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Air Quality Assessment

Sparkle Street, Manchester

Air Quality Assessment

Project: SPARKLE STREET, MANCHESTER

Report reference: RP01-23244-R2

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REVISION	ISSUE DATE	REPORT BY	CHECKED BY	NOTES
0	07 July 2023	Hazel Swinfen BSc (Hons), AMIEnvSc, Air Quality Consultant	Paul Hayward, BSc (Hons) MSc MIAQM MIEnvSc, Technical Director - Air Quality	Initial issue
1	19 July 2023	Hazel Swinfen BSc (Hons), AMIEnvSc, Air Quality Consultant	Paul Hayward, BSc (Hons) MSc MIAQM MIEnvSc, Technical Director - Air Quality	Revised following comments
2	19 April 2024	Hazel Swinfen BSc (Hons), AMIEnvSc, Air Quality Consultant	Paul Hayward, BSc (Hons) MSc MIAQM MIEnvSc, Technical Director - Air Quality	Final

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY
2. INTRODUCTION
3. PROJECT DESCRIPTION AND SITE CONTEXT
4. PLANNING POLICY
5. ASSESSMENT METHODOLOGY
6. BASELINE CONDITIONS
7. CONSTRUCTION PHASE ASSESSMENT
8. OPERATIONAL PHASE ASSESSMENT – SITE SUITABILITY
9. OPERATIONAL PHASE ASSESSMENT – AIR QUALITY IMPACTS
10. EMISSIONS COST CALCULATION
11. CONCLUSIONS

APPENDIX 1 AIR QUALITY LEGISLATION

APPENDIX 2 LOCAL AIR QUALITY POLICY AND GUIDANCE

APPENDIX 3 WIND ROSE FOR MANCHESTER (2019)

APPENDIX 4 TRAFFIC DATA

APPENDIX 5 DISPERSION MODEL DETAILS

APPENDIX 6 OPERATIONAL PHASE SIGNIFICANCE CRITERIA

APPENDIX 7 RECOMMENDED CONSTRUCTION PHASE MITIGATION

APPENDIX 8 DISPERSION MODEL RESULTS

1. EXECUTIVE SUMMARY

- 1.1 Cass Allen has been instructed by Foras (Sparkle Street) Ltd to assess the potential air quality impact of a proposed residential development at Sparkle Street, Manchester.
- 1.2 The assessment was carried out in accordance with relevant local and national planning policy and guidance.
- 1.3 The site is located within the Greater Manchester Combined Authority (GMCA) Air Quality Management Area (AQMA), declared based on the modelled $35\mu\text{g}/\text{m}^3$ isopleth for annual mean nitrogen dioxide (NO_2) concentration. Air quality in the vicinity is primarily influenced by vehicle emissions along the adjacent Store Street, Sparkle Street and the local road network.
- 1.4 Emissions of construction phase dust and particulate matter (PM_{10}) were assessed in accordance with Institute of Air Quality Management (IAQM) guidance. A High Risk of dust soiling and a Low Risk of PM_{10} health effects have been identified, respectively, in the absence of mitigation. Suitable best practice mitigation measures have been recommended and no significant residual air quality impacts are expected.
- 1.5 A detailed atmospheric dispersion model was utilised to predict NO_2 and particulate matter (PM_{10} and $\text{PM}_{2.5}$) concentrations at relevant sensitive receptor locations within the study area during the operation of the development. This followed Department for Environment, Food and Rural Affairs (Defra) and Environmental Protection UK (EPUK) & IAQM guidance.
- 1.6 The results indicate that pollutant concentrations at proposed sensitive receptors will be below the relevant AQOs during the operational phase, with no requirement for additional mitigation. Furthermore, no significant impacts on local air quality as a result of development-generated traffic are anticipated. Accordingly, the overall effect of the proposed development is considered 'not significant' with regard to air quality.
- 1.7 An Emissions Cost Calculation was also undertaken to evaluate overall development emissions. This showed that proposed mitigation is expected to more than offset the calculated emissions cost, and therefore, there should be no requirement for additional mitigation measures with respect to air quality.
- 1.8 In summary, it is our view that the site is suitable for the development in terms of air quality and that there are no air quality constraints with respect to planning consent.

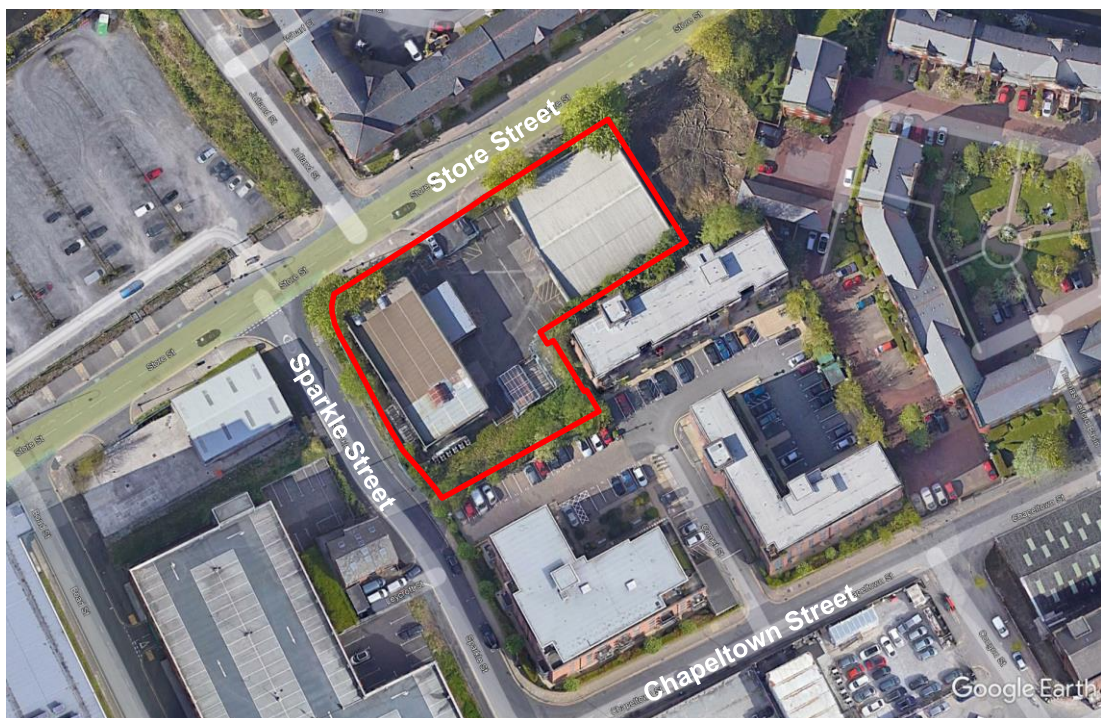
2. INTRODUCTION

- 2.1 Cass Allen has been instructed by Foras (Sparkle Street) Ltd to assess the potential air quality impact of a proposed residential development at Sparkle Street, Manchester.
- 2.2 The assessment has been carried out in accordance with relevant local and national planning guidance.
- 2.3 The aims of the assessment were to consider potential impacts on local air quality, resulting from:
- Dust and particulate matter emissions generated by construction phase activities;
 - Exhaust emissions from construction plant and traffic;
 - The exposure of new sensitive receptors to elevated pollutant concentrations; and
 - Emissions from traffic generated by the operation of the development.
- 2.4 Subsequently, where required, appropriate measures have been identified to minimise the impacts.
- 2.5 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

3. PROJECT DESCRIPTION AND SITE CONTEXT

- 3.1 The site currently contains commercial units and is located in a mixed-use area, bounded to the north, east and south by residential apartment blocks and to the west by a multistorey car park and other commercial buildings. Further south of the site is Manchester Piccadilly Station.
- 3.2 The site location is shown in Figure 1.

