AIR QUALITY ASSESSMENT

FOR

BRUNSWICK PLACE, MANCHESTER

AQ3683r1

06/05/2021

Prepared For
Maryland Securities Group
Ashfield House
Ashfield Road
Cheadle
Cheshire
SK8 1BB

Prepared By
Katie Lewis-Jones
Ensafe Consultants
Osprey House,
Pacific Quay,
Manchester
M50 2UE

DISTRIBUTION LIST

Issued To	Company
Peter Skelton	Skelton Property
Rachel Brown	Deloitte

QUALITY ASSURANCE

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Date	25/03/2021	06/05/2021	
Prepared By	Katie Lewis-Jones	Katie Lewis-Jones	
Job Title	Graduate Air Quality Consultant	Graduate Air Quality Consultant	
Signature			
Checked By	Josh Davies	Josh Davies	
Job Title	Principal Air Quality Consultant	Principal Air Quality Consultant	
Signature			
Authorised By	Conal Kearney	Josh Davies	
Job Title	Head of Noise and Air	Principal Air Quality Consultant	
Signature			
Project Number	AQ3683	AQ3683r1	

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EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by Maryland Securities Group to undertake an Air Quality Assessment in support of a proposed mixed use development at Brunswick Mill, Manchester.

The proposed development comprises the redevelopment of the site to provide mixed commercial use and 277 residential units.

The proposed development is located within the Greater Manchester Air Quality Management Area (AQMA) which has been declared for exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO_2). Subsequently, there are concerns that the development will introduce users to poor air quality, as well as causing adverse impacts to existing pollution levels at nearby sensitive receptors within the AQMA. An Air Quality Assessment is therefore required in order to determine baseline conditions at the site, assess site suitability for the proposed end-use and assess the potential impacts as a result of the proposed 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 below the relevant air quality objectives. The site is therefore considered suitable for proposed end use without the implementation of protective mitigation techniques.

Additionally, the assessment concluded that impacts on pollutant levels as a result of operational phase pollutant emissions were predicted to be **not significant** at all sensitive locations in the vicinity of the site, as a result of **negligible and slight** impacts at discrete sensitive receptor locations. 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 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 Maryland Securities Group, hereafter referred to as “the Client” to undertake an Air Quality Assessment in support of a proposed development, comprising of the development of mixed commericial and residential use, herein after referred to as the “Proposed Development”.

1.2 Site Location and Context

The application site is located at Brunswick Mill, Manchester at approximate National Grid Reference (NGR) 385850, 398730. Reference should be made to Figure 1 within Appendix A for a location plan.

The application site is located 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 (NO_2). Subsequently, the Proposed Development has the potential to introduce future site users into an area of existing poor air quality.

Additionally, due to the scale of the Proposed Development, there is potential to cause impacts upon existing NO_2 and Particulate Matter (PM_{10} and $PM_{2.5}$) concentrations as a result of additional road vehicle exhaust emission generated during operation. Fugitive dust impacts may also arise as a result of emission generated during construction.

An Air Quality Assessment has therefore been produced to assess potential impacts as a result of the Proposed Development and to quantify annual mean NO_2 and PM concentrations across the site in order to consider suitability for the proposed end-use. 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 Ensafe Consultants standard terms of engagement. Ensafe 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 Ensafe 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, Department for Environment, Food and Rural Affairs, 2007[1]
- The Air Quality Standards (Amendment) Regulations (2016);
- Local Air Quality Management Technical Guidance 2016 LAQM.TG(16), DEFRA, 2018[2];
- Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management (IAQM), v1.1, June 2016[3];
- Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK and IAQM, January 2017[4].

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 2007[1]. 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 (µg/m³)	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 City Council Local Plan

The Manchester Local Plan guides development within Manchester A review of the Core Strategy indicated the following policies in relation to air quality that are relevant to this assessment. Manchester's Core Strategy[5] was adopted in 2012 and sets out the long term strategic policies for Manchester's future development.

- **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.

5 https://secure.manchester.gov.uk/info/200074/planning/6572/local_plan

Reference has been made to this policy 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.

