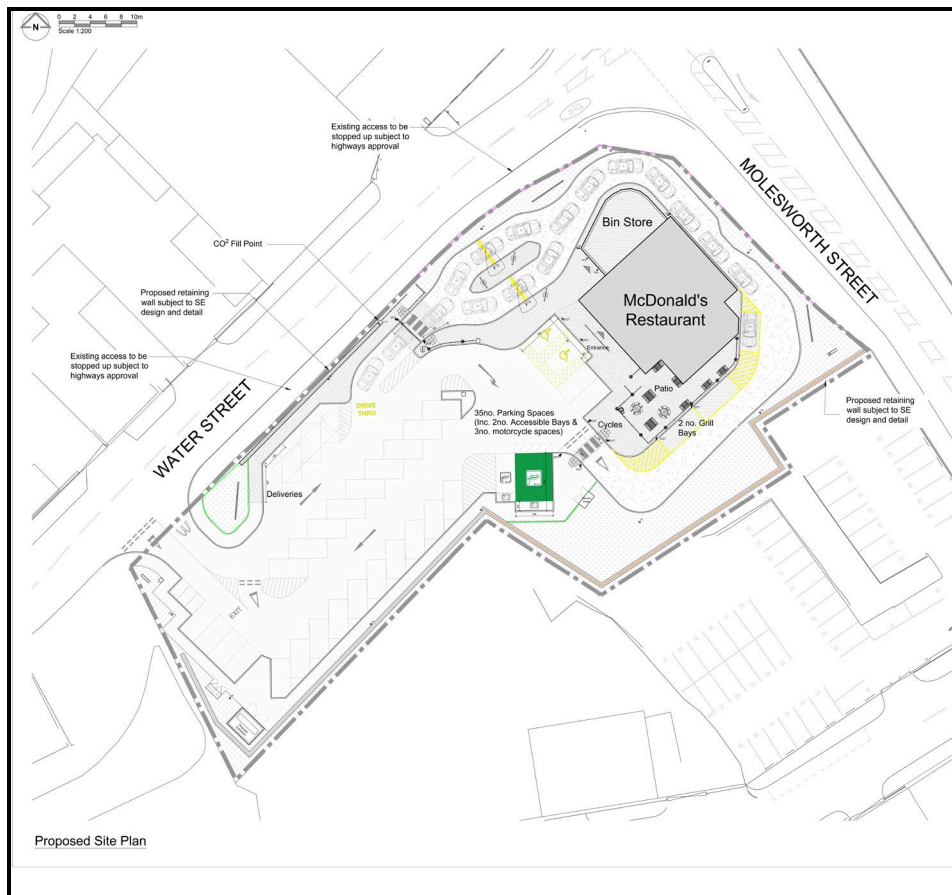
Figure 2.1: Location of proposed development site



2.2 Proposed Development

The proposed application is for the construction of a new McDonalds Drive-Thru restaurant, with access from the existing retail site car park. The proposals will include the restaurant with adjacent Drive-Thru lane and 35 no. car parking spaces, including 2 accessible bays and 3 motorcycle spaces. An indicative site layout is shown in Figure 2.2.

Figure 2.2: Indicative Layout of Site



3 Policy Context

3.1 National Legislation and Policy

3.1.1 The Air Quality Regulations

The Air Quality Standard Regulations 2010³ and Air Quality EU Exit Regulations 2019⁴ set out a series of limit values for the protection of human health and critical levels for the protection of vegetation. Concentration limits apply both nationally, where they are the responsibility of national government and locally, where achieving them is the responsibility of the relevant local authority. The UK is currently exceeding the objective limits for nitrogen dioxide (NO₂) and particulate matter (PM₁₀) within London and a number of other air quality zones within the UK.

The air quality limits are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

For some pollutants, there is both a long-term (annual mean) limit and a short-term limit. 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 (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

Of the pollutants included in the regulations, NO₂, PM₁₀ and PM_{2.5} are of particular relevance to this assessment as these are the primary pollutants associated with road traffic. The current limit values for these three pollutants in relation to human health are set out in Table 3.1.

In relation to PM_{2.5}, new legal targets are set out in the recently published Environmental Improvement Plan (EIP) 2023⁵ and Statutory Instrument 'The Environmental Targets (Fine

³ Air Quality Regulations 2010-Statutory Instrument 2010 No.1001

⁴ Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 – Statutory Instrument 2019 No. 74

⁵ HM Government Environmental Improvement Plan 2023, First Revision of the 25 Year Environment Plan

Particulate Matter) (England) Regulations 2023⁶. Although legally binding, it is central government's responsibility for meeting these future targets. Local Authorities currently have no statutory obligation to achieve these targets. For the purposes of this assessment the limit value for PM_{2.5} as set out in the 2010 regulations (as provided in Table 3.1) is considered to be appropriate to apply for this assessment. However, the new targets set out in the EIP are also provided in Table 3.1 and given consideration within the report.

Table 3.1: Relevant Objectives set out in the Air Quality Strategy

Pollutant	Concentrations	Measured As	Date to be Achieved by
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 µg/m ³	Annual mean	31 December 2005
Particulate Matter (PM ₁₀)	50 µg/m ³ not to be exceeded more than 35 times per year	24-hour mean	31 December 2010
	40 µg/m ³	Annual mean	31 December 2010
Particulate Matter (PM _{2.5})	20 µg/m ³	Annual Mean	1 January 2020
	10 µg/m ³ (Long term EIP Target)	Annual Mean	31 December 2040
	12 µg/m ³ (short term EIP Target)	Annual Mean	31 January 2028

The NAQOs apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within LAQM.TG(22)⁷ on where the objectives apply, as detailed in Table 3.2. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways).

Table 3.2: Locations Where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building Facades of residential properties, schools, hospitals, care home etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties.

⁶ The Environmental Targets (Fine particulate Matter) (England) Regulations 2023 – Statutory Instrument 2023 No.96

⁷ Defra (2022) Local Air Quality Management. Technical Guidance LAQM.TG(22)

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
		Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
24-hour mean	All locations where the annual mean objective would apply together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 hour mean objectives apply. Kerbside Sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend 1-hour or more. Any outdoor locations where the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.

3.1.2 The UK Air Quality Strategy

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) published in August 2023⁸. The document sets out the strategic framework for improving air quality and responsibilities of local authorities to address air quality exceedances in their areas. This includes requirements for declaring Air Quality Management Areas (AQMA) and publishing Air Quality Action Plans (AQAPs) setting out measures to reduce emissions and comply with the limit values.

The strategy also sets out expectations on local authorities to implement preventative action to ensure future breaches of the limit values do not occur.

3.1.3 Local Air Quality Management – The Environment Act 1995

Local authorities are seen to play a particularly important role. Section 82 of the Environment Act 1995 requires every local authority to conduct a review of the air quality from time to time within the authority's area. The DEFFA technical guidance, LAQM.TG(22), continues with the streamlined

⁸ DEFRA (2023) The Air Quality Strategy: Framework for Local Authority Delivery, August 2023

approach to the Local Air Quality Management (LAQM) regime, whereby every authority has to undertake and submit a single Annual Status Report/Annual Progress Report within its area, to identify whether the objectives have been or will be achieved at relevant locations by the applicable date. If the objectives are not being met, the authority must declare an Air Quality Management Area (section 83 of the Act) and prepare an action plan (section 84) which identifies measures that will be introduced in pursuit of the objectives.

3.1.4 Control of Dust and Particulates Associated with Construction

Section 79 of the Environmental Protection Act (1990)⁹ states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

- *'any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and*
- *'any accumulation or deposit which is prejudicial to health or a nuisance'.*

Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

In the context of the proposed development, the main potential for nuisance of this nature would arise during the construction phase - potential sources being the clearance, earthworks, construction and landscaping processes.

