



AIR QUALITY ASSESSMENT

FOR

SHELLCO 148 LIMITED

AT

**DUCIE ARMS, 424 STOCKPORT ROAD, LONGSIGHT,
MANCHESTER, M12 4EX**

AQ109852

16/06/2021

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EXECUTIVE SUMMARY

Ensaf Consultants were commissioned by Shellco 148 Limited to undertake an Air Quality Assessment in support of a proposed residential and commercial development at Ducie Arms, 424 Stockport Road, Longsight, Manchester, M12 4EX.

The proposed development comprises the demolition of the existing public house and the construction of a new purpose-built private medical centre (217 sqm) and 9 residential apartments, with associated on-site parking (14 spaces) and amenity space.

The application site is located within an area identified by the Greater Manchester Combined Authority as experiencing elevated pollutant concentrations. Subsequently, the Proposed Development has potential to introduce future users to poor air quality as well as, to cause impacts during the construction and operational phases. Additionally, there is potential for the proposals to cause impacts at sensitive receptors during the construction and operational phases. An Air Quality Assessment is therefore required to determine the baseline conditions at the site, assess site suitability for the proposed end-use and consider effects as a result of the development

Potential construction phase air quality impacts from fugitive dust emissions were assessed as a result of demolition, earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Dispersion modelling was undertaken in order to predict annual mean pollutant concentrations across the application site and to predicted impacts as a result of additional road vehicle exhaust emissions associated with the proposed development. Results were subsequently verified using local monitoring results provided by Manchester City Council.

The dispersion modelling results indicated that annual mean pollutant concentrations across the application site **were just below the relevant air quality objectives** at proposed sensitive locations.

The site therefore requires the implementation of protective mitigation measure to ensure future occupiers are not exposed to elevated pollutant concentrations.

The level of anticipated traffic generation from the site concluded that impacts on existing pollutant levels as a result of operational phase pollutant emissions were predicted to be **not significant** in accordance with relevant screening criteria. The use of robust assumptions, where necessary, was considered to provide sufficient results confidence for an assessment of this nature.

Based on the assessment results the site is considered suitable for the proposed end use subject to the inclusion of relevant mitigation measures to offset excess emissions associated with the development and complies with the Manchester City Council Local Plan and National Planning Policy Framework.

1.0 INTRODUCTION

1.1 Background

Ensafe Consultants has been commissioned by Shellco 148 Limited, hereafter referred to as “the Client” to undertake an Air Quality Assessment in support of a proposed development, comprising of the demolition of the existing public house and the construction of a new purpose-built private medical centre (217 sqm) and 9 residential apartments, with associated on-site parking (14 spaces) and amenity space, herein after referred to as the “Proposed Development”.

1.2 Site Location and Context

The application site is located at Ducie Arms, 424 Stockport Road, Longsight, Manchester, M12 4EX at approximate National Grid Reference (NGR) 386480, 395930. Reference should be made to Figure 1 within Appendix A for a location plan.

The application site is located adjacent to the A6 Stockport Road and A5184 Plymouth Grove and within the Greater Manchester Air Quality Management Area (AQMA) which has been declared due to exceedances of the annual mean Air Quality Objective (AQO) for Nitrogen Dioxide (NO₂). Subsequently, the Proposed Development has the potential to introduce future residential occupants into an area of elevated NO₂ and Particulate Matter (PM) concentrations, as well as to cause impacts at sensitive receptor locations during the construction and operational phases.

An Air Quality Assessment has therefore been produced to quantify annual mean NO₂ and PM concentrations across the site to consider suitability for the proposed end-use, and to assess potential impacts as a result of the development. The assessment will be undertaken in accordance with the requirements of the National Planning Policy Framework (NPPF) and the Environmental Protection UK and Institute of Air Quality Management guidance.

1.3 Limitations

This report has been produced in accordance with Ensaf Consultants standard terms of engagement. Ensaf Consultants has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from Ensaf Consultants; a charge may be levied against such approval.

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2.0 LEGISLATION, GUIDANCE AND POLICY

The following legislation, guidance and policy will be considered and adhered to during the preparation of the Air Quality Assessment:

- European Union (EU) Directive 2008/50/EC;
- The National Planning Policy Framework (NPPF), updated on 19th February 2019);
- The National Planning Practice Guidance (NPPG), relevant chapters produced on 1st November 2019;
- Section 82 of the Environment Act (1995) (Part IV);
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007).
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs, 2007¹
- The Air Quality Standards (Amendment) Regulations (2016);
- Local Air Quality Management Technical Guidance 2016 LAQM.TG(16), DEFRA, 2018²;
- Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management (IAQM), v1.1, June 2016³;
- Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and IAQM, January 2017⁴.

2.1 UK Legislation and Guidance

The Air Quality Standards (Amendment) Regulations (2016) came into force on 31st December 2016. These Regulations amend the Air Quality Standards Regulations 2010 and transpose the EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 6 pollutants.

Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by DEFRA and published in July 2007¹. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

Table 1 presents the AQOs for pollutants considered within this assessment.

Table 1: Air Quality Objectives

Pollutant	Air Quality Objectives	
	Concentration ($\mu\text{g}/\text{m}^3$)	Averaging Periods
NO ₂	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM ₁₀	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year
PM _{2.5}	25	Annual Mean

Table 2 summarises the advice provided in DEFRA guidance LAQM.TG(16)2 on where the AQOs for pollutants considered within this report apply.

1 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007

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

3 Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management, 2016.

4 Land-Use Planning and Development Control: Planning for Air Quality, EPUK and IAQM, January 2017.

Table 2: Examples of Where the Air Quality Objectives Apply

Averaging Periods	Objectives Should Apply At	Objectives Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades 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 Kerbside sites (as opposed to locations at the building façade), 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 (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

The results of the dispersion modelling assessment will also be compared against the relevant AQOs detailed in Table 1 to determine significance.

2.2 Local Planning Policy

2.2.1 Manchester's Local Development Framework Core Strategy

The Manchester Local Development Framework (LDF) Core Strategy⁵ was formally adopted in 2012 and provides a framework for development within the city. The LDF comprises a number of documents which set out Manchester City Council's (MCC's) spatial policy framework for delivering a number of policies contained within the Core Strategy which have been saved in accordance with the Planning and Compulsory Purchase Act (2004) and therefore provide the basis for the determination of planning applications prior to the finalisation of the local development framework.

A review of the Core Strategy indicated the following policy in relation to air quality that relevant to this assessment:

- Policy EN16 – Air Quality**

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

traffic generated by the development, as well as emissions created by the use of the development itself, including from Combined Heat and Power and biomass plant.

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

- **Policy DM1 – 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 privacy, light, noise, vibration, air quality, odours, litter, vermin, birds, road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise."

- **Policy T 1 – Sustainable Transport**

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

Facilitate modes of transport that reduce carbon emissions e.g by incorporating charging points for electric vehicles, subject to their appropriate design and location."

Reference has been made to these policies during the undertaking of this Air Quality Assessment by assessing the impacts of road vehicle exhaust emissions on future site users and on nearby existing sensitive locations.

2.2.2 Greater Manchester Air Quality Action Plan

The Greater Manchester Air Quality Action Plan (AQAP)⁶ has involved a review of the strategies, policies and plans which tackle or are in some way related to air quality, to develop a clear, robust and meaningful set of actions which will deliver real changes in terms of air quality, whilst supporting the sustainable economic growth of the region.

The primary objectives of the AQAP are to improve air quality across Greater Manchester and to embed low emission behaviours into the culture of our organisations and lifestyles by 2025, whilst supporting the UK Government in meeting all EU thresholds for key air pollutants. The Plan identifies 'Key Priority Areas' which are generally locations near to major roads and heavily trafficked areas in Manchester city centre, and other major urban centres across the other nine districts.

The AQAP comprises a single document including actions that will be ratified by Transport for Greater Manchester (TfGM) and district authorities to tackle air quality in Key Priority Areas, whilst supporting the sustainable economic growth of the region. This plan will allow councils to carry out their statutory duties under Part IV of the Environment Act 1995, as its implementation will help mandatory EU limit values to be met. Consideration to the action plan has been made throughout the preparation assessment. Reference has been made to the AQAP during the undertaking of this Air Quality Assessment.

Reference has been made to this policy during the undertaking of this Air Quality Assessment by assessing pollutant concentrations across the development site.

3.0 METHODOLOGY

There is the potential for the to expose future site users to elevated NO₂ and PM concentrations, as well as to cause impacts at sensitive locations during the construction and operational phases. This has been assessed in accordance with the following methodology, as agreed with the Environmental Health Officer at MCC on 08/04/2021.

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the IAQM document 'Guidance on the Assessment of Dust from Demolition and Construction'³.

Reference should be made to Appendix C for details of the relevant IAQM construction phase assessment criteria, which were utilised in conjunction with site specific information

Activities on the proposed construction site have been divided into four types to reflect their different potential impacts. These are:

- Demolition
- Earthworks
- Construction
- Trackout

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling
- Harm to ecological receptors
- The risk of health effects due to a significant increase in exposure to PM₁₀ and PM_{2.5}

The assessment steps are detailed below.

3.1.1 Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the site boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should proceed to Step 2. Additionally, should ecological receptors be identified within 50m of the boundary site or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should also proceed to Step 2.

Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

3.1.2 Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without the application of best practice mitigation measures.

3.1.3 Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance³ to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

3.1.4 Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM guidance³ suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix D.

3.2 Operational Phase Assessment

3.2.1 Future Exposure

The Proposed Development is located adjacent to the A6 Stockport Road and A5184 Plymouth Grove and within the Greater Manchester AQMA. As such, the proposals have the potential to introduce new receptors into an area of existing poor air quality, as well as to cause impacts upon existing pollution levels at nearby sensitive receptors within the AQMA..

Detailed dispersion modelling was therefore undertaken to quantify NO₂ and PM pollutant exposure across the site and determine suitability for the proposed use. The following modelling scenarios were utilised during the assessment:

- 2019 as baseline year for verification against latest ratified data;
- Opening year do-something (DS) (predicted traffic flows in 2022 should the proposals be completed)

The results of the dispersion modelling assessment will also be compared against the relevant AQOs detailed in Table 1 to determine significance. Full details of data used for the modelling assessment are presented in Appendix B of this report.

3.2.2 EPUK and IAQM Impact Significant Criteria

Based on the details of the Proposed Development and anticipated trip generation a screening assessment in accordance with the EPUK and IAQM guidance⁴ was determined a suitable assessment approach. The assessment will determine road traffic exhaust and combustion emission impacts associated with the Proposed Development, and confirm the requirement for detailed assessment work. The EPUK and IAQM document states the following criteria to help establish when an air quality assessment is likely to be considered necessary:

- Proposals that will cause a change in Light Duty Vehicle (LDV) flows of more than 100 AADT within or adjacent to an AQMA or more than 500 elsewhere;
- Proposals that will cause a change in Heavy Duty Vehicle (HDV) flows of more than 25 AADT within or adjacent to an AQMA or more than 100 elsewhere;
- Proposals which include either a centralised plant using biofuel, a combustion plant with single or thermal input >300KWh or a standby emergency generator associated with a centralised energy centre; and

- Proposals which include combustion processes of any size.

Should the above criteria not be met, the EPUK and IAQM document considers air quality impacts associated with the scheme to be not significant and no further assessment is required. Conversely, should the criterion be exceeded it may be deemed necessary that further assessment is required.

4.0 BASELINE

Existing air quality conditions in the vicinity of the application site were identified in order to provide a baseline for assessment. These are detailed in the following sections.