Figure 1 Site Location and Surrounding Area



- 3.3 The proposal comprises demolition of the existing low-rise commercial units and erection of a ground plus 27-storey residential development with supporting residential amenity, private terraces and private shared garden.
- 3.4 With regard to air quality, the site is located within the GMCA AQMA, declared based on the modelled $35\mu\text{g}/\text{m}^3$ isopleth for annual mean NO_2 concentration. Air quality in the vicinity is primarily influenced by vehicle emissions along the adjacent Store Street, Sparkle Street and the local road network.

4. PLANNING POLICY

Air Quality Legislation

- 4.1 The wider air quality legislation which underpins national, regional and local planning policy, is summarised in **Appendix 1**.
- 4.2 Within the UK Air Quality Strategy (2007), standards and objectives are set for nine key air pollutants to protect health, vegetation and ecosystems. These were revised in the Air Quality Standards Regulations 2010 to include a reduced target for PM_{2.5}. The national air quality objectives (AQOs) for the pollutants most associated with vehicle emissions, and therefore applicable to this assessment, are detailed in Table 1.

Table 1 UK National Air Quality Objectives

Pollutant	Objective	Averaging Period
Nitrogen Dioxide (NO ₂)	40µg/m ³	Annual mean
	200µg/m ³ not to be exceeded more than 18 times per year	1-hour mean
Particulate Matter (PM ₁₀)	40µg/m ³	Annual mean
	50µg/m ³ not to be exceeded more than 35 times per year	24-hour mean
Particulate Matter (PM _{2.5})	20µg/m ³	Annual mean

- 4.3 The above AQOs are typically applied where there is 'relevant exposure', i.e. where members of the public are likely to be present for the relevant averaging periods, or regularly exposed, and not in workplaces.

National Policy

- 4.4 Outline guidance for the assessment of air quality affecting new developments is given in the National Planning Policy Framework (NPPF). Relevant sections in this case are highlighted below:

109. ...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.

180. Planning policies and decisions should contribute to and enhance the natural and local environment by: ... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of ... air or noise pollution.

191. 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.

192. 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.

194. 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 Policy

- 4.5 Manchester's Local Development Framework Core Strategy Development Plan Document, adopted in July 2012, contains policies and guidance to produce sustainable development in the local area between 2012 to 2027. It includes the following policies relevant to air quality:

Policy CC 5 Transport

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

Policy EN 16 Air Quality

The Council will seek to improve the air quality within Manchester, and particularly within Air Quality Management Areas, located along Manchester's principal traffic routes and at Manchester Airport. Developers will be expected to take measures to minimise and mitigate the local impact of emissions from traffic generated by the development, as well as emissions created by the use of the development itself...

When assessing the appropriateness of locations for new development the Council will consider the impacts on air quality, alongside other plan objectives. This includes cumulative impacts, particularly in Air Quality Management Areas.

Policy DM 1 Development Management

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

- Effects on amenity, including... air quality, odours... and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions...*
- Design for health...*

- 4.6 Furthermore, the Greater Manchester Places for Everyone Joint Development Plan Document is a long-term plan for the nine Greater Manchester districts, prepared by GMCA and adopted in 2024. Air quality is also highlighted in this document, within the following policy:

Policy JP-S5 Clean Air

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 having regard to 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 so that adverse impacts on air quality can be fully assessed and development only permitted where they are acceptable and/or suitable mitigation can be provided; ...*
- 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.*

- 4.7 In addition to the above policies, details of Manchester City Council (MCC) air quality technical guidance are summarised in Appendix 2.
- 4.8 To address the requirements of the national and local policies, the following key air quality matters have been considered:
- Construction phase fugitive emissions of dust and particulate matter at nearby existing receptors;
 - Construction phase plant and vehicle emissions at existing receptors;
 - Vehicle emissions exposing proposed receptors to elevated pollutant concentrations; and
 - Emissions from traffic generated by the operation of the development at existing receptors.

5. ASSESSMENT METHODOLOGY

- 5.1 The scope and methodology for this assessment has been determined with regard to Defra Local Air Quality Technical Guidance, August 2022 (TG22) and Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), Land Use Planning & Development Control: Planning for Air Quality, January 2017 (LUPDC). Reference has also been made to other relevant technical guidance, where applicable.
- 5.2 Additionally, consultation was undertaken with the Environmental Protection Officer (EPO) at MCC (response via email, dated 22/06/2023), to inform the methodology and local assessment requirements. The EPO advised that the assessment should have regard to the MCC Air Quality and Planning Technical Guidance (2022).

Construction Phase

- 5.3 The assessment of potential air quality impacts during the construction phase has focused on the generation and dispersion of dust and PM₁₀, following the IAQM Guidance on the Assessment of Dust from Demolition and Construction, June 2016, methodology, summarised as follows:
- Step 1 – screen the need for an assessment: impacts to sensitive human and ecological receptors should be considered where they are located within 350m of the site boundary, and/or within 50m of a route used by construction vehicles up to 500m from the site entrance.
 - Step 2A – estimate the dust emission magnitude for each of the main construction activities – demolition, earthworks, general construction, and trackout.
 - Step 2B – determine the sensitivity of the receiving environment, through consideration of factors such as meteorological conditions, the number of nearby receptors, their proximity and their sensitivity. Other factors to consider are detailed in Box 9 of the guidance. A wind rose for nearby Manchester meteorological station is included in Appendix 3.
 - Step 2C – define the risk of impacts.
 - Step 3 – identify site-specific mitigation requirements.
- 5.4 In addition, exhaust emissions from construction vehicles and plant may impact local air quality. The potential for significant effects resulting from these emissions has also been considered with reference to screening and significance criteria in LUPDC.