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. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates. However, impacts remain subjective and statutory limits have yet to be derived.

3.2 Planning Policy

3.2.1 National Planning Policy

⁹ Secretary of State, The Environment Act 1990 HMSO

The latest edition of the National Planning Policy Framework (NPPF)¹⁰ was published in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied. The main changes to the policy, primarily impact on planning making and on planning decisions on housing proposals. The presumption in favour of sustainable development still remains at the heart of the NPPF which requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development. In addition, members of the United Nations, including the United Kingdom, *'have agreed to pursue the 17 Global Goals for Sustainable Development in the period to 2030. These address social progress, economic well-being and environmental protection.'*

The three overarching objectives for achieving sustainable development remain the same, including the environmental objective, however, the wording of this objective has been altered slightly. It includes a requirement *'to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'*

Section 15: Conserving and Enhancing the Natural Environment, remains and the NPPF (paragraph 174) requires that *'planning policies and decisions should contribute to and enhance the natural local environment by ... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality.'*

In dealing specifically with air quality the NPPF (paragraph 186) states that *'planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to*

¹⁰ Department for Levelling up, Housing and Communities (2023) National Planning Policy Framework, December 2023

improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.'

Paragraph 188 states that *'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'.*

3.2.2 Local Planning Policy

Rochdale Core Strategy

The Rochdale Core Strategy¹¹ sets out the overall strategic plan for the district.

In dealing with air quality the Plan sets out the following under Policy G9 – Reducing the impact of pollution, contamination and land instability:

'We will reduce all forms of pollution, contamination and land instability in the borough, by:

- a. Focusing on measures that reduce air pollution in Air Quality Management Areas, and other areas where pollution levels are unacceptable, particularly around motorways and main roads;*
- b. Requiring that development does not have impacts that lead to an unacceptable increase in air, water, noise, light or other pollution;*
- c. Ensuring sensitive new developments such as housing, schools and hospitals are not adversely affected by existing sources of pollution such as roads and certain types of industry;*
- d. Requiring a Low Emissions Strategy (LES) where development requires a Transport Assessment, and in other circumstances as appropriate;*

....

¹¹ Rochdale Borough Council (2016) Rochdale Core Strategy, October 2016

g. Using planning conditions or obligations to control pollution from new development, or the impact of pollution on new development.'

In addition, Policy DM2 - Delivering planning contributions and infrastructure states '*For all types of development, including housing, we will seek contributions for any infrastructure or other measures necessary to mitigate any on site or off-site impacts from the development. These contributions may cover, dependent on need:*

....

e. Mitigation or compensation against environmental impacts e.g. noise, air quality (particularly in Air Quality Management Areas).

3.3 Air Quality Guidance

3.3.1 DEFRA Technical Guidance

LAQM.TG(22) sets out detailed guidance on how air quality should be assessed and monitored by local authorities. The document provides useful guidance on how air quality from specific sources should be screened and the approaches that should be used to undertake detailed assessment where potentially significant emissions are identified, including details on model verification and consideration of monitoring data for use in assessments.

3.3.2 IAQM Land Use Planning and Development Control: Planning for Air Quality

Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) have published joint guidance on the assessment of air quality impacts for planning purpose. This includes information on when an air quality assessment is required, what should be included in an assessment and criteria for assessing the significance of any impacts. The scope of the operational impact and exposure assessment within this report are based on the guidance set out in this document.

3.3.3 IAQM Guidance on the Assessment of Dust from Demolition and Construction

The IAQM recently updated the guidance on assessing impacts from construction and demolition activities². The methodology for identifying the risk magnitude of potential dust sources associated with demolition, construction, earthworks and trackout remains as detailed in the previous version, but the numbers used to define the risk categories have been updated. The risk magnitude of potential dust sources is then used to identify the level of mitigation necessary in order for the impacts to be not significant.

4 Methodology

4.1 Construction Phase

4.1.1 Construction Traffic

During construction of the proposed development, lorries will require access to the Site to deliver and remove materials; earthmoving plant and other mobile machinery will work on site and generators and cranes will also be in operation. These machines produce exhaust emissions; of particular concern are emissions of NO₂ and PM₁₀.

It is anticipated that during the construction phase there would be no more than 8-10 heavy duty vehicles (HDV) accessing the Site in any given day. The criteria set out in the IAQM air quality planning guidance indicates that significant impacts on air quality are unlikely to occur where a development results in less than 25 HDV movements per day within an AQMA and less than 100 per day elsewhere. It is therefore anticipated that construction traffic generated by the proposed development would result in a negligible impact on local NO₂ and PM₁₀ concentrations and has not been considered any further in this assessment

4.1.2 Construction/Fugitive Dust

Construction phase activities associated with the Proposed Development may result in the generation of fugitive dust emissions (i.e. dust emissions generated by site-specific activities that disperse beyond the construction site boundaries).

If transported beyond the site boundary, dust can have an adverse impact on local air quality. The IAQM has published a guidance document for the assessment of demolition and construction phase impacts¹². The guidance considers the potential for dust nuisance and impacts to human health and ecosystems to occur due to activities carried out during the following stages of construction:

- Demolition (removal of existing structures).
- Earthworks (soil-stripping, ground-levelling, excavation and landscaping).
- Construction (activities involved in the provision of a new structure); and

¹² IAQM (June 2016) Guidance on the assessment of dust from demolition and construction Version 1.1

- Trackout (the transport of dust and dirt from the construction site onto the public road network where it may be deposited and then re-suspended by vehicles using the network).

A qualitative assessment of air quality impacts due to the release of fugitive dust and particulates (PM₁₀) during the construction phase was undertaken in accordance with the methodology detailed in the IAQM guidance.

The assessment 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, thus enabling a level of risk to be assigned. 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 B.

4.2 Air Quality Impact Assessment

4.2.1 Baseline Assessment

A baseline assessment of air quality in the vicinity of the Site and the surrounding area has been carried out through a review of monitoring data available within the Greater Manchester Combined Authority (GMCA) air quality review and assessment reports, most notably the GMCA 2022 Air Quality Annual Status Report (ASR)¹³. Additional data has been obtained from the UK Air Information Resource (UK-AIR) background pollution maps.

The results of the baseline assessment have been used to inform the exposure assessment.

4.2.2 Operational Traffic Assessment

The air quality planning guidance published by IAQM sets out criteria for establishing when there is a risk of significant impacts on local air quality as a result of traffic generated by a proposed development. The guidance states that where the following criteria are exceeded a more detailed assessment is required:

¹³ Greater Manchester Combined Authority (2023) 2022 Air Quality Annual Status Report, June 2023

- An increase in LGV of more than 100 vehicles per day within or adjacent to an AQMA, an increase of more than 500 per day elsewhere;
- An increase in HGV of more than 25 vehicles per day within or adjacent to an AQMA, an increase of more than 100 per day elsewhere.

Where operational trips exceed the above criteria potential impacts on local air quality may need to be assessed using detailed modelling in accordance with the methodology below.

Introduction

The prediction of air quality at the Site has been undertaken using the ADMS Roads dispersion model (Version 5.0.1, released January 2022). This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data from Manchester Airport Meteorological Station for 2022 has been used for the assessment.

The model has been used to predict road specific concentrations of oxides of nitrogen (NO_x), PM₁₀ and PM_{2.5}. The predicted concentrations of NO_x have been converted to NO₂ using the LAQM calculator available on the Defra air quality website version 8.1, published in August 2020¹⁴.