2.3 Greater Manchester Air Quality Action Plan

The Greater Manchester Air Quality Action Plan (AQAP) 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 by assessing pollutant concentrations across the development site, and quantifying impacts associated with the construction and operation of the Proposed Development.

3.0 METHODOLOGY

There is the potential for the to expose future site users to elevated NO_2 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 Environmental Health at MCC on 26/03/2021.

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 D 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 PM_{10} 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 guidance[3] 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 guidance[3] suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix E.

3.2 Operational Phase Assessment

3.2.1 Road Vehicle Exhaust Impact Assessment

The Proposed Development has potential to cause impacts upon existing pollution levels at nearby sensitive receptors as a result of additional road vehicle exhaust emissions (NO_2 and PM) generated during the operational phase.

Based on data from the appointed traffic consultant, Curtins, it is expected that there will be 450 AADT trips generated by the Proposed Development. Based on the anticipated AADT trip generation a dispersion modelling assessment was undertaken in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

Impacts have been defined by predicting pollutant concentrations at sensitive locations with and without the Proposed Development in place using dispersion modelling and the following assessment scenarios:

- 2019 as baseline year for verification against latest ratified data;
- Opening year do-minimum (DM) (predicted traffic flows in 2023 should the proposals not proceed); and
- Opening year do-something (DS) (predicted traffic flows in 2023 should the proposals be completed, with the addition of traffic generated by the Proposed Development).

It should be noted that air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2019 were utilised within the dispersion model. The use of 2023 traffic data and 2019 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

Reference should be made to Appendix B for full assessment input details, and Appendix C for details of the full assessment results.

3.2.2 EPUK and IAQM Impact Significant Criteria

Receptors potentially sensitive to changes in pollutant concentrations were identified within the assessment extents. LAQM.TG(16)[2] provides the following examples of where annual mean AQOs should apply:

- Residential properties;
- Schools;

- Hospitals; and
- Care homes.

The sensitivity impact significance of each receptor was defined in accordance with the criteria shown in Table 3. These are based upon the guidance provided within the EPUK and IAQM guidance[4].

Table 3: EPUK and IAQM Assessment Significance Criteria

Long Term Average Concentration	% Change in Concentration Relative to 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

The criteria shown in Table 3 is adapted from the EPUK and IAQM guidance[4] with sensitivity descriptors included to allow comparisons of various air quality impacts. It should be noted that changes of 0%, i.e. less than 0.5%, will be described as negligible in accordance with the EPUK and IAQM guidance[4].

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 3 the EPUK and IAQM guidance[4] states that this framework is to be used as a starting point to make a judgement on significance of effect but other influences might need to be accounted for. Whilst impacts might be determined as 'slight', 'moderate' or 'substantial' at individual receptors, overall effect might not necessarily be deemed as significant in some circumstances. The following factors may provide some assistance in determining the overall significance of a development:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective will be relevant;
- The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors;
- Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease; and
- The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of $41\mu g/m^3$ should attract less significance than an annual mean of $51\mu g/m^3$.

These factors were considered and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that 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.

Full details of data used for the modelling assessment are presented in Appendix B of this report.

3.2.3 Future Exposure

The Proposed Development is located within the GMCA AQMA. Subsequently, the proposals have potential to introduce new receptors into an area of elevated NO_2, PM_{10} and $PM_{2.5}$ concentrations.

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

- Opening year do-something (DS) (predicted traffic flows in 2023 should the proposals be completed, with the addition of traffic generated by the Proposed Development)

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.

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), GMCA, of which MCC is a part of, has undertaken Review and Assessment of air quality within their area of administration. This process has indicated that annual mean concentrations of NO_2 are above the AQO within their administration. As such, one AQMA has been declared which is described as:

- 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 pollutant concentrations, and to cause air quality impacts within this sensitive area during the construction and operational phases. This has been considered within this report.

MCC 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 MCC's most recent Air Quality Monitoring Data[6] indicated that there are currently three automatic analysers operated by MCC, the closest of which is Manchester Piccadilly (Urban Centre) located approximately 1.5km north of the site, at the approximate NGR: 384310, 398337. Due to contrasting urban environments and distance between the development site and automatic analyser, similar pollutant concentrations would not be expected. This monitoring station has not been considered further within this assessment.