Operational Phase

- 5.5 LUPDC indicates that a change in Light Duty Vehicle (LDV) flows of 500 Annual Average Daily Traffic (AADT) and/or Heavy Duty Vehicle (HDV) flows of 100 AADT or more is potentially significant, and likely to require further assessment. This also applies to a change in LDV flows of 100 AADT and/or HDV flows of 25 AADT or more on routes through or close to an AQMA. Where these thresholds are not exceeded, a detailed assessment of air quality is not normally required and the resulting effect normally be considered 'not significant'.

- 5.6 The project's transport consultant has indicated that the development is expected to generate a worst-case traffic flow of up to approximately 200 AADT. This is a robust trip generation calculation, as the development is classified as 'car-free' due to having minimal parking provision. Concentrations of NO₂, PM₁₀ and PM_{2.5} have been considered in the operational phase assessment as road traffic is a major source of these pollutants and their concentrations are often close to, or in exceedance of, the relevant AQOs in urban locations. Cambridge Environmental Research Consultants' (CERC) ADMS-Roads (version 5.0.1.3) atmospheric dispersion model has been used to predict pollutant concentrations at the existing (R) and proposed (PR) receptor locations detailed in Table 2.

Table 2 Modelled Receptor Locations

ID	Description	Grid Reference (OSGB)	Height (m)
R1	41 Store Street	384921.6, 398073.4	1.5
R2	49 Store Street	384967.5, 398103.2	1.5
R3	Oxygen Flats	385105.7, 398168.2	1.5
R4	Oxygen Flats	385146.0, 398195.4	1.5
R5	Oxygen Flats	385182.7, 398220.3	1.5
R6	London Road, third floor flat	384721.2, 397790.9	10.5
PR1	Ground floor	384917.9, 398043.4	1.5
PR2	Ground floor	384923.6, 398050.5	1.5
PR3	Ground floor	384932.7, 398056.2	1.5
PR4	Ground floor	384938.9, 398060.1	1.5
PR5	Ground floor	384949.4, 398066.6	1.5
PR6	Ground floor	384958.4, 398072.3	1.5
PR7	Ground floor	384968.2, 398074.2	1.5
PR8	First Floor	384918.3, 398031.7	5.0
PR9	First Floor	384923.2, 398023.9	5.0
PR10	First Floor	384929.9, 398013.2	5.0
PR11	First Floor	384938.0, 398006.2	5.0
PR12	First Floor	384948.0, 398012.6	5.0
PR13	First Floor	384942.8, 398040.3	5.0
PR14	First Floor	384954.2, 398047.6	5.0
PR15	First Floor	384965.7, 398054.7	5.0
PR16	First Floor	384973.5, 398059.6	5.0
PR17	First Floor	384977.3, 398064.0	5.0

- 5.7 A review of the Multi-Agency Geographic Information for the Countryside website did not identify any statutory designated ecological sites in the vicinity, and therefore these have been excluded.
- 5.8 To assess the development impact on local air quality, the following scenarios have been modelled:
- 2019 – Model Verification;
 - 2026 – Anticipated Opening Year, Without Development; and
 - 2026 – Anticipated Opening Year, With Development.
- 5.9 The study area, including modelled road links and receptors, is shown in Figure 2 below.
- 5.10 Details of the traffic data used in the model are included in Appendix 4, and other model inputs such as emission factors, verification and adjustment, in Appendix 5.

Significance Criteria

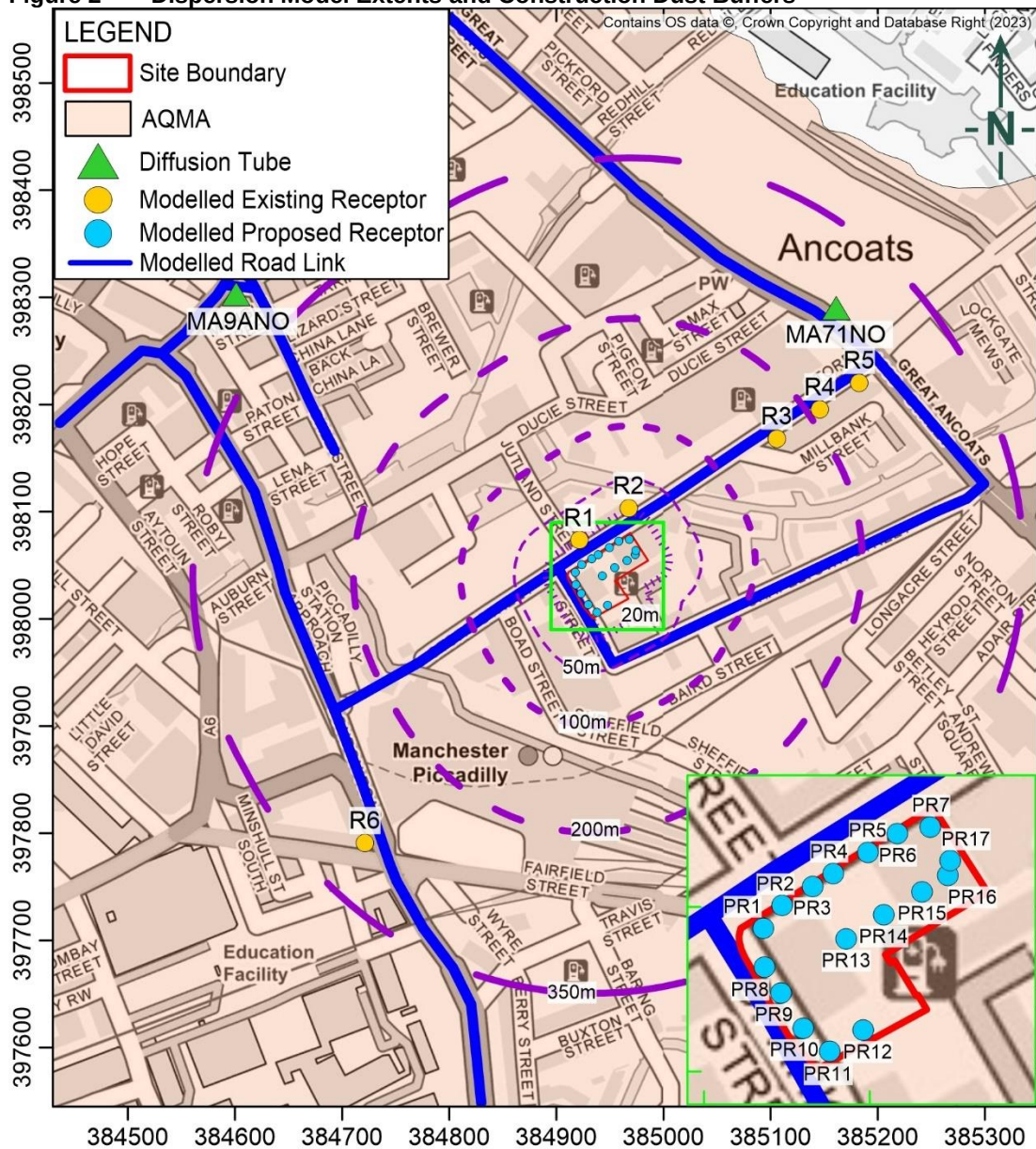
- 5.11 Significance criteria applicable to the assessment of vehicle emissions impacts have been derived from LUPDC. Where the ‘without’ and ‘with’ development pollutant concentrations are predicted at an individual receptor, the guidance recommends expressing the magnitude of incremental change as a proportion of the Air Quality Assessment Level (normally the applicable AQO).
- 5.12 The LUPDC significance criteria applicable to the assessment of impacts at existing receptors are included in Appendix 6. It should be noted that, in line with LUPDC, *‘the criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement... the objective is to identify situations where there is a possibility of a significant effect on local air quality.’*
- 5.13 For proposed receptors, predicted pollutant concentrations have been compared to the relevant AQOs to determine the potential for exceedance, and therefore, the suitability of the site for the proposed use.