4.1 Local Air Quality Management

As required by the Environment Act (1995), Greater Manchester Combined Authority (GMCA), has undertaken Review and Assessment of air quality within their area of administration. This process has indicated that annual mean concentrations of NO₂ are above the AQO within their administration. As such, one AQMA has been declared, described as:

- *AQMA Greater Manchester - An area covering the 10 districts of Greater Manchester, including arterial routes, district centres and airport.*

The application site is located within the AQMA. As such there is potential for the Proposed Development to introduce future site users into an area of elevated annual mean NO₂ concentrations, and to cause air quality impacts within this sensitive area during the construction and operational phases. This has been considered within this report.

GMCA has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs and as such no further AQMAs have been designated.

4.2 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by MCC using continuous and passive methods throughout their areas of administration. A review of GMCA's most recent Air Quality Monitoring Data⁷ indicated that there are currently three diffusion tubes located within the vicinity of the application site, presented in Table 3. **Insert Number diffusion tubes located within the vicinity of the application site, presented in Table 3.**

Table 3: Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m ³)		
			X	Y		2017*	2018*	2019*
MA87ANO	87A	Roadside	387020	396561	832	37.2	33.2	34.0
MA88ANO	88A	Roadside	386536	396699	771	47.5	44.3	43.3
MA75NO	75	Kerbside	387363	394617	1,585	47.7	47.6	47.0

*Bias adjustment and annualisation are applied where monitoring has been completed for less than 75% of the year and are used to estimate an annual average from a part year average as recommended by the LAQM (TG16).

As indicated in Table 3, there were exceedances of annual mean AQO for NO₂ at two diffusion tube locations (MA88ANO and MA75NO) in recent years. Elevated NO₂ concentrations at MA88ANO and MA75NO may be due to the adjacent A57 and A6 road within an AQMA. Reference should be made to Figure 2 within Appendix A for a graphical representation of the monitoring locations.

4.3 Background Pollutant Concentrations

The total concentration of a pollutant is comprised of explicit local emission sources (such as roads and industrial sources) and the background component. The background component consists of indeterminate sources which are transported into an area from further away by meteorological conditions. Background pollutant concentrations are therefore the ambient level of pollution that is not affected by local sources of pollution.

In reality, it is not usually practical to obtain a true representation of background levels in urban areas due to corruption by local sources; background levels used in assessments may contain a mixture of both sources.

Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The Proposed Development site is located across grid square:

- NGR: 386500, 395500

Data for this location was downloaded from the DEFRA website⁸. For the purpose of this assessment, background concentrations are summarised in Table 4 for the verification year (2019) and the predicted development opening year (2022).

Table 4: Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	2019	2022
NO _x	27.78	24.01
NO ₂	19.40	17.11
PM ₁₀	13.19	12.66
PM _{2.5}	8.83	8.50

As indicated in Table 4, background pollutant concentrations of NO₂ and PM are **well below the relevant AQOs** detailed in Table 1. It should be noted that 2019 background concentrations (Table 4) have been used for future modelled scenarios to maintain conservative approach with 2022 data only presented for completeness.

4.4 Sensitive Receptors

A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. These have been defined for construction dust impacts in the following Sections.

4.4.1 Construction Phase Sensitive Receptors

There are no nationally or European designated ecological receptors within 50m of the Site boundary, or within 50m from a route used by construction vehicles on the public highway (up to 500m from the Site entrance). Therefore, the risk of dust effects at a nationally or European designated ecological receptor site from construction impacts have not been considered further in this assessment.

Human receptors sensitive to potential dust impacts during, demolition, earthworks and construction were identified from a desk-top study of the area up to 350m from the Proposed Development boundary. These are summarised in Table 5.

Table 5: Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	1 - 10
20 – 50	10 - 100
50 – 100	More than 100

Distance from Site Boundary (m)	Approximate Number of Human Receptors
100 – 350	More than 100

Reference should be made to Figure 3 within Appendix A for a graphical representation of demolition, earthworks, and construction dust buffer zones.

Receptors sensitive to potential dust impacts from trackout were identified from a desk-top study of the area up to 50m from the road network within 500m of the site access route. These are summarised in Table 6. The exact construction vehicle access routes were not available for the purpose of this assessment as they will depend on sourcing of materials. This is likely to be decided by the contractor. However, it was assumed that construction traffic would access the Proposed Development via Plymouth Grove, to ensure a worst case trackout assessment is undertaken.

Table 6: Trackout Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	More than 100
20 – 50	More than 100

Reference should be made to Figure 4 within Appendix A for a graphical representation of trackout dust buffer zones.

A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 7.

Table 7: Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a commercial and residential area. There is likely to have been a history of dust generating activities due to commuting and redevelopment processes in the locality.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the MCC Planning Portal indicated that there are several planning applications within 500m of the Proposed Development. As such, there is potential for concurrent dust generation should the construction phases of the aforementioned developments overlap. However, it is assumed that the respective sites would employ best practice control techniques, minimising the likelihood of concurrent dust impacts.
Pre-existing screening between the source and the receptors	There is no dense vegetation present along the development boundaries. Hence, there is no level of natural protective screening in any directions.
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	The wind direction is predominantly from the south and south-west of the development. As such, properties to the north and north-east of the site would be most affected by dust emissions.

Guidance	Comment
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion.
Duration of the potential impact, as a receptor may become more sensitive over time	Currently the duration of the construction phase is unknown. Given the opening year of 2022, it is unlikely to exceed over one year.
Any known specific receptor sensitivities which go beyond the classifications given in the document.	No specific receptor sensitivities identified during the baseline.

4.4.2 Operational Phase Sensitive Receptors

A desk top study was undertaken to identify the closest receptor locations to the application site. This indicated residential locations within close proximity to all development boundaries. There are no educational and medical facility in vicinity of the application site and affected road networks, with the nearest education facility, St John's Primary School, and medical facility, New Bank Health Centre, located approximately 190m south and 50m east of the site.

5.0 ASSESSMENT

5.1 Construction Phase Assessment

5.1.1 Step 1 – Screening

The desk-study detailed in Section 4.4.1 identified a number of receptors with a **high** classification of sensitivity within 350m of the site boundary, and within 50m of the anticipated trackout routes. As such, a detailed assessment of potential dust impacts was required, and summarised in the below sections.

5.1.2 Step 2A – Magnitude

The scale and nature of the works was determined to assess the magnitude of dust arising from each construction phase activity. The determination of magnitude was based upon the criteria detailed in Appendix C, with the outcome of Step 2A is summarised below in Table 8.

Demolition

Demolition will involve the removal of the existing Ducie Arms public house. The volume of buildings to be demolished is therefore likely to be less than 20,000m³. With this considered the magnitude of potential dust emissions related to demolition activities is considered **small**.

Earthworks

The Proposed Development site is estimated to cover an area of approximately 500m². The magnitude of potential dust emissions related to earthwork activities is therefore considered **small**.

Construction

The proposals comprise the construction of a new purpose-built private medical centre (217 sqm) and 9 residential apartments, with associated on-site parking (14 spaces) and amenity space, given the scale of the Proposed Development the total building and infrastructure volume is less than 25,000m³. The magnitude of potential dust emissions related to construction activities is therefore considered **small**.

Trackout

Information on the number of HDV trips to be generated during the construction phase of the Proposed Development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project. Based on the site area, it is anticipated that the unpaved road length is likely to be less than 50m. The magnitude of potential dust emissions from trackout is therefore considered **small**.

Table 8: Dust Emission Magnitude

Magnitude of Activities			
Demolition	Earthworks	Construction	Trackout
Small	Small	Small	Small

5.1.3 Step 2B – Sensitivity

The next step (Step 2B) is to determine the sensitivity of the surrounding area, based on general principles such as amenity and aesthetics, as well as human exposure sensitivity.

Dust Soiling

As shown in Section 4.4.1 and Table 6, the desk top study indicated are approximately **more than 100** sensitive receptors within 350m of the Proposed Development boundary and **more than 100** within 50m of the anticipated trackout routes.

Based on the assessment criteria detailed in Appendix C, the sensitivity of the receiving environment to potential dust soiling impacts was considered to be **high** for all construction phase activities. This is because the site is situated in a predominantly residential area and the people or property would reasonably be expected to be present here for extended periods of time.

Human Health

The annual mean concentration of PM₁₀ is 13.19µg/m³ as detailed in Section 4, based on the receptor counts provided above, the area is considered to be of **low** sensitivity for demolition, earthworks, and construction and **medium** sensitivity for trackout activities.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria detailed in Appendix C is summarised in Table 9.

Table 9: Sensitivity of the Surrounding Area

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

5.1.4 Step 2C – Risk

Both the magnitude and sensitivity factors are combined in Step 2C to determine the risk of dust impacts without the application of best practice mitigation measures.

It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase. A summary of the risk from each dust generating activity is provided in Table 10.

Table 10: Summary of Potential Unmitigated Dust Risks

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low	Low	Low	Low
Human Health	Negligible	Negligible	Negligible	Negligible

5.1.5 Step 3 – Mitigation

The IAQM guidance³ provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the Proposed Development site as summarised in Table 11.

Table 11: Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager. • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.
Site Management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. • Make the complaints log available to the local authority when asked • Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
Monitoring	• Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m 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 monitoring locations with the Local Authority • Where possible, commence baseline monitoring at least three months before phase begins. • Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.
Preparing & Maintaining 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 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 time period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods. • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.

Issue	Control Measure
	Cover, seed or fence stockpiles to prevent wind whipping.
Operating Vehicle/Machinery & Sustainable Travel	- Ensure all vehicles switch off engines when stationary - no idling vehicles. - Avoid the use of diesel- or petrol-powered 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 un- surfaced 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)
Operations	- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems. - Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. - Use enclosed chutes and conveyors and covered skips. - 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
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. Hand held 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
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 ensure that appropriate additional control measures are in place.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of

Issue	Control Measure
	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. • Record all inspections of haul routes and any subsequent action in a site log book. • Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

5.1.6 Step 4 – Residual Impacts

Assuming the relevant mitigation measures outlined in Table 11 are implemented, the residual effect from all dust generating activities is predicted to be negligible and therefore **not significant** in accordance with the IAQM guidance³.

5.2 Operational Phase Assessment

The assessment was undertaken in accordance with the methodology detailed in Section 3.2.

5.2.1 Future Exposure

Annual mean NO₂ and PM concentrations were predicted across the Proposed Development for the 2022 DS scenario at a height of 1.5m to represent exposure across the ground floor level, as shown in Figures 7 and 9 within Appendix A.

Background NO₂ and PM₁₀ levels are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above ground floor level are considered acceptable in regards to future exposure and have not been assessed further.

Nitrogen Dioxide (NO₂)

Predicted annual mean NO₂ concentrations across the Proposed Development site during the DS scenario are summarised in Table 12.

Table 12: Modelling Results - Annual Mean NO₂ at Proposed Sensitive Use

Floor Level	Predicted 2022 Annual Mean NO ₂ Concentration (µg/m ³)
Ground (1.5m)	31.06 – 39.62

The predicted concentrations shown in Table 12 indicate that there were no exceedances of the AQO at sensitive locations across ground floor areas of the proposed development. As such, it is considered that annual mean NO₂ levels at the Proposed Development site should not be viewed as a constraint to development.

Predictions of 1-hour NO₂ concentrations were not produced as part of the dispersion modelling assessment. LAQM.(TG16)² states if annual mean NO₂ concentrations are below 60µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. As such, based on the results in Table 12, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO₂.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for residential use without the implementation of mitigation techniques to protect future site users from elevated NO₂ concentrations.

Particulate Matter (PM₁₀ & PM_{2.5})

Predicted annual mean PM concentrations across the Proposed Development site during the DS scenario are summarised in Table 13.