MCC also monitor NO_2 concentrations across the borough using passive diffusion tubes. A review of the most recent air quality monitoring data indicated 5 diffusion tubes located within the vicinity of the application site, presented in Table 4.

Table 4: Diffusion Tube Monitoring Results

Site ID	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (μg/m³)		
		X	Y		2017	2018	2019
MA28NO	Roadside	387951	397430	2,465	38.9	37.1	36.1
MA36NO	Roadside	385205	399750	1,216	34.4	33.1	31.7
MA71NO	Roadside	385161	398290	811	**50.9**	N/A	**45.3**
MA95BNO	Roadside	386568	397580	1,346	N/A	N/A	**43.4**
MA96BNO	Roadside	385189	397167	1,686	N/A	N/A	**46.0**

As indicated in Table 4, there were exceedances of the AQO in recent years at three locations. This is likely be due to their roadside locations adjacent to arterial traffic routes within an AQMA. Reference should be made to Figure 2 within Appendix A for a graphical representation of the monitoring locations.

[6] 2019 Air Quality Annual Status Report, June 2020

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: 385500, 398500

Data for this location was downloaded from the DEFRA website[7]. For the purpose of this assessment, background concentrations are summarised in Table 5 for the verification year (2019) and the predicted development opening year (2023).

Table 5: Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration (µg/m³)	
	2019	2023
NO_x	35.16	29.67
NO_2	23.41	20.31
PM_{10}	12.56	11.91
$PM_{2.5}$	8.32	7.87

As indicated in Table 5, background pollutant concentrations of NO_2 and PM are below the relevant AQOs detailed in Table 1. It should be noted that 2019 background concentrations (Table 5) have been used for future modelled scenarios to maintain conversative approach with 2023 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 are no nationally or European designated ecological receptors within 50m of the Site boundary, or within 50m from trackout 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, 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 6.

Table 6: Earthworks and Construction Dust Sensitive Receptors

7 https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

Distance from Site Boundary (m)	Approximate Number of Human Receptors
Less than 20	10 - 100
20 – 50	10 - 100
50 – 100	More than 100
100 – 350	More than 100

Reference should be made to Figure 3 within Appendix A for a graphical representation of, 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 7. 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 egress the Proposed Development via Bradford Road, to ensure a worst case trackout assessment is undertaken.

Table 7: Trackout Dust Sensitive Receptors

Distance from Trackout Routes (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 8.

Table 8: Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	The site is located in a residential/industrial area. There is likely to have been a history of dust generating activities due to redevelopment and industrial 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 large scale planning applications within 500m of the Proposed Development. • 123735/FO/2019 – Residential development 13 units • 122420/FO/2019 – Residential development of 17 units • 126630/FO/2020 – Office Extension • 123887/FO/2019 – Residential development of 37 units As such, there is potential for concurrent dust generation should the construction phases of the aforementioned developments overlap.
Pre-existing screening between the source and the receptors	There is vegetation present along the southern boundary of the site. If retained, this could provide

Guidance	Comment
	natural protective screening to receptors in these 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 of the development. As such, properties to the North of the site would be most affected by dust emissions
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.
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 in order to identify any sensitive receptor locations in the vicinity of the site that require specific consideration during the assessment and are summarised Table 9.

Table 9: Existing Sensitive Human Receptors

Potential Impact		NGR (m)		Height (m)
		X	Y	
R1	55 Bradford Road	385821.06	398758.25	1.5
R2	26 Bradford Road	385992.12	398846.13	1.5
R3	331 Bradford Road	386357.10	399130.21	1.5
R4	6 The Mews	386569.54	399301.61	1.5
R5	2 Stuart Street	386986.25	398821.98	1.5
R6	19 The Mews	386571.71	399337.27	1.5
R7	143 Old Mill Street	385646.02	398614.70	1.5
R8	130 Piercy Street	385611.81	398557.66	1.5
R9	18 Tavery Close	385488.76	398494.43	1.5
R10	88 Old Mill Street	385498.92	398470.14	1.5
R11	Old Mill Street New Apartments	385386.06	398382.54	4.5
R12	Weavers Quay	385379.14	398413.27	1.5
R13	Islington Wharf Mews	385301.15	398322.66	1.5
R14	151 Great Ancoats Street	385265.14	398185.54	4.5
R15	James Brindley Basin	385237.51	398164.75	1.5
R16	40 Laystall Street	385037.96	398306.53	4.5
R17	83 Pickford Streets	384918.70	398467.28	4.5
R18	Eastbank Tower	385455.51	398004.36	4.5
R19	Pollard Street New Apartments	385222.61	398248.39	4.5