Emissions Cost Calculation

- 5.14 As outlined in Appendix 2, for ‘Major’ proposals, including development of 10 or more dwellings, the MCC Air Quality and Planning Technical Guidance (2022) recommends an emissions cost calculation is undertaken to identify the environmental ‘damage’ costs associated with the proposal and determine the amount (value) of mitigation (including intrinsic mitigation) that is appropriate to offset this cost. This has been undertaken following the Defra Interdepartmental Group on Costs and Benefits (IGCB) approach, utilising the following calculation:

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

Figure 2 Dispersion Model Extents and Construction Dust Buffers



6. BASELINE CONDITIONS

- 6.1 Air quality conditions in the vicinity of the site have been reviewed to provide a baseline for consideration. The collected data are included in the tables below.

Table 3 GMCA Monitored Concentrations – NO₂

ID	Location	Type	Distance to site (m)	Monitored Annual Mean (µg/m ³)				
				2017	2018	2019	2020	2021
MA9ANO	Newton Street, bus lane	Kerbside	405	51.1	45.8	44.9	32.5	35.7
MA71NO	Great Ancoats Street	Roadside	285	50.4	46.1	45.3	31.4	34.2

Note: Data obtained from GMCA Annual Status Report, 2021.

Bold denotes exceedance of the AQO.

Table 4 Defra Mapped Background Annual Mean Concentrations (µg/m³)

OS Grid Reference	2019				2026			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}	NO ₂	NO _x	PM ₁₀	PM _{2.5}
384500, 397500	28.2	44.5	14.4	9.1	21.8	32.6	13.4	8.5
384500, 398500 (site)	29.3	47.0	13.6	8.8	23.6	36.1	12.7	8.1
385500, 398500	23.4	35.2	12.6	8.3	18.7	27.0	11.7	7.7

Note: Data obtained from <https://uk-air.defra.gov.uk/data/lagm-background-home>.

- 6.2 As indicated above, pollutant concentrations in the vicinity of the site were below the relevant AQOs in the two most recent monitoring years, 2020 and 2021, although it should be noted that results from these years are likely to be atypical due to COVID-19 travel restrictions. Exceedances of the AQO were recorded at both locations throughout 2017-2019, though both locations are adjacent to busy arterial routes through the city.
- 6.3 No monitoring of PM₁₀ or PM_{2.5} is undertaken in the vicinity of the site, though Defra predicted background concentrations for 2019 and 2026 are below the relevant AQOs for these pollutants, and NO₂. Table 4 also highlights the predicted reduction in air pollutant concentrations over time.

7. CONSTRUCTION PHASE ASSESSMENT

- 7.1 The IAQM methodology has been used to assess the potential impact of dust and PM₁₀ arising from on-site activities. As indicated within the guidance, the use of professional judgment is necessary, due to the diverse range of projects that are subject to dust impact assessment, meaning that it is not possible to be prescriptive as to how to assess the impacts.
- 7.2 As sensitive receptors were identified within the relevant IAQM screening distances, the assessment progressed to Step 2, which has been summarised in the tables below.

Table 5 Step 2A – Dust Emission Magnitude for Construction Activities

Activity	Magnitude	Explanation
Demolition	Small	Total building volume <20,000m ³ , construction material with low dust potential.
Earthworks	Medium	Total site area 2,500m ² -10,000m ² , 5-10 heavy earth moving vehicles assumed.
Construction	Large	Total building volume >100,000m ³ .
Trackout	Small	Surface material with low potential for dust release and nominal unpaved road length.

Table 6 Step 2B – Sensitivity of the Area

Potential Impact	Details	Construction Activity			
		Demolition	Earthworks	Construction	Trackout
Dust Soiling	10-100 receptors within 20m of site	High	High	High	High
Human Health	10-100 receptors within 20m of site; low background PM ₁₀ concentration	Low	Low	Low	Low
Ecological	No designated sites within 50m	N/A	N/A	N/A	N/A

Table 7 Step 2C – Summary of Impact Risks to Define Site-Specific Mitigation

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

- 7.3 Overall, the development is considered High Risk for dust soiling effects and Low Risk for PM₁₀ health effects, in the absence of mitigation. Following implementation of the recommended mitigation measures for High Risk sites in Appendix 7, it is anticipated that the residual effect of the construction phase will be not significant.

- 7.4 Furthermore, the development Demolition Environmental Management Plan (DEMP) (JRL, June 2023) should be complied with throughout the construction phase. In particular, sections 8.6 and 8.8 of this DEMP will aid in reducing the potential for release of air contaminants.
- 7.5 With regard to construction traffic, the construction phase flows are not expected to exceed the criteria detailed in Paragraph 5.4 and therefore, significant residual effects are not anticipated.

8. OPERATIONAL PHASE ASSESSMENT – SITE SUITABILITY

- 8.1 To consider the suitability of the site for the proposed use, the potential for future occupants of development to be exposed to exceedances of the relevant AQOs has been assessed. Modelled predicted pollutant concentrations at proposed receptors are detailed in Table 8.

Table 8 Predicted Pollutant Concentrations at the Development in 2026

Receptor	Annual Mean Concentration ($\mu\text{g}/\text{m}^3$)		
	NO ₂	PM ₁₀	PM _{2.5}
PR1	25.7	13.1	8.4
PR2	25.9	13.2	8.4
PR3	25.8	13.2	8.4
PR4	25.8	13.2	8.4
PR5	25.8	13.2	8.4
PR6	25.8	13.2	8.4
PR7	25.5	13.1	8.3
PR8	25.0	12.9	8.3
PR9	24.8	12.9	8.2
PR10	24.7	12.9	8.2
PR11	24.6	12.9	8.2
PR12	24.6	12.9	8.2
PR13	24.8	12.9	8.2
PR14	24.8	12.9	8.2
PR15	24.8	12.9	8.2
PR16	24.8	12.9	8.2
PR17	24.8	12.9	8.2

- 8.2 The data in Table 8 show that pollutant concentrations were predicted to be below the relevant annual AQOs at all proposed receptor locations. The highest predicted NO₂, PM₁₀ and PM_{2.5} concentrations were 25.9 $\mu\text{g}/\text{m}^3$, 13.2 $\mu\text{g}/\text{m}^3$, and 8.4 $\mu\text{g}/\text{m}^3$ at receptors PR2, PR2-PR6 and PR1-PR6, respectively.
- 8.3 The annual mean NO₂ concentrations predicted by the model were all below 60 $\mu\text{g}/\text{m}^3$. As indicated in TG22, a breach of the hourly mean AQO for NO₂ is unlikely where this is the case. Equally, exceedances of the 24-hour mean AQO for PM₁₀ are not anticipated.
- 8.4 Accordingly, it is not anticipated that proposed receptors would be exposed to exceedances of the relevant AQOs and therefore, the site is considered suitable for the proposed use, with no requirement for additional mitigation.