Emissions Data

The model uses traffic flow data and vehicle related emission factors to predict road specific concentrations of oxides of nitrogen (NO_x) and particulate matter (PM₁₀ and PM_{2.5}) at selected receptors.

The assessment has predicted air quality during 2022 for model verification and to predict concentrations at sensitive receptor locations.

¹⁴ <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/>

The emission factors released by Defra in August 2024, provided in the Emissions Factors Toolkit, EFT_v12.1¹⁵, have been used to predict traffic related emissions of PM and NO_x.

Traffic Data

Traffic data for use in the assessment has been provided by the transport consultants for the proposed development, Andrew Moseley Associates. Data for the following scenarios has been provided:

- 2022 Baseline
- 2025 Opening Year Do Minimum
- 2025 Opening Year Do Something

A summary of the traffic data is provided in Appendix C.

Background Concentrations

The ADMS model predicts concentrations arising as a result of vehicle emissions. It is necessary to add an estimate of local background concentrations to obtain the total concentration for comparison against the air quality objectives.

Background concentrations of NO₂, PM₁₀ and PM_{2.5} have been taken from the Defra background maps¹⁶. Comparison of the 2022 Defra data and 2022 NO₂ concentrations measured at the nearest background monitoring site RO18ANO, located on Penn Street, shows the measured concentrations to be highest, however the data capture at this location was poor (67%). A data capture of 100% was achieved in 2022 at the Holmes Street background monitoring location, which measured an annual mean NO₂ concentration that is in excellent agreement with the Defra data.

The Defra mapped data are therefore considered representative of the 2022 background concentrations in the Study Area and have been used in the assessment to predict potential impacts at sensitive receptor locations.

¹⁵ <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

¹⁶ <https://uk-air.defra.gov.uk/data/laqm-background-home>

To ensure a worst-case assessment, 2022 background concentrations have been used for the 2025 assessment scenario, assuming no decline in background concentrations between the two assessment years.

Details of the background data used in the modelling assessment is provided in Table 5.2.

Model Outputs and processing

The ADMS Model has predicted traffic related annual mean emissions of oxides of nitrogen (NO_x) and PM at existing sensitive receptors located adjacent to those road links where the development would exceed the IAQM screening criteria.

The predicted concentrations of NO_x have been converted to NO₂ using the LAQM calculator (Version 8.1, released August 2020) available on the Defra air quality website¹⁷.

Relevant background concentrations have subsequently been added to the model outputs to provide the total concentrations across the Site.

Analysis of long-term monitoring data¹⁸ suggests that if the annual mean NO₂ concentration is less than 60 µg/m³ then the one-hour mean NO₂ objective is unlikely to be exceeded where road transport is the main source of pollution. Therefore, in this assessment the annual mean concentration has been used to screen whether the one-hour mean objective is likely to be achieved as recommended within LAQM.TG(22). Similar to NO₂, an annual mean PM₁₀ concentrations below 32 µg/m³ is used to screen whether the 24-hour PM₁₀ mean objective is likely to be achieved, the approach also recommended within LAQM.TG(22).

4.2.3 Verification of Model results

It is recommended that the model results are compared with measured data to determine whether the model results need adjusting to more accurately reflect local air quality. This process is known as verification.

¹⁷ <https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/>

¹⁸ D Laxen and B Marner: Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites (July 2003).

LAQM.TG(22) recommends that model predictions should be within 25% (preferably 10%) of monitored concentrations for the model to be predicting with any degree of accuracy. Also, the guidance recommends that any adjustment factors applied to model results should be calculated based on verification using monitoring sites in a similar location i.e. roadside, intermediate or background sites.

To verify the model results, the ADMS model has been used to predict NO_x concentrations at local monitoring site RO26ANO, located on Whitworth Road. Other monitoring sites in the area have been excluded from the model verification due to poor data capture or because the characteristics of the road (traffic flows, streetscape, traffic speeds etc.) are too dissimilar from the road links that have been identified for assessment.

Further details on the verification and calculation of adjustment factors are provided in Appendix D. Details of the approach taken for PM₁₀ and PM_{2.5} are also set out in Appendix D.

4.2.4 Model Uncertainty

There are many components that contribute to the uncertainty of predicted concentrations. The model used in the assessment is dependent upon the traffic data that is used within it and which will have inherent uncertainties associated with it. There is also the additional uncertainty as the model simplified real-world conditions into a series of algorithms.

As detailed in the previous section there has also been some disparity between national road transport emission projections and measures annual mean concentrations of NO₂, although the most recent emissions data has been shown to be predicting within good agreement of monitored data, thus reducing this uncertainty.

The modelling assessment has been based on 2022 emission factors with the resulting predicted concentrations added to 2022 background data. Furthermore, the modelled NO₂ concentrations have been verified against 2022 monitoring data. This is considered to provide an appropriately conservative and robust assessment taking into account the uncertainties regarding future vehicle

emissions and the fact that the most recently release emissions data has been shown to better represent real-world emissions and future reductions in tailpipe emissions and the fact that the development would not be completed or occupied until at least 2025 by when local pollutant concentrations are expected to have declined further.

4.3 Selection of Receptors

4.3.1 Construction Phase Receptors

The IAQM assessment is undertaken where there are:

- human receptors within 250m of the site boundary or within 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s);
- 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 250m from the site entrance(s).

It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

4.3.2 Operational Phase Receptors

As set out in Table 3.2, LAQM.TG(22) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations 'where members of the public are regularly present' should be considered. At such locations, members of the public would be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