Receptors modelled at 1.5m to represent the average UK “breathing height” above ground level, with first floor locations represented by heights of 4.5m.

Reference should be made to Figure 6 within Appendix A for a graphical representation of operational phase emission sensitive human receptor locations.

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 D, with the outcome of Step 2A is summarised below in Table 10.

Demolition

The proposals comprise the deconstruction of ancillary buildings and boiler sheds. The volume of buildings to be demolished is therefore likely to be less than 20,000m^3. 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 less than 2,500m^2. It is not anticipated to move >20,000 tonnes of material. The magnitude of potential dust emissions related to earthwork activities is therefore considered **small**.

Construction

The proposals comprise the construction of 143m^2 of commercial space, approximately 124 new residential units and the conversion of the existing warehouse. Given the scale of the Proposed Development the total building and infrastructure volume is 155,000m^2. The magnitude of potential dust emissions related to construction activities is therefore considered **large**.

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 between 50m and 100m. The magnitude of potential dust emissions from trackout is therefore considered **medium**.

Table 10: Dust Emission Magnitude

Magnitude of Activities			
Demolition	**Earthworks**	**Construction**	**Trackout**
Small	Small	Large	Medium

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 7, the desk top study indicated are **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 D, 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 PM_{10} is **12.56µg/m^3** as detailed in Section 4, based on the receptor counts provided above, the area is considered to be of low sensitivity for earthworks and construction and medium for trackout activities.

The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria detailed in Appendix D is summarised in Table 11.

Table 11: Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	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 12.

Table 12: Summary of Potential Unmitigated Dust Risks

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

5.1.5 Step 3 – Mitigation

The IAQM guidance[3] 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 13.

Table 13: Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. • 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. • Hold regular liaison meetings with other high-risk construction sites within 500 m 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 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 dust deposition, dust flux, or real-time PM_{10} 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 & 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 actives 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 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) • 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 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. • Bag and remove any biological debris or damp down such material before demolition
Earthworks & 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. • 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.
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.

Issue	Control Measure
	• 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 10 m from receptors where possible.

5.1.6 Step 4 – Residual Impacts

Assuming the relevant mitigation measures outlined in Table 13 are implemented, the residual effect from all dust generating activities is predicted to be negligible and therefore **not significant** in accordance with the IAQM guidance[3].

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 NO_2 and PM concentrations were predicted across the Proposed Development for the 2023 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 NO_2 and PM_{10} 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 (NO_2)

Predicted annual mean NO_2 concentrations across the Proposed Development site during the DS scenario are summarised in Table 14.

Table 14: Modelling Results - Annual Mean NO_2 at Proposed Sensitive Use

Floor Level	Predicted 2023 Annual Mean NO_2 Concentration ($\mu g/m^3$)
Ground (1.5m)	25.84 – 33.06

The predicted concentrations shown in Table 14 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 NO_2 levels at the Proposed Development site should not be viewed as a constraint to development.

Predictions of 1-hour NO_2 concentrations were not produced as part of the dispersion modelling assessment. LAQM.(TG16)[2] states if annual mean NO_2 concentrations are below 60µg/m^3 then it is unlikely that the 1-hour AQO will be exceeded. As such, based on the results in Table 14, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO_2.

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 NO_2 concentrations.

Particulate Matter (PM_{10} & $PM_{2.5}$)

Predicted annual mean PM concentrations across the Proposed Development site during the DS scenario are summarised in Table 15.