9. OPERATIONAL PHASE ASSESSMENT – AIR QUALITY IMPACTS

- 9.1 To assess the potential air quality impacts resulting from operational phase development-generated vehicle emissions at existing receptor locations, dispersion modelling has been undertaken to quantify pollutant concentrations in both ‘without development’ and ‘with development’ scenarios. A summary of the worst-case impacts is provided in Table 9, with full model results detailed in Appendix 8.

Table 9 Worst-Case Predicted Operational Impacts at Existing Receptors in 2026

Pollutant	Receptor	Annual Mean Concentration (µg/m³)			Impact Descriptor
		Without	With	Change	
Highest Absolute Concentrations					
NO ₂	R1	26.9	27.0	<0.1	Negligible
PM ₁₀	R6	13.6	13.6	<0.1	Negligible
PM _{2.5}	R1	8.6	8.6	<0.1	Negligible
	R6				Negligible
Maximum Predicted Changes					
NO ₂	R1	26.9	27.0	<0.1	Negligible
PM ₁₀	R1	13.5	13.5	<0.1	Negligible
	R2	13.4	13.4		
PM _{2.5}	R1	8.6	8.6	<0.1	Negligible

Note: Results are reported to the nearest 0.1 $\mu\text{g}/\text{m}^3$. Any discrepancies in results are due to rounding.

- 9.2 No existing receptors are expected to experience pollutant concentrations in excess of the relevant annual mean AQOs. Furthermore, the impact at all receptor locations is considered ‘Negligible’ in accordance with LUPDC. As such, the overall effect of the proposed development is considered ‘not significant’ with regard to air quality.

Summary

- 9.3 Based on the extent of predicted population exposure to NO₂, PM₁₀ and PM_{2.5} impacts, the overall effect of the development is considered not significant, with regard to air quality.

10. EMISSIONS COST CALCULATION

- 10.1 As outlined in Appendix 2, the MCC Air Quality and Planning Technical Guidance (2022) recommends an emissions cost calculation is undertaken for 'Major' developments, in order to analyse the environmental 'damage' costs associated with the proposal and determine the value of mitigation required to offset this. Despite being 'car-free' in principle, due to the fact that the development is well over 10 residential dwellings, this assessment has been undertaken and the results presented below, based on the worst-case trip generation of 200 AADT.

Table 10 Emissions Cost Calculation Inputs

Input	Value
Development trip rate	200 AADT (0% HDV)
Average speed	10km/hr
Emissions year	2026
Area / road type	England (not London) - Urban (not London)
Defra road transport cost per tonne ('inner conurbation') from updated 2023 damage costs	NO _x : £22,630 PM _{2.5} : £167,746
Development vehicle emissions from EFT (Defra Emissions Factors Toolkit v11.0)	NO _x : 0.186 tonnes/year PM _{2.5} : 0.014 tonnes/year

- 10.2 The inputs to the emissions cost calculation are shown in Table 11, which includes the 2% uplift per year specified in the IBC guidance, '*to reflect a higher willingness to pay for health*'.

Table 11 Emissions Cost Calculation Outputs

Emissions Year	Calculated Cost by Pollutant	
	NO _x	PM _{2.5}
2026	£4,218.23	£2,314.89
2027	£4,302.60	£2,361.19
2028	£4,388.65	£2,408.42
2029	£4,476.42	£2,456.58
2030	£4,565.95	£2,505.72
Total Cost	£33,998.65	

- 10.3 The calculated emissions cost value in **Table 11** gives an indication of the potential cost of the development to local air quality over a 5-year period. However, the development will include extensive measures intended to encourage the transition to more sustainable transport options and, therefore, minimise emissions during its operation.

10.4 These will include Travel Plan measures (see Curtins, Interim Travel Plan, 2023), such as:

- Appointment of a Travel Plan Coordinator (TPC) to oversee the implementation and monitoring of the Travel Plan measures;
- Production of Welcome Packs for all residents, detailing aims and objectives of the travel plan, plus key information regarding public and low emissions transport facilities and schemes;
- Marketing and promotional measures including posters, notice boards and monthly promotional events;
- Measures to encourage walking including the provision of adequate lighting, landscaping and shelter to create pleasant pedestrian areas;
- Measures to encourage cycling, including the provision of signage, secure parking facilities and an on-site cycle repair stand;
- Measures to encourage the use of public transport including provision of details of journey planner tools; and
- Measures to encourage car sharing and shared transport.

10.5 It is our view that the cost of the proposed Travel Plan emissions mitigation will more than offset the calculated emissions cost, and therefore, there should be no requirement for additional mitigation measures with respect to air quality.

11. CONCLUSIONS

- 11.1 Cass Allen was instructed by Foras (Sparkle Street) Ltd to assess the potential air quality impact of a proposed residential development at Sparkle Street, Manchester.
- 11.2 The assessment was carried out in accordance with relevant local and national planning policy and guidance.
- 11.3 Emissions of construction phase dust and PM₁₀ were assessed in accordance with IAQM guidance. A High Risk of dust soiling and a Low risk of PM₁₀ health effects have been identified, respectively in the absence of mitigation. Suitable best practice mitigation measures have been recommended and no significant residual air quality impacts are expected.
- 11.4 A detailed atmospheric dispersion model was utilised to predict NO₂, PM₁₀ and PM_{2.5} concentrations at relevant sensitive receptor locations within the study area during operational phase. This followed Defra TG22 and EPUK & IAQM LUPDC guidance.
- 11.5 The results indicate that pollutant concentrations at proposed sensitive receptors will be below the relevant AQOs during the operational phase, with no requirement for additional mitigation.. Furthermore, no significant impacts on local air quality as a result of development-generated traffic are anticipated. Based on the extent of predicted population exposure to NO₂, PM₁₀ and PM_{2.5} impacts, the overall effect of the development is considered to be 'not significant', with regard to air quality.
- 11.6 An Emissions Cost Calculation was also undertaken to evaluate overall development emissions. This showed that proposed mitigation is expected to more than offset the calculated emissions cost, and therefore, there should be no requirement for additional mitigation measures with respect to air quality.
- 11.7 In summary, it is our view that the site is suitable for the development in terms of air quality and that there are no air quality constraints with respect to planning consent.