Table 13: Modelling Results - Annual Mean PM at Proposed Sensitive Use

Floor Level	Predicted 2022 Annual Mean Concentration (µg/m ³)	
	PM ₁₀	PM _{2.5}
Ground (1.5m)	15.20 – 16.67	10.02 – 10.89

The predicted concentrations shown in Table 13 indicate that there were no exceedances of the annual mean AQOs for PM₁₀ or PM_{2.5} throughout the modelling area. As such, it is considered that annual mean PM levels at the Proposed Development site should not be viewed as a constraint to development.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for proposed end use without the implementation of mitigation techniques to protect future site users from elevated PM concentrations.

5.2.2 Road Vehicle Exhaust Emission Impacts

Any additional vehicle movements associated with the Proposed Development will generate exhaust emissions, such as NO₂, PM₁₀ and PM_{2.5} on the local and regional road networks.

Traffic data provided by Mode Transport Planning, the appointed traffic consultant for the scheme, indicated the Proposed Development is anticipated to generate a maximum AADT flow of 76 on the local road network. As such, it is considered that the operational phase of the site will not result in a change of AADT flows of more than 100, produce over 25 HDV movements per day or significantly affect average speeds on the local road network.

Subsequently, potential air quality impacts associated with operational phase road vehicle exhaust emissions are predicted to be **not significant** in accordance the EPUK and IAQM⁴ screening criteria shown in Section 3.2.2.

6.0 Mitigations

The Proposed Development comprises the construction of a new purpose-built private medical centre (217 sqm) and 9 residential apartments, with associated on-site parking (14 spaces) and amenity space. The dispersion modelling results indicated that annual mean pollutant concentrations across the application site were just below the relevant air quality objectives at proposed sensitive locations.

Several mitigation measures are being implemented to ensure that the excess emissions associated with the development will be offset so the Proposed Development is considered suitable for the proposed end use. The EPUK and IAQM guidance⁴ suggests that the following principles of good practices should be implemented:

- **Principles of good practice for design phase**
 - New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads, or directing combustion generated pollutants through well sited vents or chimney stacks.
 - Wherever possible, new developments should not create a new “street canyon”, or a building configuration that inhibits effective pollution dispersion.
- **Principles of good practice for operational phase**
 - The provision of at least 1 Electric Vehicle (EV) “fast charge” point per 10 residential dwellings and/or 1000m² of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made.
 - All gas-fired boilers to meet a minimum standard of <40 mgNO_x /kWh.
 - Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety.

7.0 CONCLUSION

Ensafe Consultants were commissioned by the Client to undertake an Air Quality Assessment in support of a proposed residential and commercial development at at Ducie Arms, 424 Stockport Road, Longsight, Manchester, M12 4EX..

During the construction phase of the Proposed Development there is the potential for air quality impacts as a result of fugitive dust emissions from the site. These were assessed in accordance with the IAQM methodology. Assuming good practice dust control measures are implemented, the residual potential air quality impacts from dust generated by construction, earthworks and trackout activities was predicted to be **not significant**.

Dispersion modelling was undertaken to quantify annual mean NO₂ and PM₁₀ concentrations across the application to assess suitability for proposed use. Modelling results were subsequently verified using MCC local monitoring data. The dispersion modelling results indicated that annual mean NO₂, PM₁₀ and PM_{2.5} concentrations across the application site were just below the relevant AQOs at the proposed sensitive use.

The site therefore requires the implementation of protective mitigation measure to ensure future occupiers are not exposed to elevated pollutant concentrations.

An assessment was undertaken using the EPUK and IAQM screening criteria to determine the potential for vehicle trips generated by the Proposed Development to affect local air quality. The traffic data provided by Mode Transport Planning, indicated that Proposed Development is anticipated to generate a maximum AADT flow of 76 on the local road network. Anticipated development traffic flows are **below** the relevant EPUK and IAQM assessment thresholds and operational impacts could be screened out as **not significant**.

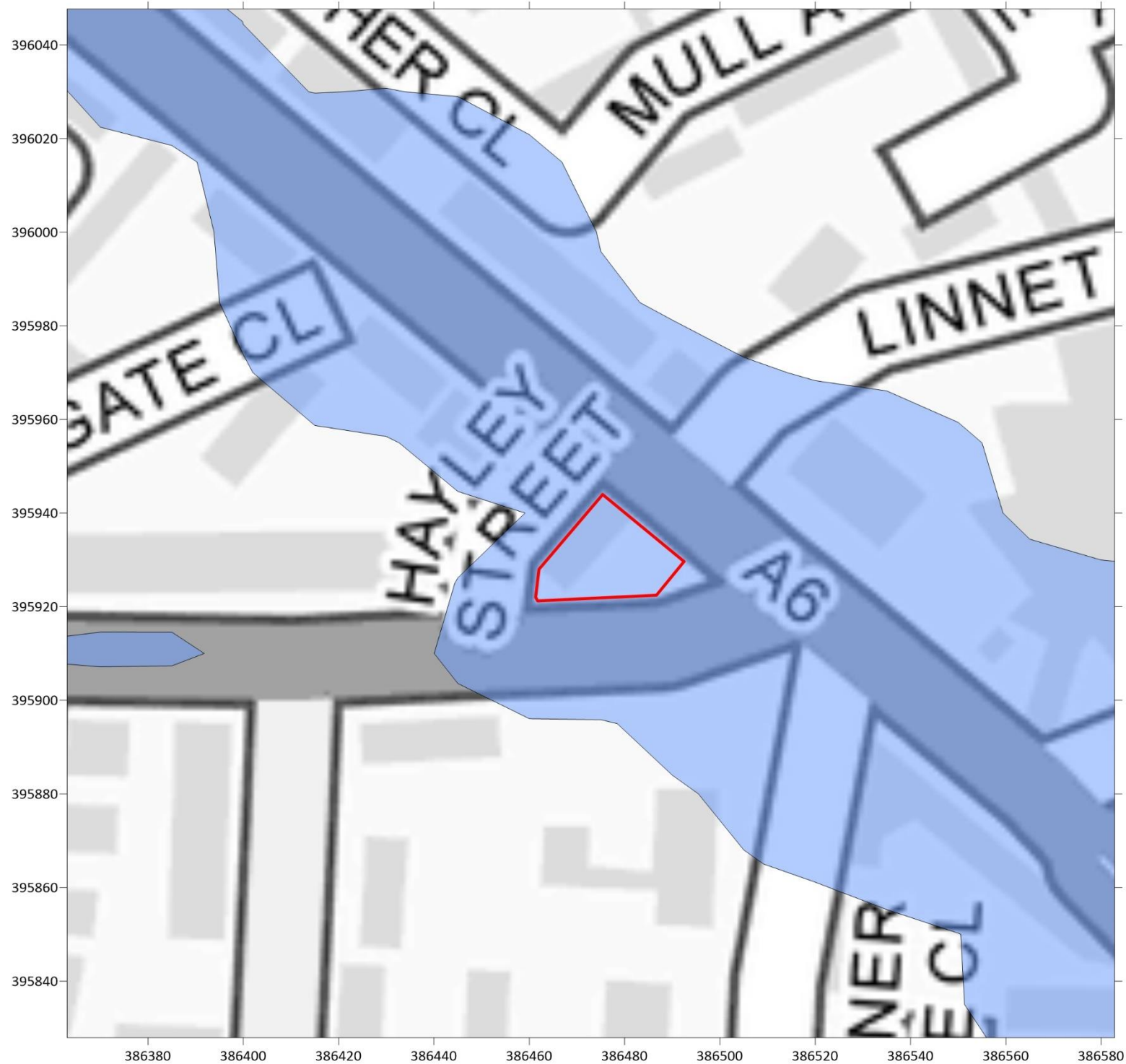
Based on the assessment results the site is considered suitable for the proposed end use subject to the inclusion of relevant mitigation measures to offset excess emissions associated with the development and complies with the MCC Local Plan and NPPF.

8.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
ASR	Annual Status Report
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DS	Do Something
DMP	Dust Management Plan
EPUK	Environmental Protection UK
EU	European Union
GMCA	Greater Manchester Combined Authority
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LA	Local Authority
LDV	Light Duty Vehicle
MCC	Manchester City Council
NGR	National Grid Reference
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Practice Guidance
PM _{2.5}	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM ₁₀	Particulate matter with an aerodynamic diameter of less than 10µm
TEMPRO	Trip End Model Presentation Program
z ₀	Roughness Length

END OF REPORT

APPENDIX A - FIGURES



Legend

-  Site Boundary
-  Air Quality Management Area

Title

Figure 1
Site Location

Project

Ducie Arms, 424 Stockport Road,
Longsight, Manchester, M12 4EX

Project Number

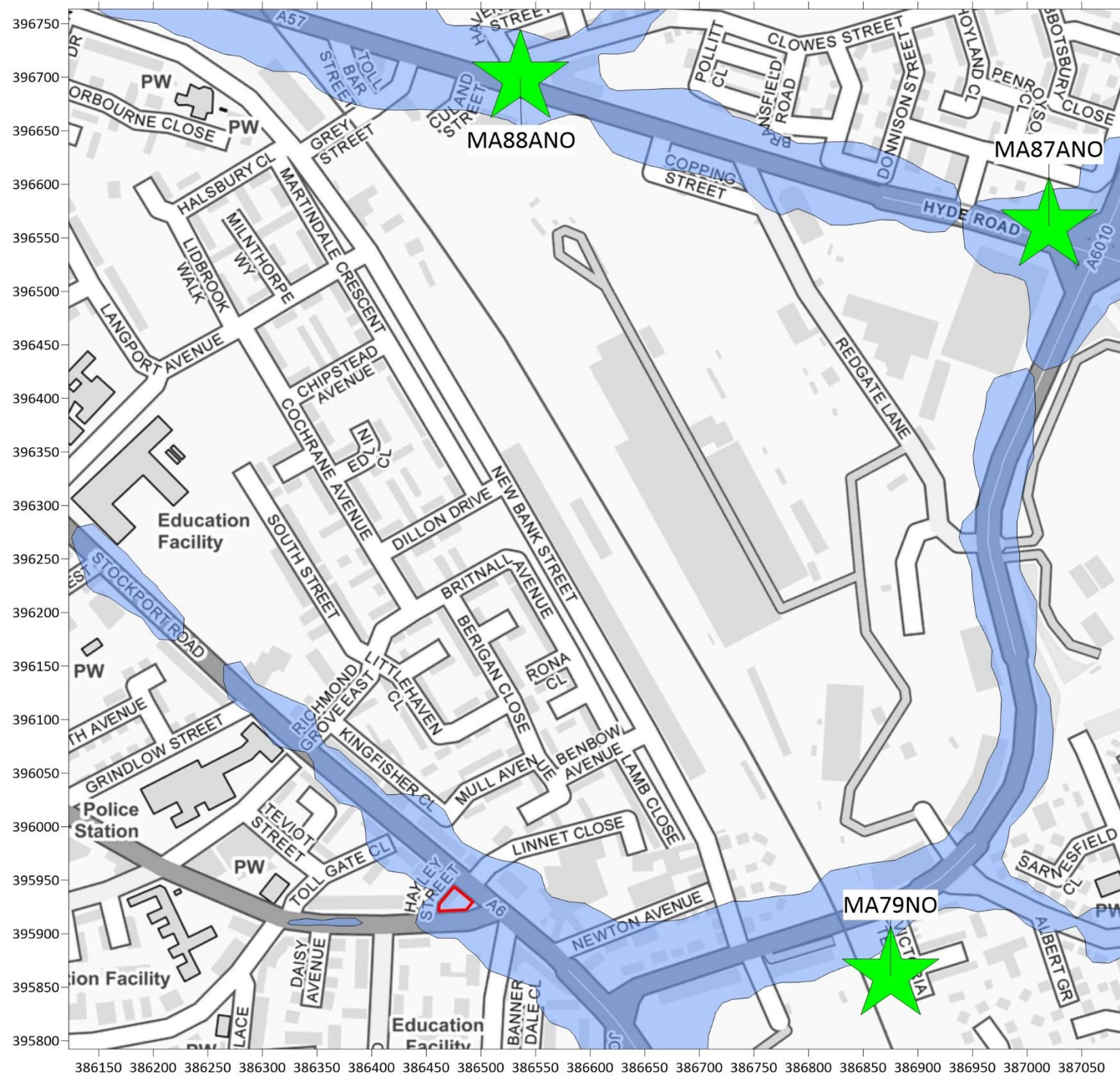
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Legend