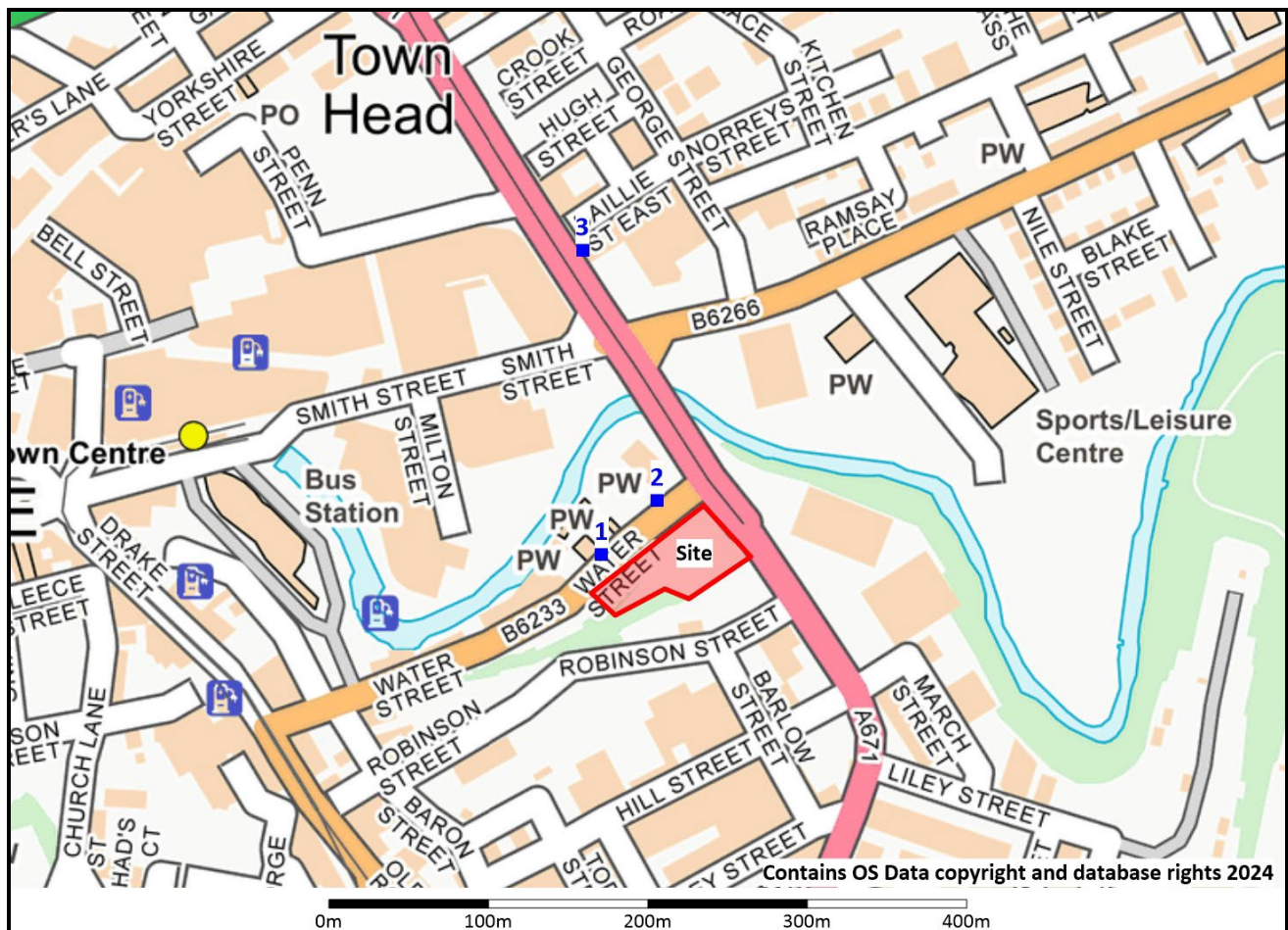
For instance, on a footpath, where exposure would be transient (for the duration of passage along that path) comparison with short-term standards (i.e. 15-minute mean or 1-hour mean) may be relevant. In a school, or adjacent to a private dwelling, however; where exposure may be for longer periods, comparison with long-term standards (such as 24-hour mean or annual mean) may be most appropriate. In general terms, concentrations associated with long-term standards are lower

than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

For the completion of this assessment, air quality has been predicted at a number of sensitive receptors (residential houses, schools, hospitals etc) adjacent to those road links within the AQMA where traffic is predicted to increase by more than 100 vehicles per day as a result of the operational development, and outside the AQMA where traffic is predicted to increase by more than 500 vehicles per day. Each receptor has been selected to represent worst-case exposure to local traffic emissions. Due to the nature of the land-use types in the vicinity of the proposed development, all the selected receptor locations are commercial and are therefore sensitive to short-term changes in air quality only (i.e. there is no relevant long-term public exposure on site). There are no residential or other high sensitivity receptors that would be affected by long-term changes in air quality close to the road links that have been identified for detailed assessment. The details of each receptor are set out in Table 4.1 and their locations shown in Figure 4.1.

Table 4.1: Receptors Used in Modelling

Receptor Number	Receptor Location	OS Grid Reference	Receptor Height (m)
1	Ukrainian Orthodox Church	390071, 413359	1.5
2	Suzuki Car Dealership	390106, 413393	1.5
3	Vale Mill	390059, 413550	1.5

Figure 4.1: Sensitive Receptor Locations

4.4 Significance Criteria

4.4.1 Construction Phase

The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

4.4.2 Operational Phase

Guidance issued by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) relates to Air Quality considerations within the planning process and sets

criterion which identify the need for an Air Quality Assessment, the type of Air Quality assessment required, and the significance of any predicted impact.

The guidance suggests expressing the magnitude of incremental change in concentrations as a proportion of an Air Quality Assessment Level (AQAL) such as the air quality objectives set out in Table 3.1. The significance of impact is then identified based on the incremental change in the context of the new total concentrations and its relationship with the assessment criteria, noting whether the impact is adverse or beneficial based on a positive or negative change in concentrations. The criteria suggested for assigning significance is set out in Table 4.2 below.

Table 4.2: Impact Descriptors for Individual Receptors

Long-term average concentration at receptor in assessment year	% Change in concentrations relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Minor	Moderate
76-94% of AQAL	Negligible	Minor	Moderate	Moderate
95-102% of AQAL	Minor	Moderate	Moderate	Major
103-109% of AQAL	Moderate	Moderate	Major	Major
110% of AQAL	Moderate	Major	Major	Major

AQAL – Air Quality Assessment Level which in this assessment refers to the Air Quality Objectives set out in Table 3.1

The percentage change in concentration should be rounded to a whole number

The table should only be used with annual mean concentrations

The descriptors are for individual receptors only: overall significance should be based on professional judgment

When defining the concentrations as a percentage of the AQAL use the 'without scheme' concentration where there is a decrease in pollutant concentrations and the 'with scheme' concentrations for an increase

The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value i.e. well below, the degree of harm is likely to be small. As exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL

It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year, it is impossible to define the new total concentrations without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

5 Baseline Assessment

5.1 Review and Assessment of Air Quality

In 2005 the review and assessment process undertaken by RBC resulted in the declaration of an Air Quality Management Area (AQMA) due to exceedances of the annual mean nitrogen dioxide (NO₂) limit value at locations in close proximity to busy roads in the borough. The designated area was amended in 2016 and incorporated into the Greater Manchester Combined Authority AQMA. The location of the AQMA in relation to the Site is presented in Appendix E.

5.2 Air Quality Monitoring Data

5.2.1 NO₂ Concentrations

The nearest automatic air quality monitoring station to the proposed development is on Queensway, 2.1km southwest of the Site. Due to the distance from the Site, the data are not considered relevant to the baseline assessment.

GMCA also operate an extensive network of passive diffusion tubes recording NO₂ concentrations across the city. Details of the monitoring sites that are considered relevant to the assessment are set out in Table 5.1. Their locations are shown in Figure 5.1.

Diffusion tubes are a passive form of monitoring, which, due to their relative in-expense, allow for a much greater spatial coverage than with automatic monitoring sites. Diffusion tubes are acknowledged as a less accurate method of monitoring ambient air pollutants than automatic monitors, with diffusion tubes over or under estimating concentrations by as much as 30%. To allow the results to be reliably compared with the AQ Objectives, the data should be bias corrected using factors calculated from a co-location site where both diffusion tubes and an automatic monitor are located in the same location. The data provided in Table 5.1 has been adjusted by GMCA using appropriately derived adjustment factors.

The monitoring data presented in Table 5.1, shows annual mean NO₂ concentrations to be below the objective limit of 40 µg/m³ at all sites in the area since 2020. The data shows an overall downward trend in concentrations over the five-year period.