Table 15: Modelling Results - Annual Mean PM at Proposed Sensitive Use

Floor Level	Predicted 2023 Annual Mean Concentration (µg/m^3)	
	PM_{10}	$PM_{2.5}$
Ground (1.5m)	12.96 – 14.08	8.56 – 9.21

The predicted concentrations shown in Table 15 indicate that there were no exceedances of the annual mean AQOs for PM_{10} 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 Impact Assessment - Predicted Concentrations at Exisiting Sensitive Use

Predicted impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at 18 sensitive receptor locations and **slight** at one sensitive receptor location within the vicinity of the site.

The overall significance of potential impacts was determined to be **not significant** in accordance with the EPUK and IAQM guidance. The use of robust assumptions, in the form of baseline 2019 emission factors combined with 2023 future year traffic data, was considered to provide sufficient results confidence for an assessment of this nature.

Full assessment results and commentary can be found in Appendix C, further discussion on the overall impact significance is provided in Table 16.

5.2.3 Impact Significance

The overall significance of operational phase road traffic emission impacts for 2023 was determined as not significant. This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 5.2. Further justifications are provided in Table 16.

Table 16: Overall Road Emissions Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Impacts on annual mean NO_2 and PM concentrations were predicted to be **negligible** at 18 sensitive receptors and **slight** at 1 sensitive receptor considered.
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	The proposed development will not result in any new exposure to pollutant concentrations above the AQOs at sensitive locations on the application site and as such no new exposure has been introduced.
The percentage change in concentration relative to the objective and the descriptions of the impacts at the receptors	The change in concentration relative to the AQO was predicted to range from: • 0.05% to 0.53 % for NO_2; • <0.01% to 0.08% for PM_{10}; and • <0.01% to 0.08% for $PM_{2.5}$ Resultant impacts were subsequently predicted to be **negligible** at 18 receptor locations and **slight** at one receptor location considered. The slight impact is marginally above the threshold for negligible effects. Had the change in concentration between DM and DS been 0.04µg/m^3 less at this receptor location, associated impacts would have been deemed negligible. When considering worst case emission factor assumption and overpredictions inherited by this approach, impacts as a result of the Proposed Development are deemed minimal and do not significantly impact existing concentrations.
Whether or not an exceedance of an objective is predicted to arise or be removed in the study area due to a substantial increase or decrease	There were exceedances of the annual mean AQOs for NO_2. at 3 sensitive receptor locations. These exceedances were predicted in the DM and DS scenario. There were no exceedances of the annual mean PM_{10} and $PM_{2.5}$ at any location within the modelling extent.
The extent to which an objective is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3	As stated above, there were exceedances of the annual mean AQOs for NO_2 at 3 sensitive receptor locations. The maximum concentration was predicted at **42.09µg/m^3** (R19) in which negligible impacts were predicted. Annual mean PM_{10} and $PM_{2.5}$ concentrations were not exceeded at any location within the modelling extent.

The combined use of 2023 traffic data and 2019 emission factors is again considered to provide a worst-case scenario, which will lead to overestimations of actual pollutant concentrations during the operation of the proposals. The overall significance of operational phase road traffic emission impacts upon annual mean NO_2 and PM concentrations was determined **not significant.**

The assessment was undertaken in accordance with the methodology detailed in Section 3.2 and full impact assessment results can be found in Appendix C.

6.0 CONCLUSION

Ensafe Consultants were commissioned by the Client to undertake an Air Quality Assessment in support of a proposed residential development at Brunswick Mill, Manchester.

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 NO_2 and PM_{10} 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 NO_2, PM_{10} and $PM_{2.5}$ concentrations across the application site were **below the relevant AQOs** at the proposed sensitive use. The site is therefore considered suitable for the proposed end-use without the implementation of protective mitigation techniques to protect future amenity.

Predicted impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at 18 sensitive receptor locations and **slight** at one receptor location within the vicinity of the site.

The overall significance of potential impacts was determined to be **not significant** in accordance with the EPUK and IAQM guidance. The use of robust assumptions, in the form of worse-case road vehicle emission factors, 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 and complies with the MCC Local Plan and NPPF.