Appendix 1 Air Quality Legislation

Defra and the Devolved Administrations (2007) - The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2):

The Air Quality Strategy provides a framework for reducing air pollution in the UK, with the aim of meeting the requirements of European Union (EU) legislation. This has been brought into UK law via the EU (Withdrawal) Act 2018 (as amended) and is referred to as 'retained EU law'.

The air quality standards set within the Air Quality Strategy are recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO), based on current scientific knowledge regarding the effects of each pollutant on health and the environment.

The AQOs are medium-term policy-based targets set by the government, taking into account economic efficiency, practicability, feasibility and timescales. Whilst some of the AQOs correspond with the EPAQS / WHO limits, others have a margin of tolerance, by specifying a number of permitted exceedances of the standard over a given period.

Many of the AQOs in the Air Quality Strategy have been made statutory in England via The Air Quality (England) Regulations, 2000, The Air Quality (England) Amendment Regulations, 2002 and The Air Quality Standards (Amendment) Regulations, 2016 – Statutory Instrument 2016 No. 1184.

Environmental Protection Act (1990):

Section 79 of the Environmental Protection Act 1990 defines statutory nuisance relevant to dust and particles as:

'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'.

Furthermore, Section 80 states 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. However, there are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist and nuisance is a subjective concept, its perception being highly dependent upon the existing conditions and the change which has occurred.

Environment Act (2021):

The Act mandates that local authorities review and document local air quality within their jurisdiction 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, or to identify relevant sources within neighbouring authorities' areas. Where the objective(s) are not likely to be achieved within the relevant period(s), the authority is required to designate an AQMA. For each AQMA the Local Authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality, in order to work towards achieving air quality standards in the future.

Defra (2019) Clean Air Strategy:

The UK Government's Clean Air Strategy sets out the comprehensive actions required to improve air quality, required from all parts of government and society.

The primary focus of previous iterations of the Clean Air Strategy has been NO₂, and its principal source – road traffic. The 2019 Strategy broadens the focus into other areas, including actions on clean growth and pollutant emissions from other sources such as industry, agriculture, and domestic wood-burning stoves.

Appendix 2 Local Air Quality Policy and Guidance

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

A joint Greater Manchester AQAP has been prepared, which identifies the sources of air pollution within the area and sets out the actions that GMCA plan to take 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 local 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)

'This Low Emission Strategy 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.

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.'

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

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 Roadside, referred to as the GM CAP. This document originally included plans for a Greater Manchester Charging Clean Air Zone and clean vehicle funds, however the plan never came into force and Greater Manchester local authorities have submitted the case for a new Greater Manchester Clean Air Plan, with no charging Clean Air Zone, to government.

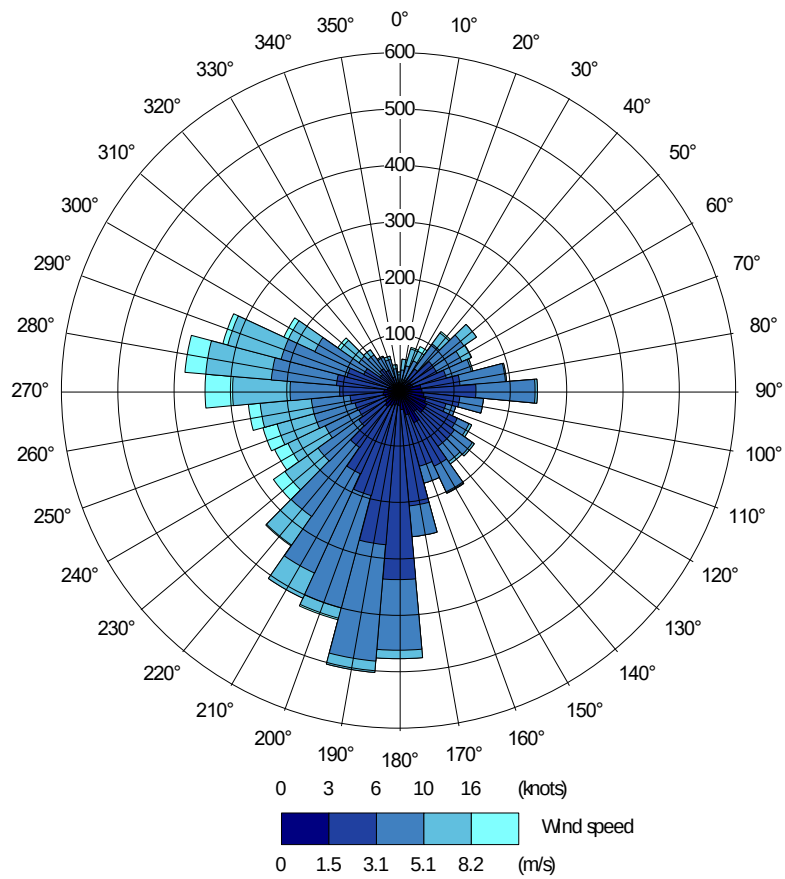
Manchester City Council Air Quality and Planning Technical Guidance (2022)

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

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. This states that 'Major' developments are those where:

- *The number of dwellings is 10 or above;*
- *The residential development is carried out on a site of more than 0.5ha where the number of dwellings is unknown;*
- *The provision of more than 1000 m² commercial floorspace; or*
- *Development carried out on land of 1ha or more.*

Appendix 3 Wind Rose for Manchester (2019)



Appendix 4 Traffic Data

Traffic data for the dispersion model were obtained from the project's Transport Consultant and supplemented by additional data from Department for Transport (DfT) Traffic Counts. Where necessary, traffic data were converted to the appropriate assessment year using a robust factor derived from Defra Trip End Model Presentation Program (TEMPro) program (version 8.0).