Table 5.1: NO₂ Diffusion Tube Monitoring Results 2018-2019 (µg/m³)

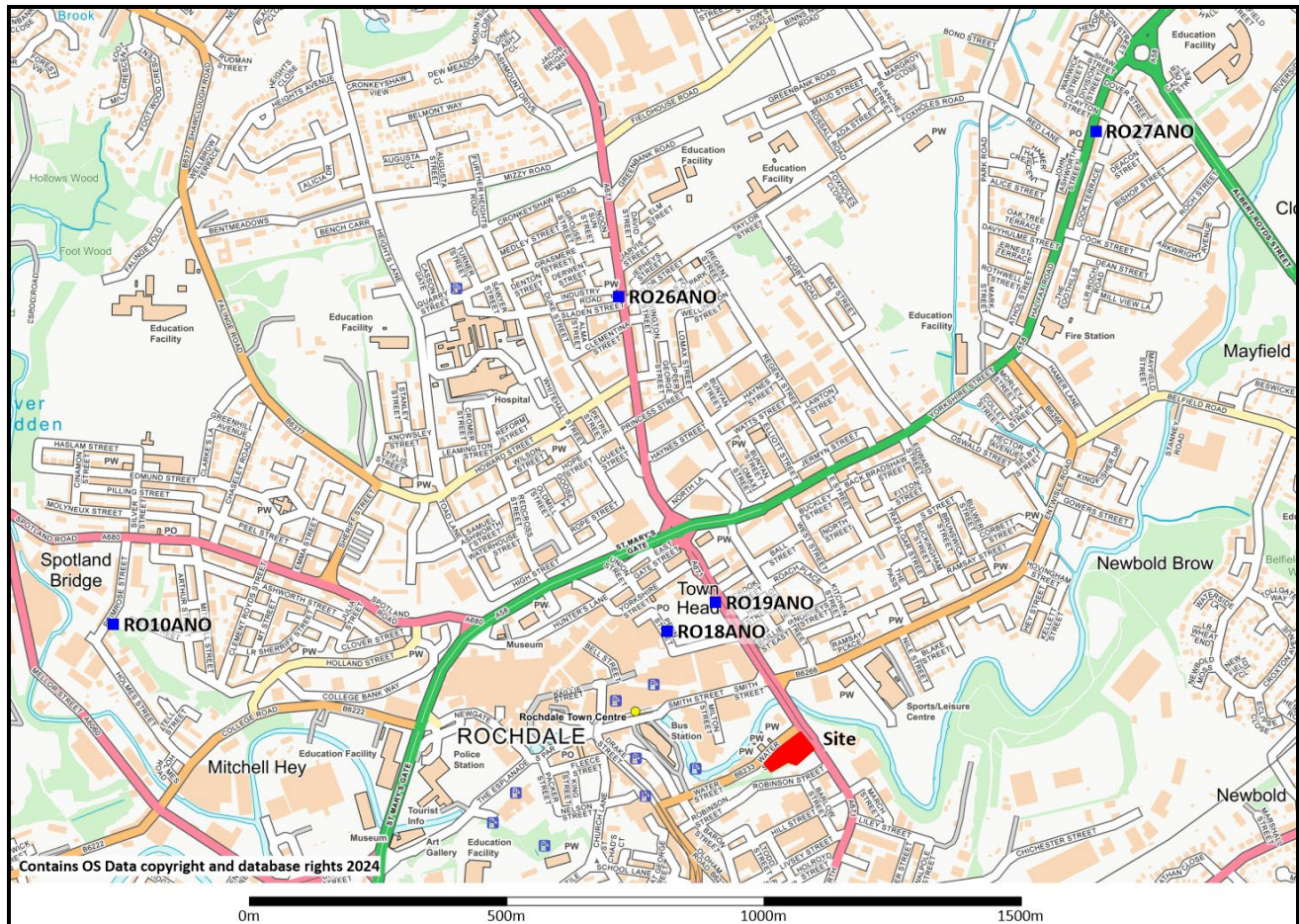
Site	Site Type	Year				
		2018	2019	2020 ¹	2021 ¹	2022
RO10ANO – Holmes Street	UB	18.7	17.7	14.8	14.9	15.0
RO18ANO – Penn Street	UB	31.1	26.8	20.9	18.7	22.7
RO19ANO – John Street	R	-	27.2	35.8	29.3	35.4
RO26ANO – Whitworth Road	R	-	41.6	31.1	32.5	34.2
RO27ANO – 156 Halifax Road	R	-	46.1	32.7	28.8	31.3
UB – Urban Background, R - Roadside Data taken from GMCA 2022 ASR Data in bold shows an exceedance of the annual mean objective ¹ data has been presented for 2020 and 2021, however due to the restrictions imposed during the Covid 19 pandemic, resulting in significant reductions in vehicle movements, a significant reduction in air quality was recorded at the majority of locations across the UK. For this reason 2020 and 2021 data has not been used to inform the baseline assessment.						

Diffusion tubes cannot monitor short-term NO₂ concentrations, however, research¹⁹ has concluded that exceedences of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m³. Based on monitoring data presented in Table 5.1, it is unlikely that the short-term objective is being exceeded in the area.

PM Concentrations

Roadside PM₁₀ and PM_{2.5} concentrations are measured by the Queensbridge automatic monitoring site, however, as discussed, due to the distance from the Site, the data are unlikely to be representative of the current baseline at the proposed development.

¹⁹ D Laxen and B Marner: Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites (July 2003).

Figure 5.1: Location of NO₂ Monitoring Sites

5.3 Background Data

Additional information on estimated background pollutant concentrations has been obtained from the Defra background maps provided on the UK-AIR, the Air Quality Information Resource.

Estimated air pollution concentrations for oxides of nitrogen (NO_x), NO₂, PM₁₀ and PM_{2.5} have been extracted from the 2018 background pollution maps for the UK, which were published in August 2020²⁰. These maps are available in 1 km x 1 km grid squares and provide an estimate of concentrations between 2018 and 2030. The average concentrations for the grid squares representing the study area have been extracted for the 2022 base year. The data is provided in Table 5.2.

²⁰ <https://uk-air.defra.gov.uk/data/laq11.7m-background-home12.8>

Table 5.2: Annual Mean Background Air Pollution Concentrations

Location (OS Grid Square)	Annual mean concentrations (μgm^{-3})		
	2022		
	NO ₂	PM ₁₀	PM _{2.5}
389500,414500	13.0	11.0	7.5
389500,413500	17.9	11.3	7.6
390500,413500	15.0	11.3	7.6
390500,412500	15.5	12.1	8.2

The data indicates that estimated background concentrations are currently meeting the NO₂, PM₁₀ and PM_{2.5} objectives in the study area.

6 Construction Assessment

6.1 Assessing the Risk of Dust Effects

6.1.1 Site and Surroundings

A summary of the proposed development is provided in Section 2 of this report.

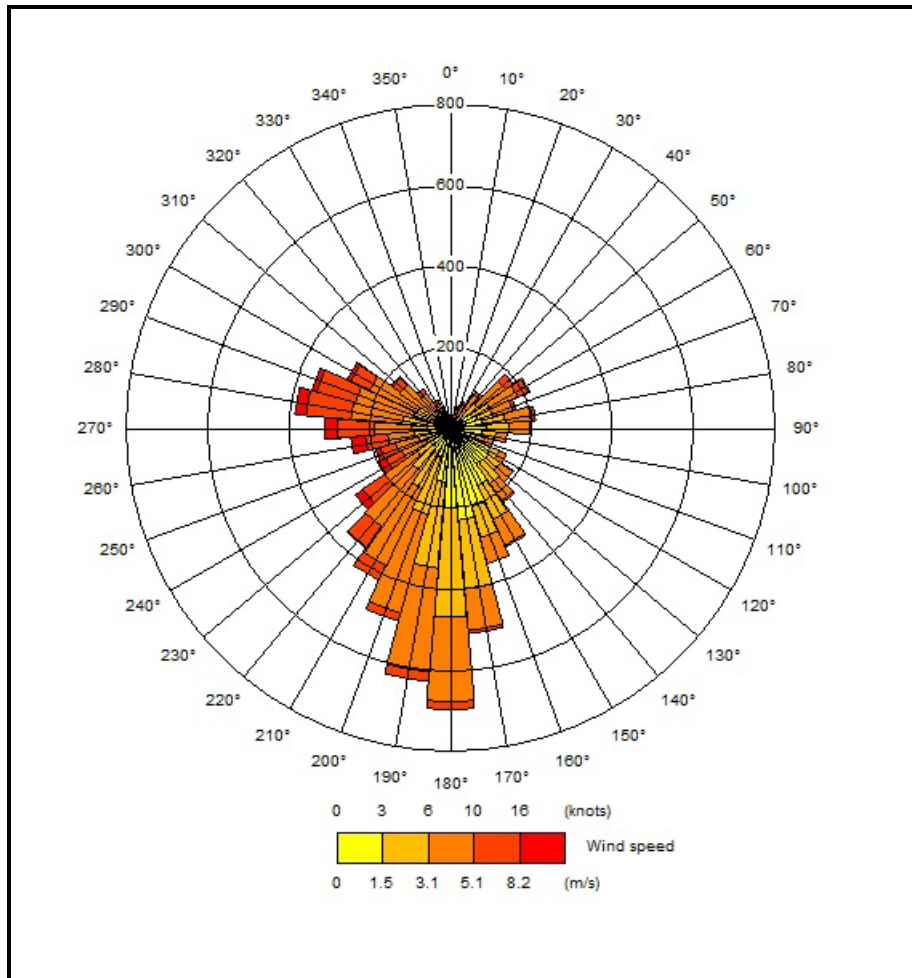
The Site covers an area of approximately 0.35 hectares (ha) (3,528 m²) and there are residential properties located within 250 m of the Site boundary. An assessment of construction related impacts in relation to human receptors is therefore considered necessary.