- Site Boundary
- Air Quality Management Area
- Diffusion Tube Monitoring Locations

Title

Figure 2
Diffusion Tube Monitoring Locations

Project

Ducie Arms, 424 Stockport Road,
Longsight, Manchester, M12 4EX

Project Number

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- Legend**
- Site Boundary
 - 20m from Site Boundary
 - 50m from Site Boundary
 - 100m from Site Boundary
 - 350m from Site Boundary

Title
Figure 3
Demolition, Earthworks and Construction
Dust Buffer Zones

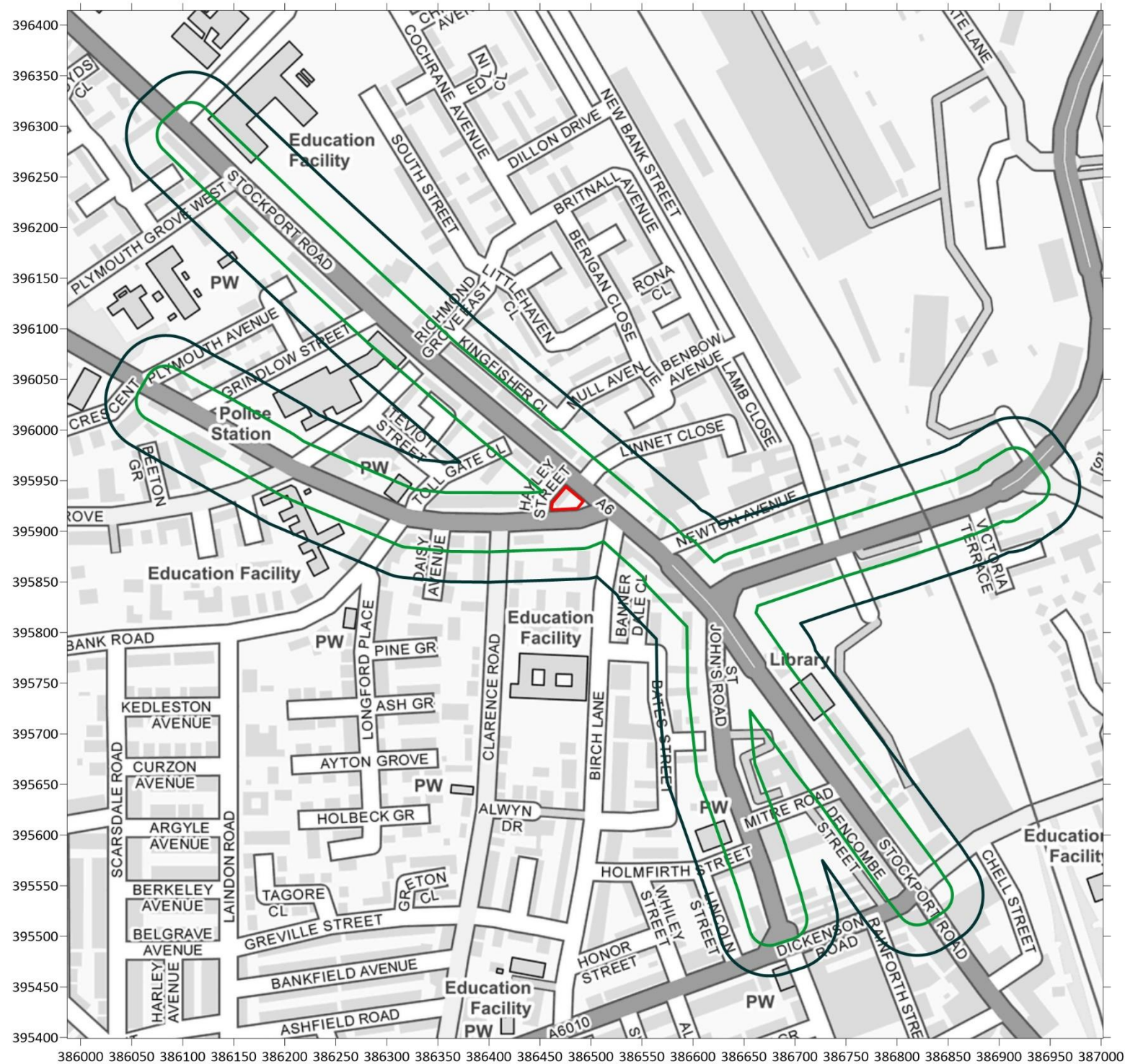
Project
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Legend

- Site Boundary
- 20m from Site Access Route
- 50m from Site Access Route

Title

Figure 4
Trackout Dust Buffer Zones

Project

Ducie Arms, 424 Stockport Road,
Longsight, Manchester, M12 4EX

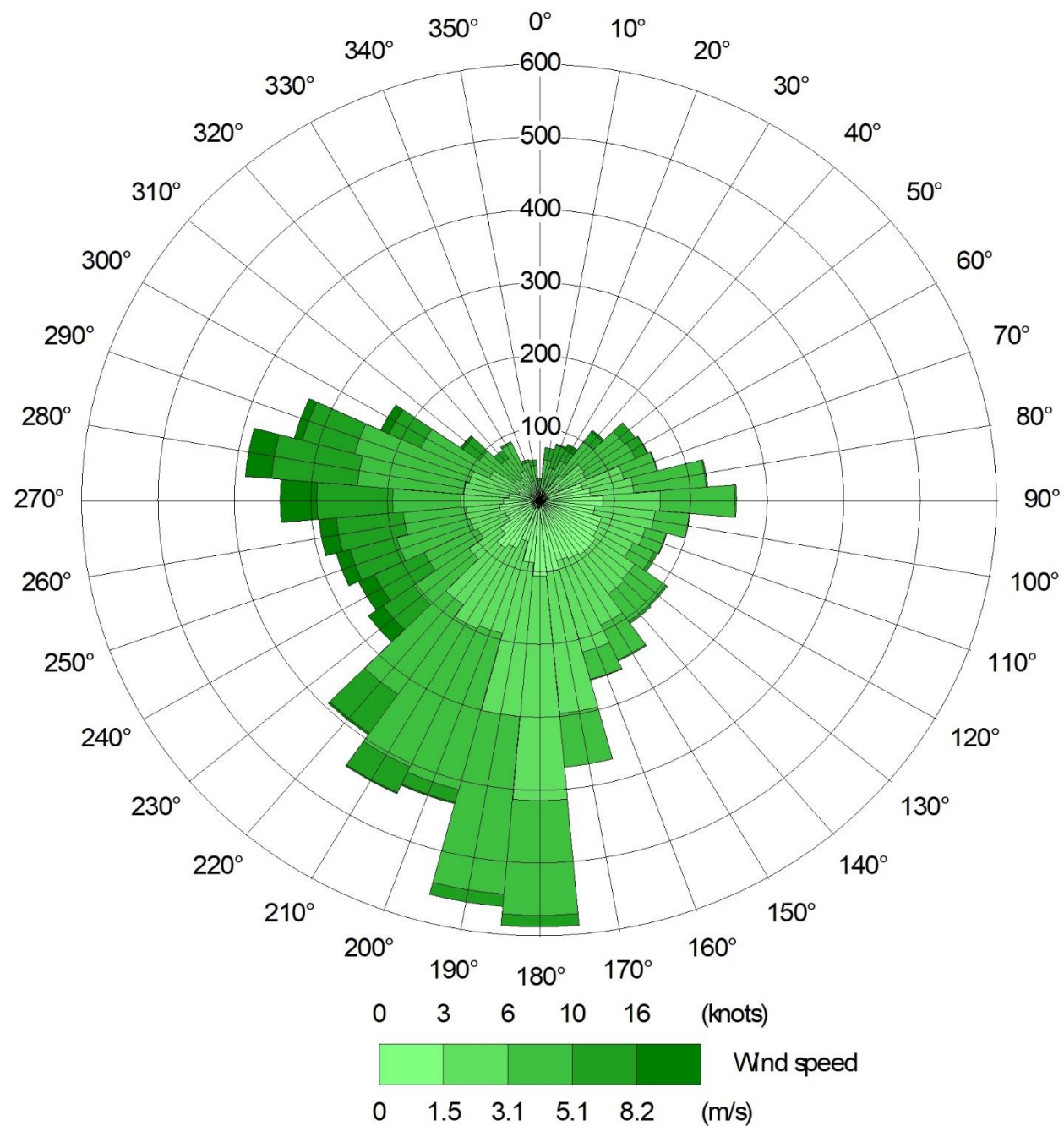
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Title

Figure 5

Wind Rose Manchester Ringway 2019
Meteorological Station

Project

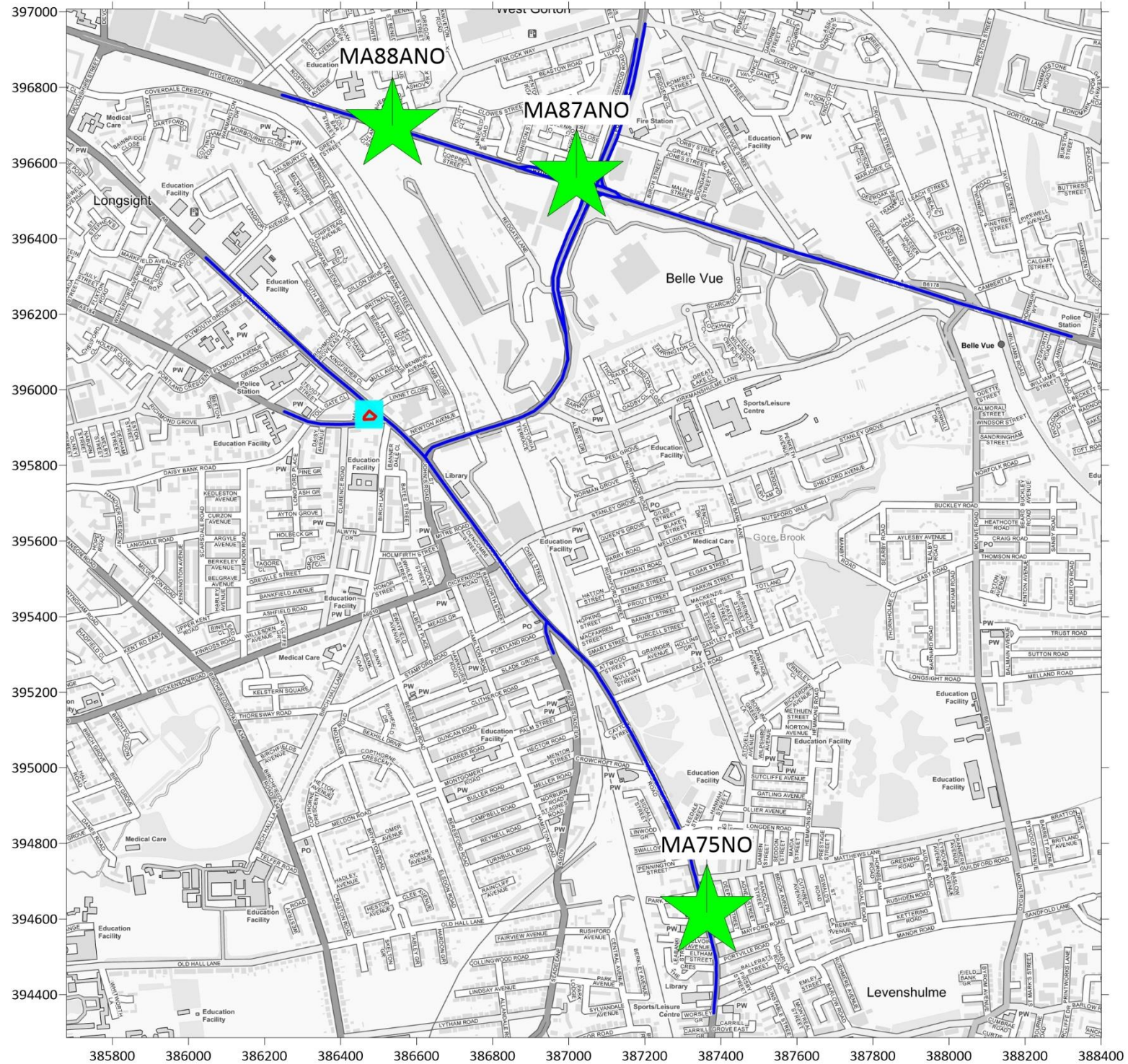
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Legend