2019 Model Verification

Link ID	Description	Road Type	AADT	%HDV	Speed (km/h)
1	Sparkle Street, south of Store Street, junction approach/exit	Urban (not London)	230	1.90	5
2	Sparkle Street onto Chapeltown Street, west of Comet Street	Urban (not London)	230	1.90	15
3	Chapeltown Street, east of Comet Street	Urban (not London)	230	1.90	15
4	Chapeltown Street, west of A665 Great Ancoats Street	Urban (not London)	230	1.90	5
5	Store Street, east of Sparkle Street	Urban (not London)	5,454	1.90	15
6	Store Street, west of A665 Great Ancoats Street, junction approach/exit	Urban (not London)	5,454	1.90	5
7	A665 Great Ancoats Street, north of A662 Pollard Street, south of Store Street/Old Mill Street, traffic light junction	Urban (not London)	31,264	3.37	10
8	A665 Great Ancoats Street, north of Store Street / Old Mill Street, south of Laystall Street, traffic light junction	Urban (not London)	31,264	3.37	10
9	A665 Great Ancoats Street, north of Laystall Street, south of Newton Street, traffic light junction	Urban (not London)	31,264	3.37	10
10	Newton Street, south of A665 Great Ancoats Street, north of Houldsworth Street, junction approach/exit	Urban (not London)	11,755	3.45	5
11	Newton Street, south of Houldsworth Street, north of Dale Street	Urban (not London)	11,755	3.45	15
12	Newton Street, south of Dale Street, north of A6 Piccadilly, traffic light junction	Urban (not London)	11,755	3.45	5
13	Dale Street, east of Newton Road	Urban (not London)	11,755	3.45	10
14	Dale Street onto Newton Street, bus lane	Urban (not London)	202	100.00	5
15	A6 Portland Street, west of Newton Road, traffic light junction	Urban (not London)	11,533	27.50	10
16	A6 Piccadilly onto London Road, south of Newton Road, north of Store Street, traffic light junctions	Urban (not London)	7397	11.69	10
17	Store Street, east of A6 London Road, west of Sparkle Street	Urban (not London)	5,454	1.90	15
18	A6 London Road, south of Store Street, north of Whitworth Street	Urban (not London)	7,397	11.69	10
19	A6 London Road, south of Whitworth Street, north of B6469 Fairfield Street, traffic light junction	Urban (not London)	13,854	13.00	5

Link ID	Description	Road Type	AADT	%HDV	Speed (km/h)
20	A6 London Road, south of Fairfield Street, north of Altrincham Street, traffic light junction	Urban (not London)	13,854	13.00	5
21	A6 London Road, south of Altrincham Street, north of Travis Street	Urban (not London)	13,854	13.00	30
22	A6 London Road, south of Travis Street, north of A57(M)	Urban (not London)	13,854	13.00	15

2026 Without Development

Link ID	Description	AADT	%HDV	Speed (km/h)
1	Sparkle Street, south of Store Street, junction approach/exit	243	1.90	5
2	Sparkle Street onto Chapeltown Street, west of Comet Street	243	1.90	15
3	Chapeltown Street, east of Comet Street	243	1.90	15
4	Chapeltown Street, west of A665 Great Ancoats Street	243	1.90	5
5	Store Street, east of Sparkle Street	5,774	1.90	15
6	Store Street, west of A665 Great Ancoats Street, junction approach/exit	5,774	1.90	5
7	A665 Great Ancoats Street, north of A662 Pollard Street, south of Store Street/Old Mill Street, traffic light junction	33,096	3.37	10
8	A665 Great Ancoats Street, north of Store Street / Old Mill Street, south of Laystall Street, traffic light junction	33,096	3.37	10
9	A665 Great Ancoats Street, north of Laystall Street, south of Newton Street, traffic light junction	33,096	3.37	10
10	Newton Street, south of A665 Great Ancoats Street, north of Houldsworth Street, junction approach/exit	12,444	3.45	5
11	Newton Street, south of Houldsworth Street, north of Dale Street	12,444	3.45	15
12	Newton Street, south of Dale Street, north of A6 Piccadilly, traffic light junction	12,444	3.45	5
13	Dale Street, east of Newton Road	12,444	3.45	10
14	Dale Street onto Newton Street, bus lane	214	100.00	5
15	A6 Portland Street, west of Newton Road, traffic light junction	12,209	27.50	10
16	A6 Piccadilly onto London Road, south of Newton Road, north of Store Street, traffic light junctions	7,830	11.69	10
17	Store Street, east of A6 London Road, west of Sparkle Street	5,774	1.90	15
18	A6 London Road, south of Store Street, north of Whitworth Street	7,830	11.69	10
19	A6 London Road, south of Whitworth Street, north of B6469 Fairfield Street, traffic light junction	14,666	13.00	5
20	A6 London Road, south of Fairfield Street, north of Altrincham Street, traffic light junction	14,666	13.00	5
21	A6 London Road, south of Altrincham Street, north of Travis Street	14,666	13.00	30
22	A6 London Road, south of Travis Street, north of A57(M)	14,666	13.00	15

2026 With Development

Link ID	Description	AADT	%HDV	Speed (km/h)
1	Sparkle Street, south of Store Street, junction approach/exit	443	1.13	5
2	Sparkle Street onto Chapeltown Street, west of Comet Street	243	2.06	15
3	Chapeltown Street, east of Comet Street	243	2.06	15
4	Chapeltown Street, west of A665 Great Ancoats Street	243	2.06	5
5	Store Street, east of Sparkle Street	5,834	1.89	15
6	Store Street, west of A665 Great Ancoats Street, junction approach/exit	5,834	1.89	5
7	A665 Great Ancoats Street, north of A662 Pollard Street, south of Store Street/Old Mill Street, traffic light junction	33,126	3.37	10
8	A665 Great Ancoats Street, north of Store Street / Old Mill Street, south of Laystall Street, traffic light junction	33,126	3.37	10
9	A665 Great Ancoats Street, north of Laystall Street, south of Newton Street, traffic light junction	33,126	3.37	10
10	Newton Street, south of A665 Great Ancoats Street, north of Houldsworth Street, junction approach/exit	12,444	3.45	5
11	Newton Street, south of Houldsworth Street, north of Dale Street	12,444	3.45	15
12	Newton Street, south of Dale Street, north of A6 Piccadilly, traffic light junction	12,444	3.45	5
13	Dale Street, east of Newton Road	12,444	3.45	10
14	Dale Street onto Newton Street, bus lane	214	100.00	5
15	A6 Portland Street, west of Newton Road, traffic light junction	12,209	27.50	10
16	A6 Piccadilly onto London Road, south of Newton Road, north of Store Street, traffic light junctions	7,830	11.69	10
17	Store Street, east of A6 London Road, west of Sparkle Street	5,914	1.86	15
18	A6 London Road, south of Store Street, north of Whitworth Street	7,970	11.48	10
19	A6 London Road, south of Whitworth Street, north of B6469 Fairfield Street, traffic light junction	14,806	12.88	5
20	A6 London Road, south of Fairfield Street, north of Altrincham Street, traffic light junction	14,736	12.94	5
21	A6 London Road, south of Altrincham Street, north of Travis Street	14,736	12.94	30
22	A6 London Road, south of Travis Street, north of A57(M)	14,736	12.94	15

Appendix 5 Dispersion Model Details

Model Details and Input Parameters

Parameter	Value
Emissions Factors	Obtained from Defra Emissions Factors Toolkit v11.0 using the traffic data in Appendix 4
Emissions Year	2019 for verification, 2026 anticipated opening year for future scenarios
Background Concentrations	Sources from Defra maps – 2019 for verification, 2026 for future scenarios
Surface Roughness	Site – 1.0m; Meteorological Station – 0.5m
Monin-Obukhov Length	Site – 30m; Meteorological Station – 30m
Meteorological Data	Manchester (2019)
Road-contribution Adjustment Factor	1.9 – see Model Verification, below
NO _x to NO ₂ conversion	This utilised Defra NO _x to NO ₂ Calculator v8.1 and Defra mapped background concentrations