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
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

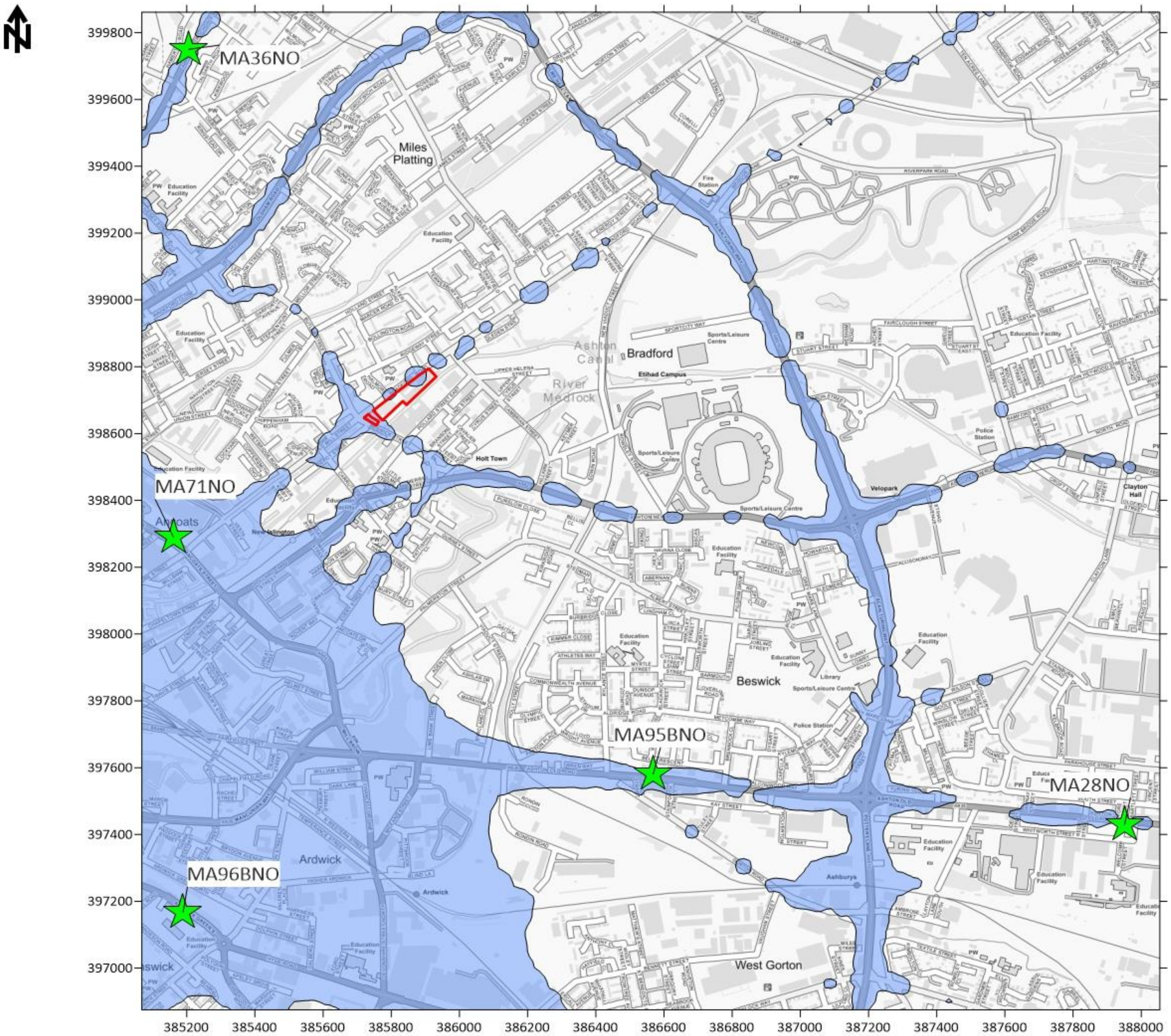
Project

Air Quality Assessment
Brunswick Mill, Manchester

Project Number

AQ3683

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300
www.ensafe.co.uk