-  Site Boundary
-  Modelled Road Link
-  Cartesian Grid
-  Diffusion Tube Monitoring

Title

Figure 6

ADMS-Roads Input

Project

Ducie Arms, 424 Stockport Road,
Longsight, Manchester, M12 4EX

Project Number

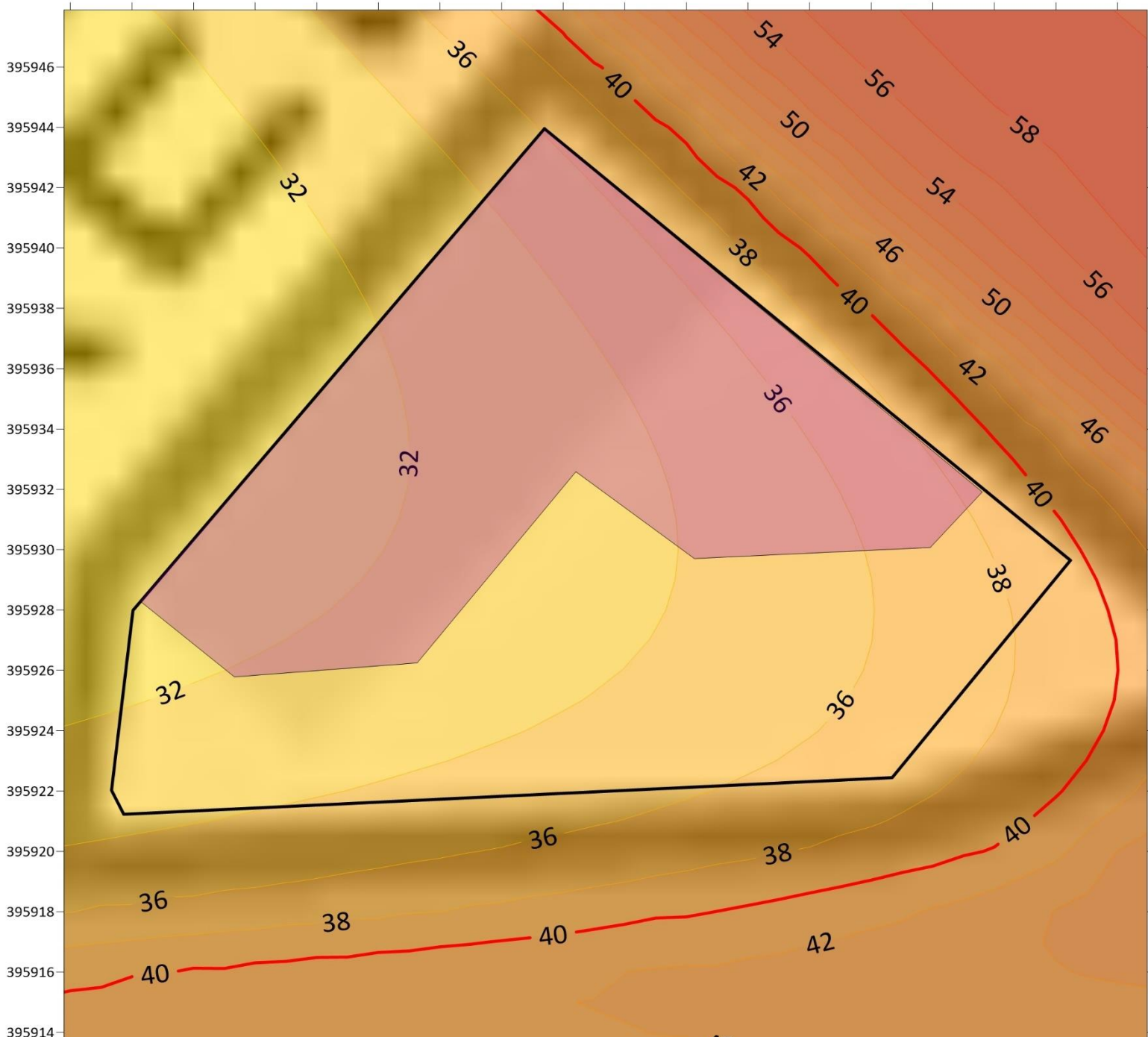
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Legend

- Site Boundary
- Proposed Development
- Predicted Annual Mean NO₂ Concentration (µg/m³)

Title

Figure 7
Predicted Annual Mean NO₂
Concentrations (µg/m³) 2022 DS

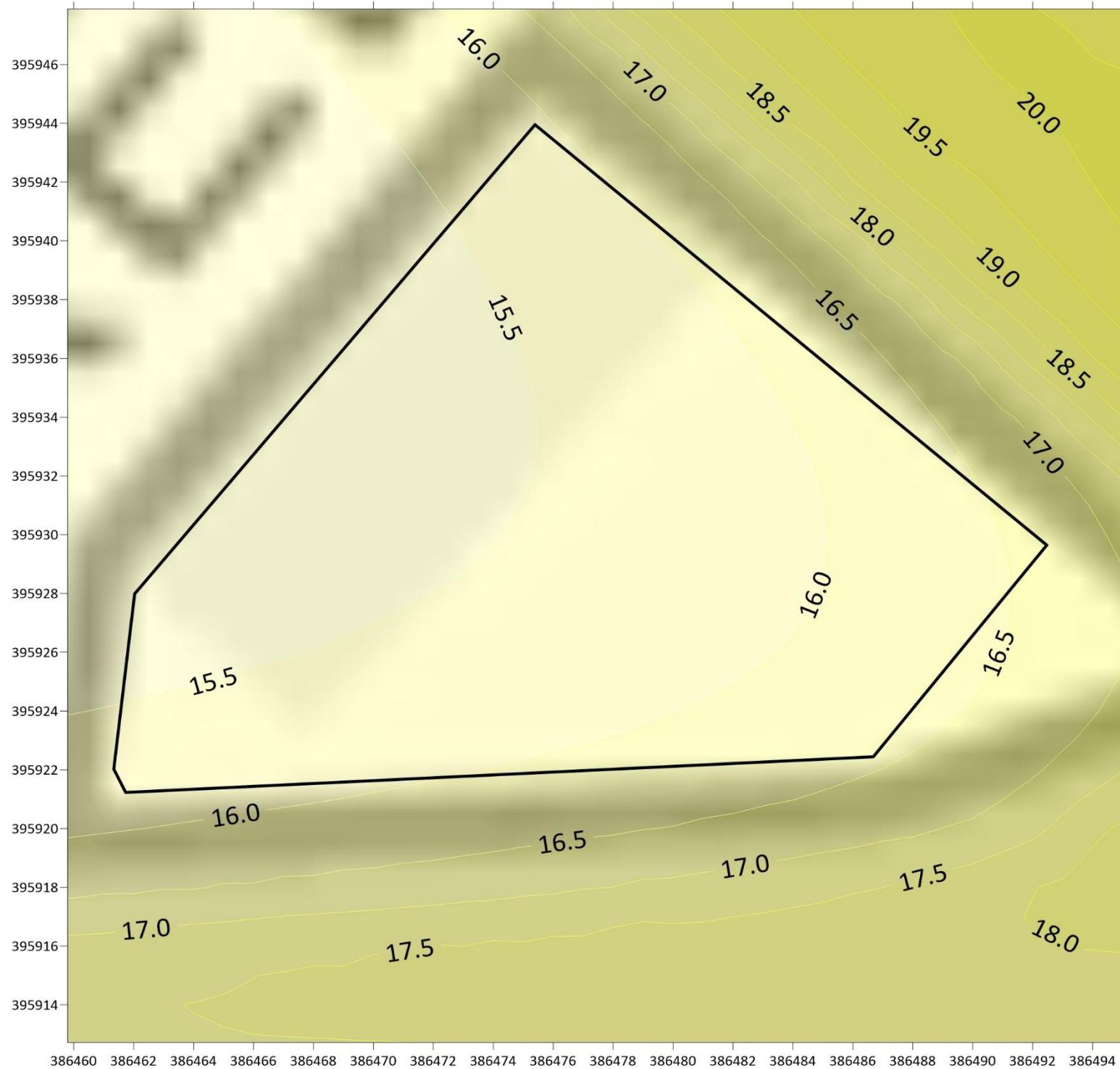
Project

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Longsight, Manchester, M12 4EX

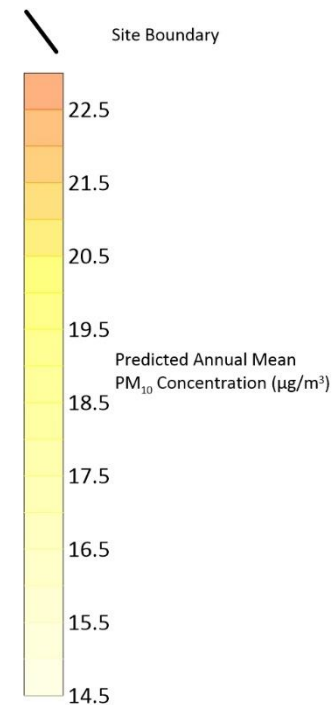
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Legend



Title

Figure 8

Predicted Annual Mean PM₁₀
Concentrations (µg/m³) 2022 DS

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Longsight, Manchester, M12 4EX