Significant impacts on ecologically sensitive receptors are unlikely to occur beyond 50 m from any construction activities. A review of data held on the Defra MAGIC website²¹ shows no sites designated as important for wildlife within 50 m of the Site therefore impacts on ecological receptors has not been considered any further within this assessment.

The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited would depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

A wind rose from Manchester Airport Meteorological Station for 2022 is provided below in Figure 6.1, which shows that the prevailing wind is from the south. Receptors located to the north of the Site are therefore most at risk of experiencing impacts. There are no high sensitivity receptors located to the north; the nearest residential properties are approximately 160m northeast of the Site.

²¹ <http://magic.defra.gov.uk/>

Figure 6.1: Wind Rose from Manchester Airport Meteorological Site (2022)

6.1.2 Risk Assessment of Dust Impacts

Defining the Dust Emission Magnitude

With reference to the criteria detailed in Appendix B, the dust emission magnitude for each of the categories; demolition, earthworks, construction and trackout have been determined. These have been summarised in Table 6.1.

Table 6.1: Dust Emission Magnitude for each Activity

Activity	Criteria	Magnitude
Demolition	No demolition	n/a
Earthworks	Site area 3528 m ² , approx. 1-2 HDV on site, breaking up of concrete hardstanding, layered subsoil of sand and gravel ²² .	Small
Construction	Total build volume approximately 1,200 m ³ , concrete and brick construction materials, high potential for dust generation	Small
Trackout	8-10 HDV per day	Small

Sensitivity of Surrounding Area

Using the criteria set out in Tables B1 to B3, Appendix B, the sensitivity of the surrounding area to impacts from dust emissions has been determined and are set out in Table 6.2.

Dust Soiling

As discussed, the nearest high sensitivity residential receptors are 160m northeast of the Site, on Entwisle Road. The receptors immediately surrounding the Site are predominantly commercial and light industrial, which are generally considered to be of lower sensitivity to dust impacts, however there is a car showroom opposite the Site on Water Street, with cars parked on the forecourt within 20m of the Site boundary that will be sensitive to dust soiling effects. The overall sensitivity of the surrounding area in relation to dust soiling effects during earthworks and construction activities is therefore considered to be high.

It is expected that there will be between 8-10 HDV (>3.5t) movements per day during the construction phase which are likely to travel to and from the Site along Water Street, accessing the A58 via the A671 (Molesworth St/John St). Due to the close proximity of the car showroom to the Site access, the sensitivity of the area to dust soiling effects from trackout is also considered to be high.

²² UKSO Soil Observatory <https://mapapps2.bgs.ac.uk/ukso/home.html>

PM₁₀ Effects

A review of background data published by Defra within the 2022 background maps, indicates background concentrations at the Site in the region of 11-12 µg/m³. Based on the proximity of sensitive receptors to the site boundary and the local concentrations of PM₁₀ the sensitivity of the surrounding area is considered to be low with regards human health impacts.

Table 6.2: Sensitivity of Surrounding Area

Source	Dust Soiling	Human health
Demolition	n/a	n/a
Earthworks	High	Low
Construction	High	Low
Trackout	High	Low

Defining the Risk of Impacts

The dust emission magnitude as set out in Table 6.1 is combined with the sensitivity of the area (Table 6.2) to determine the risk of both dust soiling and human health impacts, assuming no mitigation measures applied at site. The risk of impacts associated with each activity is provided in Table 6.3 below and has been used to identify site-specific mitigation measures, which are discussed in Section 6.2 and set out in Appendix F.

Table 6.3: Summary of Risk Effects to Define Site Specific Mitigation

Source	Dust Soiling	Human health
Demolition	n/a	n/a
Earthworks	Low Risk	Negligible Risk
Construction	Low Risk	Negligible Risk
Trackout	Low Risk	Negligible Risk

6.2 Determining Appropriate Mitigation

The control of dust emissions from construction site activities relies upon management provisions and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, large-scale operations have been successfully undertaken without impacts to nearby properties.

An overall medium risk of impacts is predicted at adjacent receptors during construction of the proposed development. Appropriate mitigation measures for the Site have been identified following the IAQM guidance and based on the risk effects presented in Table 6.3. It is recommended that the measures set out in Appendix F are incorporated into a DMP and approved by RBC prior to commencement of any work on site.

Based on the risk effects identified during each of the four types of activities and following implementation of the recommended mitigation measures, the significance of residual impacts during construction of the proposed development will be **negligible**.

7 Operational Impacts

7.1 Model Results

Annual mean NO₂ concentrations predicted at the selected receptor locations are provided in Table 7.1, while annual mean PM₁₀ and PM_{2.5} are provided in Tables 7.2 and 7.3, respectively.

Table 7.1: Predicted Annual Mean NO₂ Concentrations (µg/m³)

Receptor	2024 Do Minimum	2024 Do Something	Change in NO ₂ due to Development (as % of the AQAL)	Significance of Impact
1	30.0	30.6	1	Negligible
2	33.4	37.6	10	Moderate
3	36.1	36.2	0	Negligible

Table 7.2: Predicted Annual Mean PM₁₀ Concentrations (µg/m³)

Receptor	2024 Do Minimum	2024 Do Something	Change in PM ₁₀ due to Development (as % of the AQAL)	Significance of Impact
1	14.8	14.9	0	Negligible
2	15.2	16.3	3	Negligible
3	16.6	16.6	0	Negligible

Table 7.3: Predicted Annual Mean PM_{2.5} Concentrations (µg/m³)

Receptor	2024 Do Minimum	2024 Do Something	Change in PM _{2.5} due to Development (as % of the AQAL)	Significance of Impact
1	9.5	9.5	1	Negligible
2	9.7	10.3	5	Negligible
3	10.4	10.4	0	Negligible

7.1.1 NO₂ Concentrations

The data set out in Table 7.1 shows that the model is predicting annual mean NO₂ concentrations below the objective limit at all the selected receptor locations in both the Do-minimum and Do-Something scenarios.