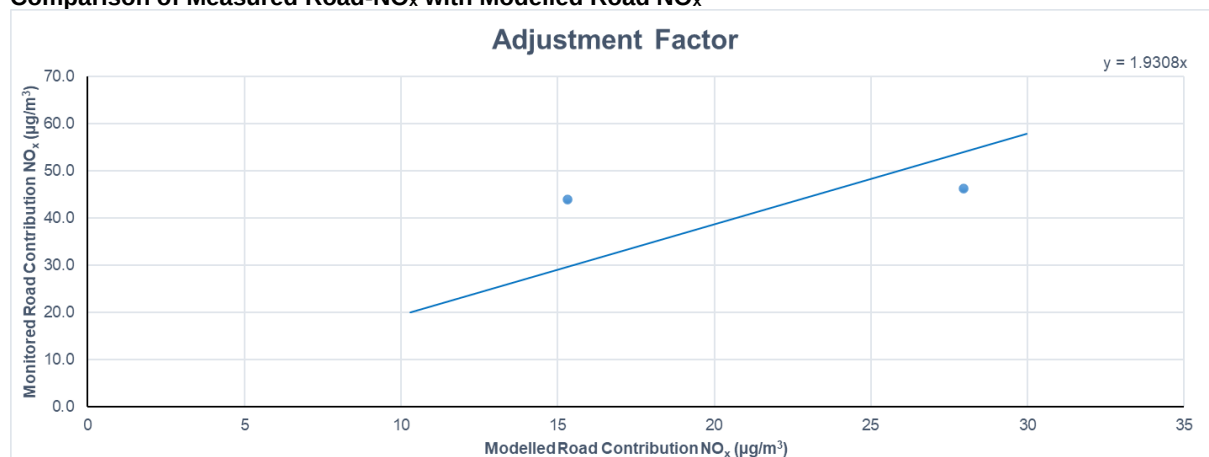
Model Verification

The model has been verified using the TG22 methodology. The model has been used to predict 2019 annual mean road-NO_x contributions at one kerbside and one roadside monitoring location within the study area. The modelled road-NO_x concentrations have been compared with the 'measured' road-NO_x utilising the Defra NO_x to NO₂ Calculator.

Model Verification (all concentrations in µg/m³)

Monitor ID	2019 Monitored NO ₂	2019 background NO ₂	2019 Monitored Road NO _x	2019 Modelled Road NO _x	Ratio
MA9ANO	44.9	29.3	43.9	15.3	2.870
MA71NO	45.3	23.4	46.1	28.0	1.650

Comparison of Measured Road-NO_x with Modelled Road NO_x



Calculation of Model Uncertainty

To assess model uncertainty, the Root Mean Square Error (RMSE) of the above data was calculated to provide an estimate of the average error of the model. The overall weighted RMSE value calculated following model verification was 4.07, which is within the acceptable range specified in TG22.

Appendix 6 Operational Phase Significance Criteria

Long Term Average Concentration at Receptors in Assessment Year	% Change in Concentration Relative to Air Quality Objective (AQO)			
	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:

- The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.
- The Table is only designed to be used with annual mean concentrations.
- Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.
- When defining the concentration as a percentage of the AQO, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme' concentration for an increase.
- The total concentration categories reflect the degree of potential harm by reference to the AQO value. At exposure less than 75% of this value, i.e. 'well below', the degree of harm is likely to be small. As the exposure approaches and exceeds the AQO, 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 AQO.
- 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 AQO. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQO, rather than being exactly equal to it.
- When defining the concentration as a percentage of the AQO, '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.
- LUPDC states that an assessment must reach a conclusion on the likely significance of the predicted effect. It should be noted that this is a binary judgement of either it is significant, or it is not significant.

Appendix 7 Recommended Construction Phase Mitigation

Recommended Mitigation Measures for High Risk Sites

General Communication

- Prior to work commencing on each phase of development, the developer will inform the local community on works due to commence and a point of contact provided for construction-related queries.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.
- Display the head or regional office contact information, where applicable.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this Appendix. Further, 'desirable' measures from IAQM guidance should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real-time PM₁₀ continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken.
- Make complaints log available to the Local Authority on request.
- Record any exceptional incidents that cause dust and/or air emissions, either on or off-site should be recorded, and the action taken to resolve the situation, in the logbook.
- Hold regular liaison meetings with other major / high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

Monitoring

- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

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.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on-site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on-site. If they are being reused on-site cover as described below.

- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure 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.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply is available on the site for effective dust/PM suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes/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.
- Ensure equipment is readily available on-site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Measures Specific to Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces), if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case make sure that that appropriate additional control measures are in place.
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10m from receptors, where possible.

Appendix 8 Dispersion Model Results

Annual Mean NO₂ Impacts

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R1	26.9	27.0	67.4	<0.1	<1	Negligible
R2	26.7	26.8	66.9	<0.1	<1	Negligible
R3	21.2	21.2	53.1	<0.1	<1	Negligible
R4	22.1	22.1	55.2	<0.1	<1	Negligible
R5	25.5	25.6	63.9	<0.1	<1	Negligible
R6	24.0	24.0	60.1	<0.1	<1	Negligible

Note: results are reported to the nearest 0.1µg/m³. Any discrepancies in results are due to rounding.

Annual Mean PM₁₀ Impacts

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R1	13.5	13.5	33.7	<0.1	<1	Negligible
R2	13.4	13.4	33.6	<0.1	<1	Negligible
R3	12.3	12.3	30.7	<0.1	<1	Negligible
R4	12.5	12.5	31.1	<0.1	<1	Negligible
R5	13.1	13.1	32.9	<0.1	<1	Negligible
R6	13.6	13.6	34.1	<0.1	<1	Negligible

Note: results are reported to the nearest 0.1µg/m³. Any discrepancies in results are due to rounding.

Annual Mean PM_{2.5} Impacts

Receptor	Without (µg/m ³)	With (µg/m ³)	With % of AQO	Change (µg/m ³)	Change (% AQO)	Impact Descriptor
R1	8.6	8.6	42.9	<0.1	<1	Negligible
R2	8.5	8.5	42.7	<0.1	<1	Negligible
R3	8.0	8.0	40.2	<0.1	<1	Negligible
R4	8.1	8.1	40.7	<0.1	<1	Negligible
R5	8.5	8.5	42.7	<0.1	<1	Negligible
R6	8.6	8.6	42.9	<0.1	<1	Negligible

Note: results are reported to the nearest 0.1µg/m³. Any discrepancies in results are due to rounding.



Architectural & Environmental Consultants

Noise | Vibration | Air Quality

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