Project Number

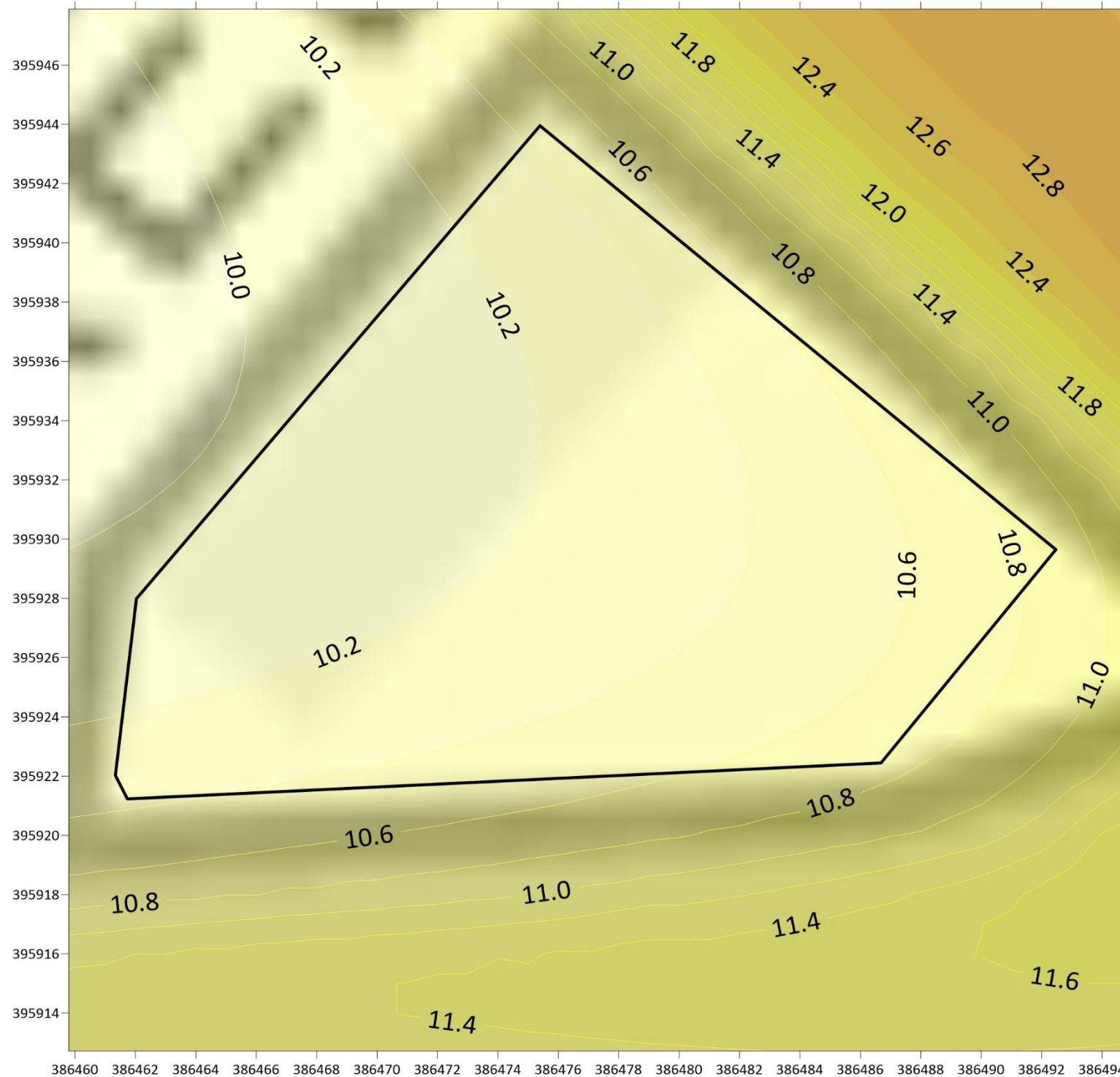
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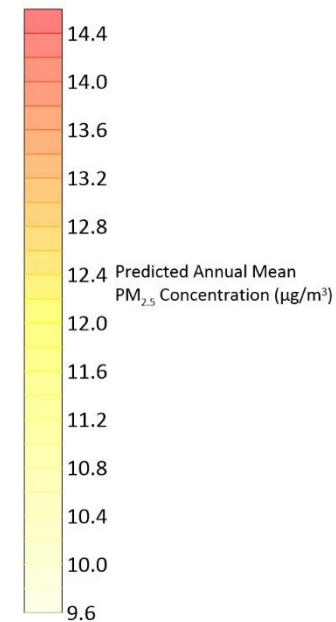
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Legend

Site Boundary



Title

Figure 9

Predicted Annual Mean PM_{2.5} Concentrations (µg/m³) 2022 DS

Project

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APPENDIX B – ASSESSMENT INPUTS

ASSESSMENT INPUTS

The Proposed Development has the potential to introduce future site users to poor air quality. Dispersion modelling using ADMS Roads was therefore undertaken to predict NO₂ and PM₁₀ concentrations across the site to consider site suitability for the proposed end-use.

The assessment was undertaken in accordance with the guidance contained within the DEFRA document LAQM.TG(16)² and the EPUK and IAQM guidance⁴.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length; and
- Monin-Obukhov length.

Assessment Area

Ambient concentrations were predicted over the Proposed Development site and surrounding highway network. One Cartesian grid was included in the model over the area at approximately NGR: 386440, 395900 and 386510, 395970 at height of 1.5m to represent the proposed ground floor level for the 2022 opening year scenario.

Results were subsequently used to produce contour plots within the Surfer software package. Reference should be made to Figure 7 and 9 within Appendix A for a graphical representation of the verification inputs and operation phase DS extents, respectively.

Traffic Flow Data

Development flow traffic data and associated network distribution was provided by Mode Transport Planning, the appointed Transport Consultants for the scheme, and indicated that a total flow generation of 76 AADT is anticipated as a result of the Purposed Development.

Baseline traffic data for all the road links was obtained from the Department for Transport (DfT).

The DfT Matrix web tool enables the user to view and download traffic flows on every link of the A-road and motorway network in Great Britain for the years 1999 to 2019. The DfT matrix is referenced in DEFRA guidance LAQM.TG(16)² as being a suitable source of data for air quality assessments and is therefore considered to provide a reasonable representation of traffic flows in the vicinity of the site.

Growth factors provided by the Trip End Model Presentation Program (TEMPRO) software package were utilised to allow for conversion from the obtained 2019 traffic flow to 2022 which was used to represent the opening year scenario. Vehicle speeds were estimated based on the free flow potential of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards.

A summary of the traffic data used in the verification scenario is provided in Table B1.

Table B1: 2019 Verification Traffic Data

Road Link		Road Width (m)	Canyon Height	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)	Data Source (DfT ID)
L1	A6 - Stockport Road (between Stanley Grove & Brook Terrace)	16.2	9.80	17,530	5.7	40	7946
L2	A6 - Stockport Road (between Brook Terrace & Slade Lane)	9.6	0.00	17,530	5.7	15	7946
L3	A6 - Slowdown between Stockport Road & Slade Lane	13.3	0.00	22,764	3.5	15	73778
L4	A6 - Stockport Road (between Slade Lane & Cayton Street)	10.8	0.00	22,764	3.5	40	73778
L5	A6 - Slowdown between Stockport Road & Crowcroft Lane (northern)	12.1	0.00	22,764	3.5	25	73778
L6	A6 - Slowdown between Stockport Road & Crowcroft Lane (southern)	12.5	0.00	22,764	3.5	40	73778
L7	A6 - Stockport Road (between Crowcroft Road & Swallow Street)	7.8	0.00	22,764	3.5	25	73778
L8	A6 - Stockport Road (between Swallow Street & Mayford Road)	12.2	0.00	22,764	3.5	25	73778
L9	A6 - Stockport Road (between Mayford Road & Barlow Road)	8.2	0.00	22,764	3.5	25	73778
L10	A5079 - Slade Lane	9.4	0.00	11,108	2.0	15	36355
L11	A6010 - Pottery Lane South	6.6	0.00	13,326	3.7	48	99014
L12	A6010 - Pottery Lane South - A57 Junction Approach	9.6	0.00	6,663	3.7	25	99014
L13	A6010 - Pottery Lane North	6.7	0.00	13,326	3.7	48	99014
L14	A6010 - Kirkmanshulme South - A57 Junction Exit	7.2	0.00	6,663	3.7	32	99014
L15	A6010 - Kirkmanshulme South - A57 Junction Approach	7.7	0.00	4,579	1.9	32	99015
L16	A6010 - Pottery Lane South - A57 Junction Exit	11.0	0.00	4,579	1.9	25	99015
L17	A57 - Hyde Road East - A6010 Junction Approach	4.1	0.00	11,579	4.6	15	17931
L18	A57 - Hyde Road East Junction Approach	6.8	0.00	5,790	4.6	32	17931
L19	A57 - Hyde Road onto Pottery Lane	4.4	0.00	5,790	4.6	32	17931
L20	A57 - Hyde Road East - A6010 Junction Exit	4.4	0.00	11,579	4.6	32	17931
L21	Junction Exit onto Hyde Road	7.0	0.00	4,576	4.9	25	56582
L22	A6010 - Pottery Lane to A57 East	4.4	0.00	6,663	3.7	32	99014
L23	A57 - Hyde Road West - A6010 Junction Exit	3.9	0.00	5,790	4.6	25	17931
L24	A57 - Hyde Road West - A6010 Junction Exit	6.7	0.00	9,153	4.9	25	56582
L25	A57 - Hyde Road West - A6010 Junction Approach	6.8	0.00	9,153	4.9	15	56582
L26	A57 - Hyde Road West - A6010 Junction Approach	3.4	0.00	4,576	4.9	15	56582

Road Link		Road Width (m)	Canyon Height	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)	Data Source (DfT ID)
L27	A57 - Hyde Road West to A6010	4.1	0.00	4,576	4.9	32	56582
L28	A6010 - Kirkmanshulme to A57 West	4.0	0.00	4,579	1.9	32	99015
L29	A57 - Hyde Road West	12.5	0.00	18,305	4.9	48	56582
L30	A57 - Hyde Road East	10.5	0.00	23,158	4.6	48	17931
L31	A6010 - Kirkmanshulme South	6.9	0.00	9,158	1.9	48	99015
L32	A6010 - Kirkmanshulme Lane North	7.7	0.00	9,158	1.9	48	99015
L33	A6 - Stockport Road	12.5	0.00	15,780	4.2	40	36161
L34	A6 - Stockport Road junction	12.5	0.00	15,780	4.2	20	36161
L35	A5184 - Plymouth Grove	10.8	0.00	9,979	1.8	40	27782
L36	A6 - Stockport Road (Newton Avenue junction)	14.8	0.00	23,310	3.4	20	28695
L37	A6 - Stockport Road (St John's Road junction)	19.7	0.00	17,343	4.7	15	60078
L38	A6 - Stockport Road	9.3	0.00	17,343	4.7	40	60078
L39	A6 - Stockport Road junction (Dickenson Road/Stanley Grove)	12.4	0.00	17,343	4.7	15	60078
L40	A6 - Stockport Road junction (Dickenson Road/Stanley Grove)	12.8	0.00	17,530	5.7	15	7946
L41	A6010 - Pottery Lane	16.4	0.00	18,315	1.9	40	99015
L42	A6010 - Kirkmanshulme Lane junction	12.8	0.00	18,315	1.9	15	99015
L43	A6010 - Kirkmanshulme Lane	8.8	0.00	18,315	1.9	40	99015
L44	A6010 - Kirkmanshulme Lane junction	14.3	0.00	18,315	1.9	15	99015

Reference should be made to Figure 6 within Appendix A for a graphical representation of the road link locations used within the verification assessment. The road width, canyon height and mean vehicle speed shown in Table B1 remained the same for the 2022 scenarios.

A summary of the 2022 traffic data is shown in Table B2.