The model is predicting a change in annual mean NO₂ concentrations of 4.1 µg/m³ at the Suzuki dealership (Receptor 2), which is 10% of the UK air quality standard (AQAL). The dealership is located opposite the proposed development on Water Street, which will provide access to the Drive-Thru. In accordance with the IAQM/ EPUK planning guidance, the change in concentration is of moderate significance with respect to long-term impacts. However, the dealership is a commercial receptor and there will be no relevant long-term exposure to poor air quality. As discussed previously, an exceedance of the short-term objective is unlikely where annual mean concentrations are below 60 µg/m³. The predicted concentrations at all three receptors are less than 70% of this threshold and the risk of an exceedance is therefore considered to be negligible.

7.1.2 PM₁₀ Concentrations

The model is predicting annual mean PM₁₀ concentrations at less than 50% of the objective limit at all receptor locations (Table 7.2) under both future year assessment scenarios.

The modelling assessment is predicting change in PM₁₀ concentrations of no more than 1.1 µg/m³, less than 2.6% of the AQAL, as a result of the operational vehicle movements and therefore the significance of the long-term impact is negligible.

The predicted concentrations are also well below the 32 $\mu\text{g}/\text{m}^3$ threshold for a potential exceedance of the short-term PM_{10} objective. The impact of the development on local PM_{10} concentrations is therefore deemed to be negligible.

7.1.3 $\text{PM}_{2.5}$ Concentrations

The modelling assessment has predicted annual mean $\text{PM}_{2.5}$ concentrations at less than 55% of the air quality standard.

The modelling assessment is predicting a change in $\text{PM}_{2.5}$ concentrations of no more than 0.6 $\mu\text{g}/\text{m}^3$, less than 2.8% of the AQAL, as a result of the operational vehicle movements and therefore the significance of the long-term impact is negligible.

7.2 Exposure Assessment

The proposed development would not provide any residential accommodation as the proposals are for a new restaurant. Due to the transient nature of users of the site, the annual mean and 24-hour objective limits do not apply. However, the shorter-term objective limits such as the 1-hour NO_2 objective are considered relevant to the Site. Exposure at the Site should therefore be considered in relation to the 1-hour NO_2 objective but not in relation to the PM objective limits.

Local monitoring of annual mean NO_2 concentrations (Table 5.1) has shown that roadside annual mean concentrations in the area are currently below the objective limit of 40 $\mu\text{g}/\text{m}^3$. It is therefore considered unlikely, based on professional judgement and the results of the modelling assessment, that concentrations at the Site would exceed 60 $\mu\text{g}/\text{m}^3$. Concentrations at the Site are therefore expected to be meeting the 1-hour objective limit for NO_2 . The impact of the proposals in terms of new exposure are therefore considered to be negligible.

7.3 On-site Emissions

The energy strategy for the proposed development is 100% electric (heat pumps and electric hot water boilers) and therefore on-site emissions will be negligible.

7.4 Determining Appropriate Mitigation

The assessment has predicted a negligible impact on local air quality as a result of operational traffic associated with the development. Furthermore, the Site has been found to be suitable for retail use in respect of exposure. No mitigation of air quality is therefore considered necessary.

8 Conclusion

It is inevitable that with any development, demolition and construction activities will cause some disturbance to those nearby. Dust arising from most construction activities tends to be of a coarse nature, which through dispersion by the wind can lead to soiling of property including windows, cars, external paintwork and laundry. However, as well as giving rise to annoyance due to soiling of surfaces from dust emissions, there is evidence of major construction activities causing increases in long term PM₁₀ concentrations and in the number of days exceeding the short term PM₁₀ objective of 50 µgm⁻³.

The IAQM guidance on assessing impacts on air quality from construction activities and determining the likely significance has been used to determine the risk of impacts occurring during the construction of the development and to identify appropriate mitigation measures to be implemented on site to reduce dust emissions and associated impacts.

Due to the proximity of nearby residential receptors the Site is considered to have a medium risk of impacts with regards to dust soiling and PM₁₀ concentrations. However, following the implementation of appropriate mitigation measures impacts associated with the construction of the development are likely to be insignificant.

Detailed modelling has been used to predict the impact of operational traffic on local air quality. The assessment has found that impacts associated with operational traffic will be negligible including with the AQMA.

The baseline assessment has shown that NO₂, PM₁₀ and PM_{2.5} are comfortably meeting the relevant UK air quality standards within the Site. The Site is deemed suitable for retail development and impacts in terms of exposure will be negligible.

The energy strategy will be from all electric sources therefore there will be no significant on-site emissions and impacts during operation of energy plant on local air quality will be negligible.

The proposed development would meet current national and local planning policy and based on the above, air quality does not pose a constraint to development of the site to provide a new drive-thru restaurant.

Appendix A

Glossary of Terminology

Term	Definition
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 exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
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. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
DEFRA	Department for Environment, Food and Rural Affairs.
Exceedance	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
Fugitive emissions	Emissions arising from the passage of vehicles that do not arise from the exhaust system.
LAQM	Local Air Quality Management.
NO	Nitrogen monoxide, a.k.a. nitric oxide.
NO ₂	Nitrogen dioxide.
NO _x	Nitrogen oxides.
O ₃	Ozone.
Percentile	The percentage of results below a given value.
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
Ratification (Monitoring)	Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation).
µg/m ³ micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m ³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
UKAS	United Kingdom Accreditation Service.
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

Term	Definition
	closely related parameter 'accuracy', and has replaced it on recent European legislation.
USA	Updating and Screening Assessment.
Validation (modelling)	Refers to the general comparison of modelled results against monitoring data carried out by model developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

Appendix B

IAQM Construction Dust Assessment Procedure

In order to assess the potential impacts, the activities on construction sites are divided into four categories. These are:

- demolition (removal of existing structures).
- earthworks (soil-stripping, ground-levelling, excavation and landscaping).
- construction (activities involved in the provision of a new structure); and
- trackout (the transport of dust and dirt from the construction site onto the public road network where it may be deposited and then re-suspended by vehicles using the network).

For each activity, the risk of dust annoyance, health and ecological impact is determined using three risk categories: low, medium and high risk. The risk category may be different for each of the four activities. The risk magnitude identified for each of the construction activities is then compared to the number of sensitive receptors in the near vicinity of the site in order to determine the risks posed by the construction activities to these receptors.

Step 1: Screen the Need for an Assessment

The first step is to screen the requirement for a more detailed assessment. An assessment is required where there is:

- a 'human receptor' within 250m of the boundary of the site or 50m of the route(s) used by construction vehicles on the public highway, up to 250m from the site entrance(s); and/or
- an 'ecological receptor' within 50m of the boundary of the site; or 50m of the route(s) used by the construction vehicles on the public highway, up to 250m from the site entrance(s).

Step 2A: Define the Potential Dust Emission Magnitude

This is based on the scale of the anticipated works and the proximity of nearby receptors. The risk is classified as small, medium or large for each of the four categories.

Demolition: The potential dust emission classes for demolition are:

- Large: Total building volume $>75,000\text{m}^3$, potentially dusty construction material (e.g. Concrete), on site crushing and screening, demolition activities $>12\text{m}$ above ground level.
- Medium: total building volume $12,000\text{m}^3 - 75,000\text{m}^3$, potentially dusty construction material, demolition activities 6-12 m above ground level; and
- Small: total building volume $<12,000\text{m}^3$, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities $<6\text{m}$ above ground, demolition during wetter months.

Earthworks: This involves excavating material, haulage, tipping and stockpiling. The potential dust emission classes for earthworks are:

- Large: Total site area $>110,000\text{m}^2$, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds $>6\text{ m}$ in height;
- Medium: Total site area $18,000\text{ m}^2 - 110,000\text{m}^2$, moderately dusty soil (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds $3\text{m} - 6\text{m}$ in height; and
- Small: Total site area $<18,000\text{m}^2$, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds $<3\text{ m}$ in height.