Legend

Site Boundary

Air Quality Management Area

Diffusion Tube Monitoring Location

Title

Figure 2

Diffusion Tube Monitoring Locations

Project

Air Quality Assessment
Brunswick Mill, Manchester

Project Number

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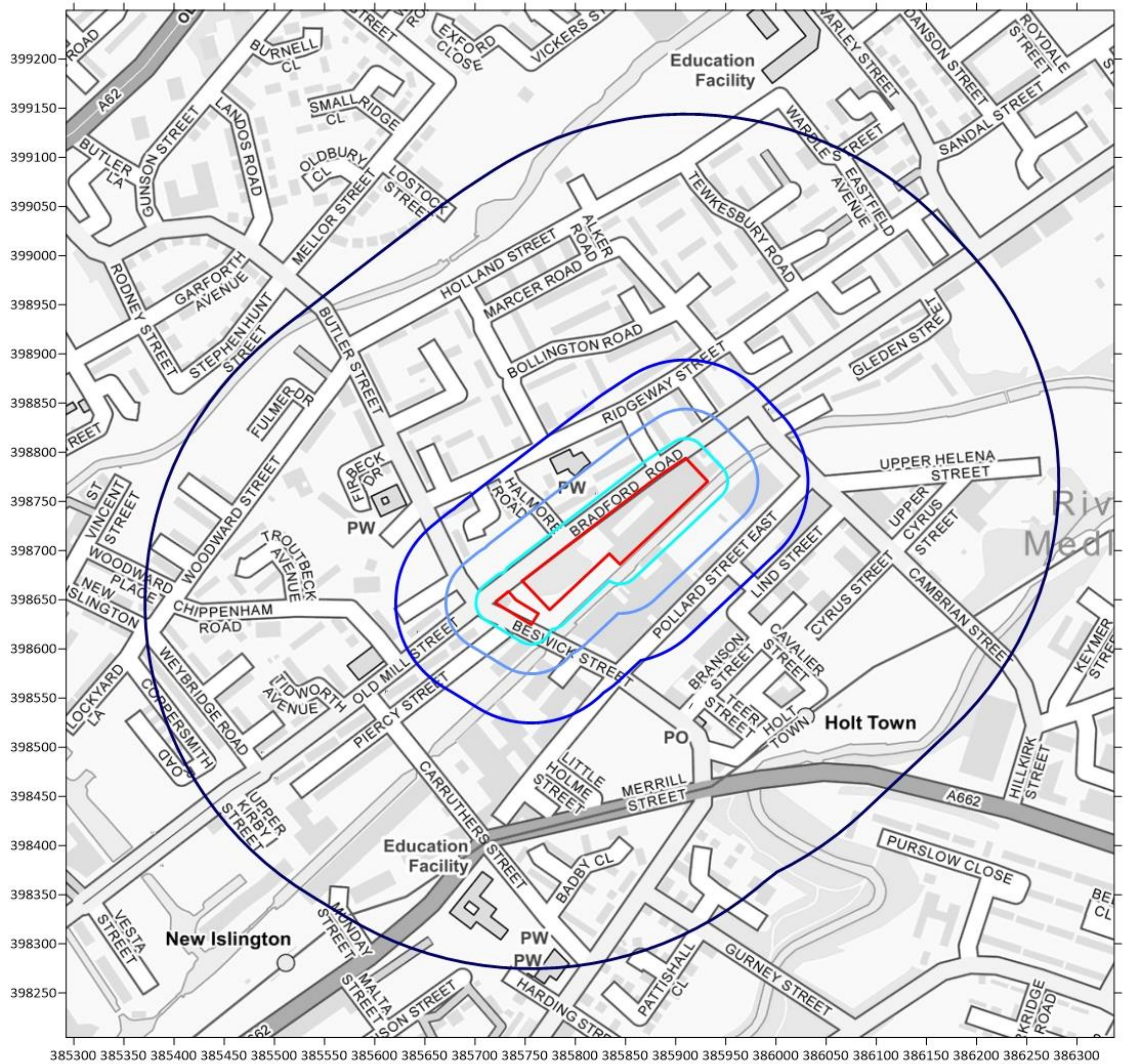