Table B2: 2022 Traffic Data

Road Link		Additional Development AADT flow	DS Scenario	
			24 Hr AADT Flow	HDV Prop (%)
L1	A6 - Stockport Road (between Stanley Grove & Brook Terrace)	76	17,998	5.7
L2	A6 - Stockport Road (between Brook Terrace & Slade Lane)	76	17,998	5.7
L3	A6 - Slowdown between Stockport Road & Slade Lane	76	23,350	3.5
L4	A6 - Stockport Road (between Slade Lane & Cayton Street)	76	23,350	3.5
L5	A6 - Slowdown between Stockport Road & Crowcroft Lane (northern)	76	23,350	3.5

Road Link		Additional Development AADT flow	DS Scenario	
			24 Hr AADT Flow	HDV Prop (%)
L6	A6 - Slowdown between Stockport Road & Crowcroft Lane (southern)	76	23,350	3.5
L7	A6 - Stockport Road (between Crowcroft Road & Swallow Street)	76	23,350	3.5
L8	A6 - Stockport Road (between Swallow Street & Mayford Road)	76	23,350	3.5
L9	A6 - Stockport Road (between Mayford Road & Barlow Road)	76	23,350	3.5
L10	A5079 - Slade Lane	76	11,432	2.0
L11	A6010 - Pottery Lane South	76	13,700	3.7
L12	A6010 - Pottery Lane South - A57 Junction Approach	76	6,887	3.7
L13	A6010 - Pottery Lane North	76	13,700	3.7
L14	A6010 - Kirkmanshulme South - A57 Junction Exit	76	6,887	3.7
L15	A6010 - Kirkmanshulme South - A57 Junction Approach	76	4,756	1.9
L16	A6010 - Pottery Lane South - A57 Junction Exit	76	4,756	1.9
L17	A57 - Hyde Road East - A6010 Junction Approach	76	11,914	4.6
L18	A57 - Hyde Road East Junction Approach	76	5,994	4.6
L19	A57 - Hyde Road onto Pottery Lane	76	5,994	4.6
L20	A57 - Hyde Road East - A6010 Junction Exit	76	11,914	4.6
L21	Junction Exit onto Hyde Road	76	4,753	4.9
L22	A6010 - Pottery Lane to A57 East	76	6,887	3.7
L23	A57 - Hyde Road West - A6010 Junction Exit	76	5,994	4.6
L24	A57 - Hyde Road West - A6010 Junction Exit	76	9,432	4.9
L25	A57 - Hyde Road West - A6010 Junction Approach	76	9,432	4.9
L26	A57 - Hyde Road West - A6010 Junction Approach	76	4,753	4.9
L27	A57 - Hyde Road West to A6010	76	4,753	4.9
L28	A6010 - Kirkmanshulme to A57 West	76	4,756	1.9
L29	A57 - Hyde Road West	76	18,791	4.9
L30	A57 - Hyde Road East	76	23,753	4.6
L31	A6010 - Kirkmanshulme South	76	9,438	1.9
L32	A6010 - Kirkmanshulme Lane North	76	9,438	1.9
L33	A6 - Stockport Road	76	16,209	4.2
L34	A6 - Stockport Road junction	76	16,209	4.2
L35	A5184 - Plymouth Grove	76	10,278	1.8
L36	A6 - Stockport Road (Newton Avenue junction)	76	23,908	3.4
L37	A6 - Stockport Road (St John's Road junction)	76	17,807	4.7
L38	A6 - Stockport Road	76	17,807	4.7
L39	A6 - Stockport Road junction (Dickenson Road/Stanley Grove)	76	17,807	4.7
L40	A6 - Stockport Road junction (Dickenson Road/Stanley Grove)	76	17,998	5.7

Road Link		Additional Development AADT flow	DS Scenario	
			24 Hr AADT Flow	HDV Prop (%)
L41	A6010 - Pottery Lane	76	18,801	1.9
L42	A6010 - Kirkmanshulme Lane junction	76	18,801	1.9
L43	A6010 - Kirkmanshulme Lane	76	18,801	1.9
L44	A6010 - Kirkmanshulme Lane junction	76	18,801	1.9

Reference should be made to Figure 6 within Appendix A for a graphical representation of the road link locations used within the operation phase assessment.

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 10.1) released in August 2020, which incorporates updated COPERT 5.3 vehicle emissions factors for NO_x and PM and EURO 6 vehicle fleet sub-categories.

There is current uncertainty over NO₂ concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2019 emission factors have been utilised for the prediction of pollution levels for all scenarios in preference to the development opening year in order to provide a robust assessment.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO₂ concentrations using the NO_x to NO₂ Calculator (v.8.1) provided by DEFRA, which is the method detailed within LAQM.TG(16)².

Meteorological Data

Meteorological data used in this assessment was taken from Manchester Ringway meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive).

Manchester Ringway meteorological station is located at approximate NGR: 381745, 383960 which is approximately 13km south-west of the Proposed Development. Although there is a large distance between the application site and Manchester Ringway meteorological station, the use of this data has prior approval from the Environmental Health Department at MCC and is therefore considered to provide a reasonable representation of conditions at the development site.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 5 within Appendix A for a wind rose of utilised meteorological data.

Roughness Length

The specific roughness length (z_0) values used to represent conditions during the verification process, DM/DS scenario, as well as conditions at the Manchester Ringway meteorological station are summarised in Table B3.

Table B3: Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification and DS Scenario	1	Cities, woodlands
Manchester Ringway meteorological station	0.3	Agricultural areas (max)

These values of z_0 are considered appropriate for the morphology of the assessment area.

Monin-Obukhov Length

The Monin-Obukhov length provides a measure of the stability of the atmosphere within certain urban or rural contexts. The specific length values used to represent conditions during the verification process, DM/DS scenario, as well as conditions at the Manchester Ringway meteorological station are summarised in Table B4

Table B4: Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification and DS Scenario	30	Cities and large towns
Manchester Ringway meteorological station	30	Mixed urban/industrial

This Monin-Obukhov value is considered appropriate for the morphology of the assessment area.

Background Concentrations

The annual mean NO₂ concentrations detailed in Table 4, was used in the dispersion modelling assessment to represent annual mean pollutant levels at the Proposed Development site and local monitoring sites.

Table B5 displays the specific background concentrations as predicted by DEFRA, utilised to represent the condition at the monitoring locations used within the verification process.

Table B5: Predicted Background Pollutant Concentrations for Diffusion Tubes

Monitoring Location	DEFRA Grid Square	Pollutant	2022 Predicted Background Concentration (µg/m ³)
MA87ANO	387500, 396500	NO _x	26.48
		NO ₂	18.63
MA88ANO	386500, 396500	NO _x	27.19
		NO ₂	19.04
MA75NO	387500, 394500	NO _x	26.55
		NO ₂	18.65

Similar to emission factors, background concentrations for 2019 were utilised in preference to predicted background concentrations for the development opening year (2022). This provided a robust assessment and is likely to overestimate actual pollutant concentrations during the operation of the proposals.

Verification

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including:

- Estimates of background concentrations;
- Uncertainties in source activity data such as traffic flows and emission factors;
- Variations in meteorological conditions;
- Overall model limitations; and
- Uncertainties associated with monitoring data, including locations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

For the purpose of this assessment model verification was undertaken for 2019, using traffic data, meteorological data and monitoring results from this year.

MCC undertakes periodic monitoring of NO₂ concentrations at three roadside monitoring location within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO₂ result for use in the verification process. This was undertaken following the methodology contained within DEFRA guidance LAQM.TG(16)². The monitored annual mean NO₂ concentration and calculated road NO_x concentration are summarised in Table B6.

Table B6: Monitoring Results

Site ID	Monitored Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)	% Difference ((Monitored Modelled)/Monitored) * 100
MA87ANO	30.72	20.33	34%
MA88ANO	50.69	13.57	73%
MA75NO	60.32	22.20	63%

The monitored and modelled NO_x road contribution concentrations were graphed and the equation of the trend line based on the linear progression through zero was calculated, as shown in Graph 1.

This indicated that a verification factor of **2.4318** was required to be applied to all NO_x modelling results, showing the model overestimated pollutant concentrations throughout the assessment extents. Graph 1 is provided below.