Construction: The important issues here when determining the potential dust emission magnitude include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build. The categories are:

- Large: Total building volume $>75,000\text{m}^3$, on site concrete batching, sandblasting.
- Medium: Total building volume $12,000\text{m}^3 - 75,000\text{m}^3$, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- Small: Total building volume $<12,000\text{m}^3$, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout: The risk of impacts occurring during trackout is predominantly dependent on the number of vehicles accessing the Site on a daily basis. However, vehicle size and speed, the duration of activities and local geology are also factors which are used to determine the emission class of the Site as a result of trackout. The categories are:

- Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m.
- Medium: 20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content, unpaved road length 50-100m; and
- Small: <20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length >50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health (PM₁₀) and ecological receptors.

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

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

Table B1 is used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Based on the sensitivities assigned to the different receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification can be defined for each.

Tables B2 to B4 indicate the criteria used to determine the sensitivity of the area to dust soiling, human health and ecological impacts.

Table B1: Examples of Factors Defining Sensitivity of an Area

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	Users can reasonably expect enjoyment of a high level of amenity The appearance, aesthetics or value of their property would be diminished by soiling The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. E.g. dwellings, museums and other important collections, medium and long term car parks and car showrooms.	10 – 100 dwellings within 20 m of site. Local PM₁₀ concentrations close to the objective (e.g. annual mean 36 -40 µg/m³). E.g. residential properties, hospitals, schools and residential care homes.	Locations with an international or national designation and the designated features may be affected by dust soiling. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red List for Great Britain. E.g. A Special Area of Conservation (SAC).
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home. The appearance, aesthetics or value of their property could be diminished by soiling The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. E.g. parks and places of work.	Less than 10 receptors within 20 m. Local PM₁₀ concentrations below the objective (e.g. annual mean 30-36 µg/m³). E.g. office and shop workers but will generally not include workers occupationally exposed to PM₁₀ as protection is covered by the Health and Safety at Work legislation.	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. Locations with a national designation where the features may be affected by dust deposition E.g. A Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	The enjoyment of amenity would not reasonably be expected. Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the	Locations where human exposure is transient. No receptors within 20 m. Local PM₁₀ concentrations well below the objectives (less than 75%). E.g. public footpaths, playing fields, parks and shopping streets.	Locations with a local designation where the features may be affected by dust deposition. E.g. Local Nature Reserve with dust sensitive features.

Table B1: Examples of Factors Defining Sensitivity of an Area

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
	land. E.g. playing fields, farmland unless commercially sensitive horticultural, footpaths, short lived car [parks and roads.		

Table B2: Sensitivity of the Area to Dust Soiling on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
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 B3: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from Source (m)			
			<20	<50	<100	<250
High	>32 µg/m ³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m ³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m ³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m ³	>10	High	Medium	Low	Low

Table B3: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from Source (m)			
			<20	<50	<100	<250
		1-10	Medium	Low	Low	Low
		>10	Medium	Low	Low	Low
	28-32 µg/m ³	1-10	Low	Low	Low	Low
		>10	Low	Low	Low	Low
	24-28 µg/m ³	1-10	Low	Low	Low	Low
		>10	Low	Low	Low	Low
	<24 µg/m ³	1-10	Low	Low	Low	Low
		>10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Table B4: 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

Define the Risk of Impacts

The final step is to combine the dust emission magnitude determined in step 2A with the sensitivity of the area determined in step 2B to determine the risk of impacts with no mitigation applied. Tables B6 and B7 indicate the method used to assign the level of risk for each construction activity. The identified level of risk is then used to determine measures for inclusion within a site-specific Construction Management Plan (CMP) aimed at reducing dust emissions and hence reducing the impact of the construction phase on nearby receptors. The mitigation measures are drawn from detailed mitigation set out within the IAQM guidance document.

Table B5: Risk of Dust Impacts from Demolition

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table B6: Risk of Dust Impacts from Earthworks/ Construction/ Trackout

Sensitivity of Area	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Appendix C

Traffic Data used in ADMS Modelling

Table C1: Traffic Data used in ADMS Roads Dispersion Model

Link Name	Speed (kph)	2022 Baseline		2025 Do Minimum		2025 Do Something	
		AADT	HGV	AADT	HGV	AADT	HGV
Water St (SW)	24	5932	235	6119	245	6242	245
Water St (NE)	16	5932	235	6119	245	8928	249
Molesworth (S)	16 - 24	16500	176	17020	184	17263	184
Molesworth St	24	21572	372	22253	389	22499	393
Smith St	24	2686	10	2771	10	2832	10
John St	24	14977	274	15449	286	15542	290
Entwisle Road	24	11590	127	11956	133	12048	133
Whitworth Street ¹	16	11227	377	-	-	-	-
Taylor Street ¹	16	6294	139	-	-	-	

¹DfT traffic count data used for verification purposes only.

Appendix D

Roads Modelling Verification

Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions.

The model has been run to predict annual mean road- NO_x concentrations at monitoring site RO26ANO, located on Whitworth Street (full details are provided in Table 5.1).

The model output of road- NO_x (i.e. the component of total NO_x coming from road traffic) has been compared with the 'measured' road- NO_x . The 'measured' road NO_x has been calculated from the measured NO_2 concentrations, by first converting the measured NO_2 into an equivalent measured NO_x using the NO_x from NO_2 DEFRA calculator, then subtracting the background value.

A primary adjustment factor was then determined as the ratio between the measured road- NO_x contribution and the model derived road- NO_x contribution. This factor was then applied to the modelled road- NO_x concentration to provide an adjusted modelled road- NO_x concentration. The NO_2 -road contribution was then determined using the Defra $\text{NO}_x:\text{NO}_2$ calculator tool.

The total NO_2 concentration was then determined by adding the background NO_2 concentration to this calculated road contribution.

The verification calculation is presented in Table D1.

In accordance with the approach recommended in LAQM.TG(22) the adjustment factor has also been applied to the predicted PM_{10} and $\text{PM}_{2.5}$ concentrations, in the absence of any relevant PM monitoring data.

Table D1: Verification Calculation

Parameter	RO26ANO
Measured NO ₂ 2022	34.2
Background NO ₂	13.0
Measured Road-NO _x	42.4
Modelled Road-NO _x	10.8
Adjustment Factor	3.9

Appendix E

Location of AQMA



Appendix F

Construction Mitigation Measures

It is recommended that the following measures are incorporated into a DMP and approved by RBC prior to commencement of any work on site. The measures set out below summaries the measures set out within the IAQM guidance

This guidance should be read in conjunction with this report to obtain full details of all the measures that should be applied on site.

Highly Recommended Measures

- display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information on the site boundary;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action taken to resolve the situation in the log book;
- carry out regular site inspections to monitor compliance with the DMP, record inspection results and make inspection log available to RBC when asked;
- increase frequency of site inspection by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with RBC. Where possible commence baseline monitoring at least three months before work commences on site.
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;

- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles;
- avoid site runoff of water or mud;
- ensure all vehicles switch off engines when stationary - no idling vehicles;
- avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and conveyors and covered skips; and
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- avoid bonfires and burning of waste materials.

Desirable Measures

- undertake daily on-site and off-site inspection, where receptors are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars, windows sills within 100m of site boundary, with cleaning provided if necessary;
- fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- 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 as described below;
- cover, seed or fence stockpiles to prevent wind whipping;

- ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- avoid scabbling where possible;
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- avoid dry sweeping of large areas;
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; and
- implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).