Graph 1 - Verification Adjustment Factor

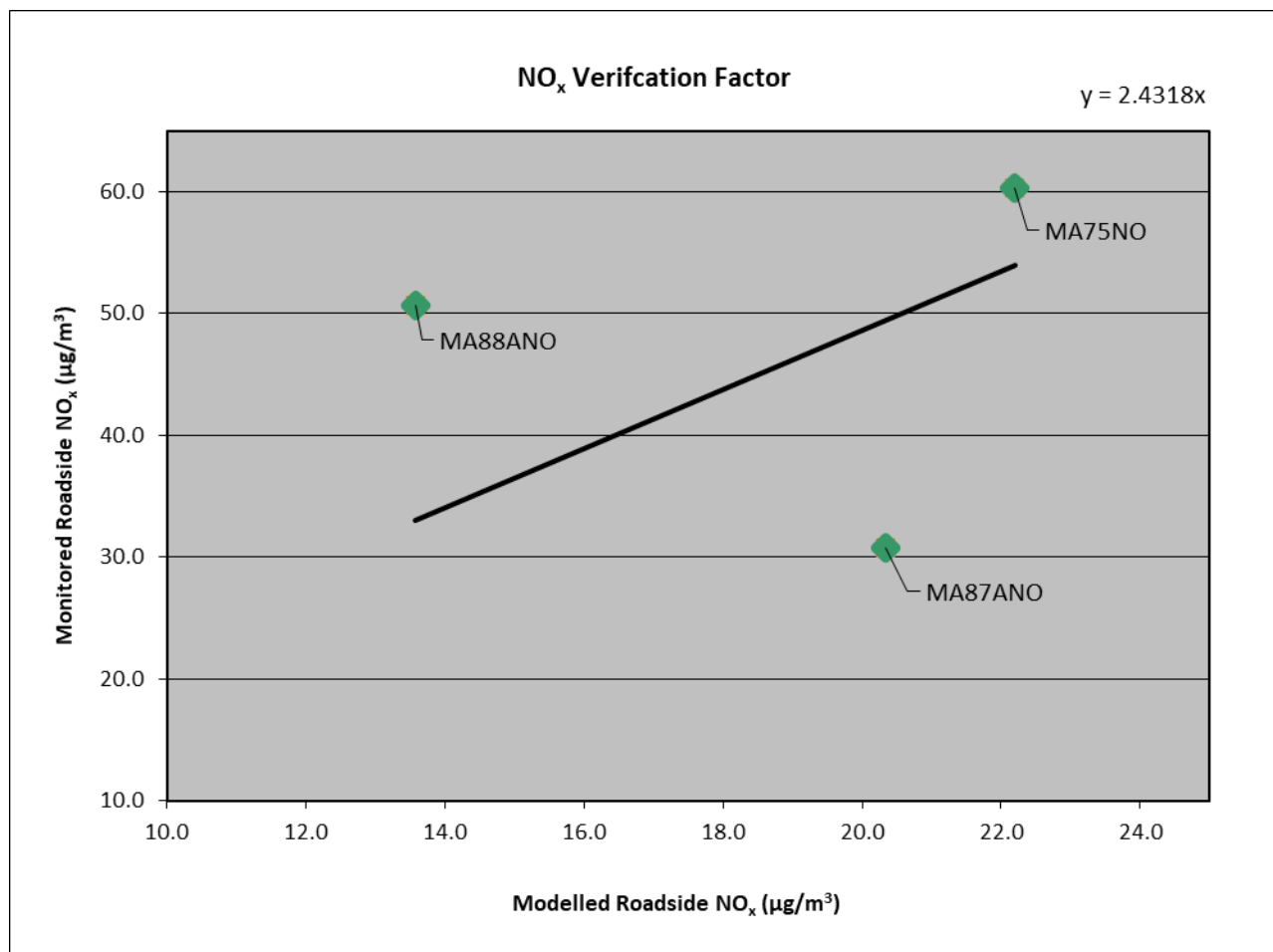


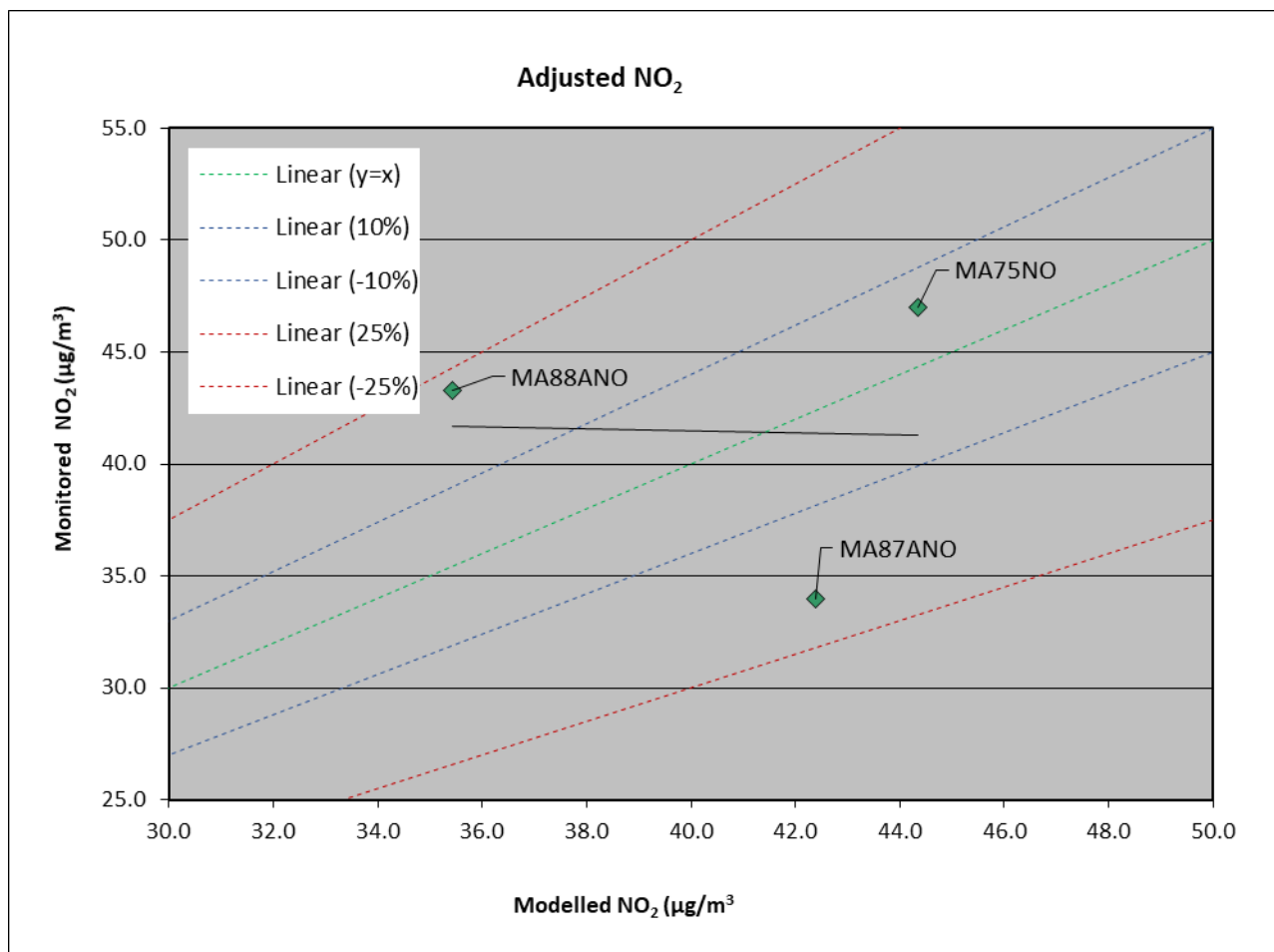
Table B7 presents the monitored annual mean NO₂ concentrations and the adjusted modelled total NO₂ concentration based on the above verification factor. Exceedances of the annual mean NO₂ AQO are highlighted in **bold**.

Table B7: Modelled Concentrations

Site ID	Monitored Road NO ₂ Concentration (µg/m³)	Adjusted Modelled Road NO ₂ Concentration (µg/m³)	% Difference ((Monitored Modelled)/Monitored) * 100
MA87ANO	34.00	42.39	-25%
MA88ANO	43.30	35.44	18%
MA75NO	47.00	44.35	6%

As demonstrated in Table B7, the percentage difference between modelled and monitored concentrations is deemed acceptable and is less than 25% in all cases, and less than 10% at one location (MA75NO). This reduces uncertainties in the model predictions and provide a robust representation of pollutant concentrations in accordance with the guidance suggested in LAQM.TG(16)².

A graphical representation of the adjusted NO₂ concentrations is provided within Graph 2.



As PM monitoring is not undertaken within the assessment extents, the NO_x adjustment factor of **2.4318** was utilised to adjust model predictions of PM in accordance with the guidance provided within LAQM.TG(16)².

APPENDIX D – CONSTRUCTION PHASE ASSESSMENT CRITERIA

CONSTRUCTION PHASE METHODOLOGY

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction'³.

Activities are divided into four types to reflect their different potential impacts. These are:

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

The potential for dust emissions was assessed for each activity that is likely to take place and considered three separate dust effects:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to a significant increase in exposure to PM₁₀ and PM_{2.5}.

The assessment steps are detailed below.

Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the site boundary or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should proceed to Step 2. Additionally, should ecological receptors be identified within 50m of the boundary site or 50m from the construction vehicle route up to 500m from the site entrance, then the assessment should also proceed to Step 2.

Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated to a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied. Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table C1.

Table C1: Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	• Total building volume greater than 50,000m³ • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities greater than 20m above ground level
	Earthworks	• Total site area greater than 10,000m² • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time

Magnitude	Activity	Criteria
		- Formation of bunds greater than 8m in height - More than 100,000 tonnes of material moved
	Construction	- Total building volume greater than 100,000m³ - On site concrete batching - Sandblasting
	Trackout	- More than 50 Heavy Duty Vehicle (HDV) trips per day - Potentially dusty surface material (e.g. high clay content) - Unpaved road length greater than 100m
Medium	Demolition	- Total building volume 20,000m³ to 50,000m³ - Potentially dusty construction material - Demolition activities 10m to 20m above ground level
	Earthworks	- Total site area 2,500m² to 10,000m² - Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time - Formation of bunds 4m to 8m in height - Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	- Total building volume 25,000m³ to 100,000m³ - Potentially dusty construction material (e.g. concrete) - On site concrete batching
	Trackout	10 to 50 HDV trips per day - Moderately dusty surface material (e.g. high clay content) - Unpaved road length 50m to 100m
Small	Demolition	- Total building volume under 20,000m³ - Construction material with low potential for dust release (e.g. metal cladding or timber) - Demolition activities less than 10m above ground level - Demolition during wetter months
	Earthworks	- Total site area less than 2,500m² - Soil type with large grain size (e.g. sand) - Less than 5 heavy earth moving vehicles active at any one time - Formation of bunds less than 4m in height - Total material moved less than 20,000 tonnes - Earthworks during wetter months
	Construction	- Total building volume less than 25,000m³ - Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	<10 HDV (3.5t) outward movements in any one day - Surface material with low potential for dust release - Unpaved road length <50m

Step 2B defines the sensitivity of the area around the development site for construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table C2.

Table C2: Examples of Factors Defining Sensitivity of an Area

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	- Users expect of high levels of amenity - High aesthetic or value property - People expected to be present continuously for extended periods of time	Internationally or nationally designated site e.g. Special Area of Conservation

Sensitivity	Examples	
	Human Receptors	Ecological Receptors
	Locations where members of the public are exposed over a time period relevant to the AQO for PM₁₀ e.g. residential properties, hospitals, schools and residential care homes	
Medium	- Users would expect to enjoy a reasonable level of amenity - Aesthetics or value of their property could be diminished by soiling - 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	Nationally designated site e.g. Sites of Special Scientific Interest
Low	- Enjoyment of amenity would not reasonably be expected - Property would not be expected to be diminished in appearance - Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads	Locally designated site e.g. Local Nature Reserve

The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts during the construction phase:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and the receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors were considered in the undertaking of this assessment.

The sensitivity of the area to dust soiling effects on people and property is shown in Table C3.

Table C3: Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Table C4 outlines the sensitivity of the area to human health impacts.

Table C4: Sensitivity of the Area to Human Health Impacts

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

Table C5 outlines the sensitivity of the area to ecological impacts.

Table C5: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Table C6 outlines the risk category from demolition activities.

Table C6: Dust Risk Category from Demolition

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

Table C7 outlines the risk category from earthworks and construction activities.

Table C7: Dust Risk Category from Earthworks and Construction

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table C8 outlines the risk category from trackout.

Table C8: Dust Risk Category from Trackout

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Low	Negligible
Low	Low	Low	Negligible

Step 3

Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

APPENDIX D – ASSESSORS CURRICULUM VITAE

JOSHUA DAVIES

Principal Air Quality Consultant

BSc (Hons) AMIEnvSci

KEY EXPERIENCE

Josh is an Environmental Consultant with specialist experience in the air quality sector. His key capabilities include:

- Production of Air Quality Assessments to the Department for Environment, Food and Rural Affairs (DEFRA), Environment Agency and Environmental Protection UK (EPUK) methodologies for clients from the residential, retail and commercial sectors.
- Detailed dispersion modelling of road vehicle emissions using ADMS-Roads. Studies have included impact assessment of pollutant concentrations at various floor levels and assessment of suitability of development sites for proposed end-use.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Assessment of Odour Impact from commercial and industrial processes in line with Environment Agency (EA) and IAQM methodologies and guidance
- Quantification of Ecological Impacts associated with Nitrogen and Acid Deposition from industrial processes
- Production of air quality mitigation strategies for developments throughout the UK.
- Management of Environmental Permit Applications primarily for the Medium Combustion Plant Directive (MCDP)

SELECT PROJECTS SUMMARY

- Imperial War Museum, Duxford – Air Quality screening assessment associated with dust and odour as a result of proposed restoration activities
- London South Bank University -AQA for redevelopment of the campus, with associated energy centre
- Scunthorpe United Football Stadium - AQA for new sports stadium and commercial and retail park
- Heineken UK, Manchester – Production of various AQAs for the expansion of the Manchester Brewery site.
- Cricklewood Freight Terminal – AQA for an aggregate freight terminal in Brent. Dust and HGV impact assessment and mitigation strategy
- Llay Wrexham – AQ associated with a Short-Term Reserve Operation site in line with the Medium Combustion Plant Directive (MCPD)

ES Chapters

- Great Jackson Street Framework - Production of a number of ES chapters for large-scale mixed use multi storey buildings
- Keele University – Road and Energy Assessment for the proposed re-development of the student campus
- Newton Farm, Perth - EIA for a medium scale residential development in close vicinity to the A9.

Odour Assessments

- Clipsone House Farm – Quantitative odour and ammonia assessment in support of a proposed extension to a large-scale poultry farm.
- Chatteris AD Plant - Quantitative odour modelling and sniff tests to discharge condition on an existing anaerobic digestion plant
- Jennychem, Snodland - Risk Assessment and Best Practice Statement in support of the proposed car repairs facility spray booth

London Borough of Southwark Experience

- Camberwell Road, Southwark - Exposure assessment for a proposed gym within an AQMA, 24 hour and 1 hour mean AQOs assessed.
- Pelier Street- AQA for a residential development located within the Southwark AQMA
- Haddonfield Estate - AQA for a residential development located within the Southwark AQMA
- Lavington Street - AQA for mixed use scheme in AQMA in Southwark, including an AQN assessment.
- Daniels Road - AQA for a residential development within the Southwark AQMA

Educational Developments

- Brinsworth Comprehensive School, Rotherham - Baseline and Construction phase assessment for the proposed extension and new Sports Hall. Site suitability due to the Schools close proximity to the M1 Motorway.
- Ashton House, Waterloo Street, Bolton – Exposure and impact assessment related to a proposed expansion of the existing site located within the Greater Manchester AQMA
- St Marys and Johns CE School, Barnet AQA for the refurbishment of the existing school and the construction of a 3-storey classroom block, within the borough wide Barnet AQMA.
- St Peters Catholic School, Guildford - AQA for the redevelopment of the existing site, and the construction of a two-storey classroom block

Monitoring & Surveying Experience

- Co-ordination and management of NO2 diffusion tube monitoring surveys in accordance with DEFRA guidance.
- Odour Acuity certified, undertaken numerous site sniff tests

QUALIFICATIONS

- Bachelor of Science
- Member of the Institute of Environmental Science (IES)
- Odour Acuity Certified