Legend

Site Boundary

20m from Site Boundary

50m from Site Boundary

100m from Site Boundary

350m from Site Boundary

Title

Figure 3

Earthworks and Construction Dust Buffer Zones

Project

Air Quality Assessment
Brunswick Mill, Manchester

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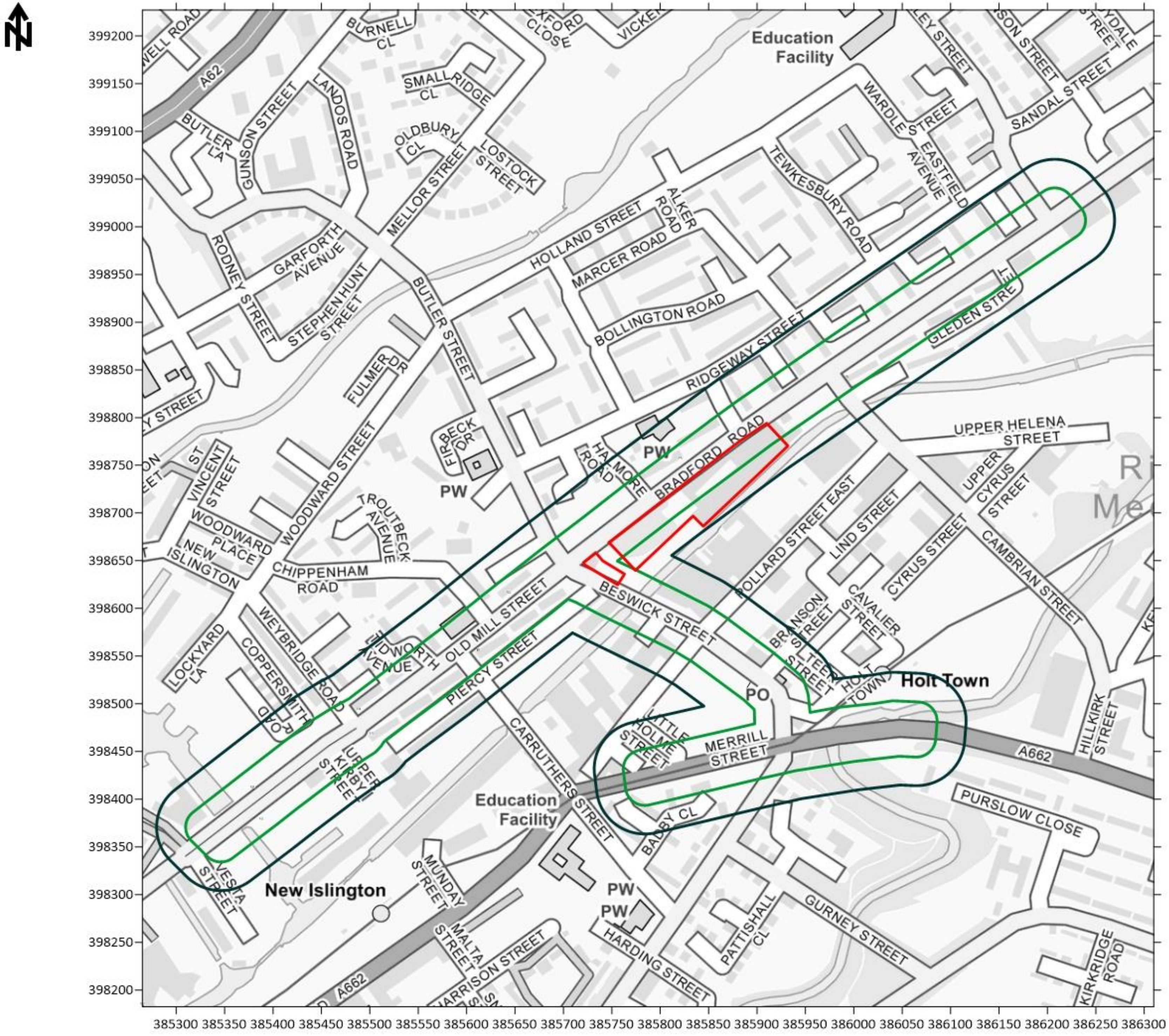
Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300
www.ensafe.co.uk



Legend

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

Title

Figure 4

Trackout Dust Buffer Zones

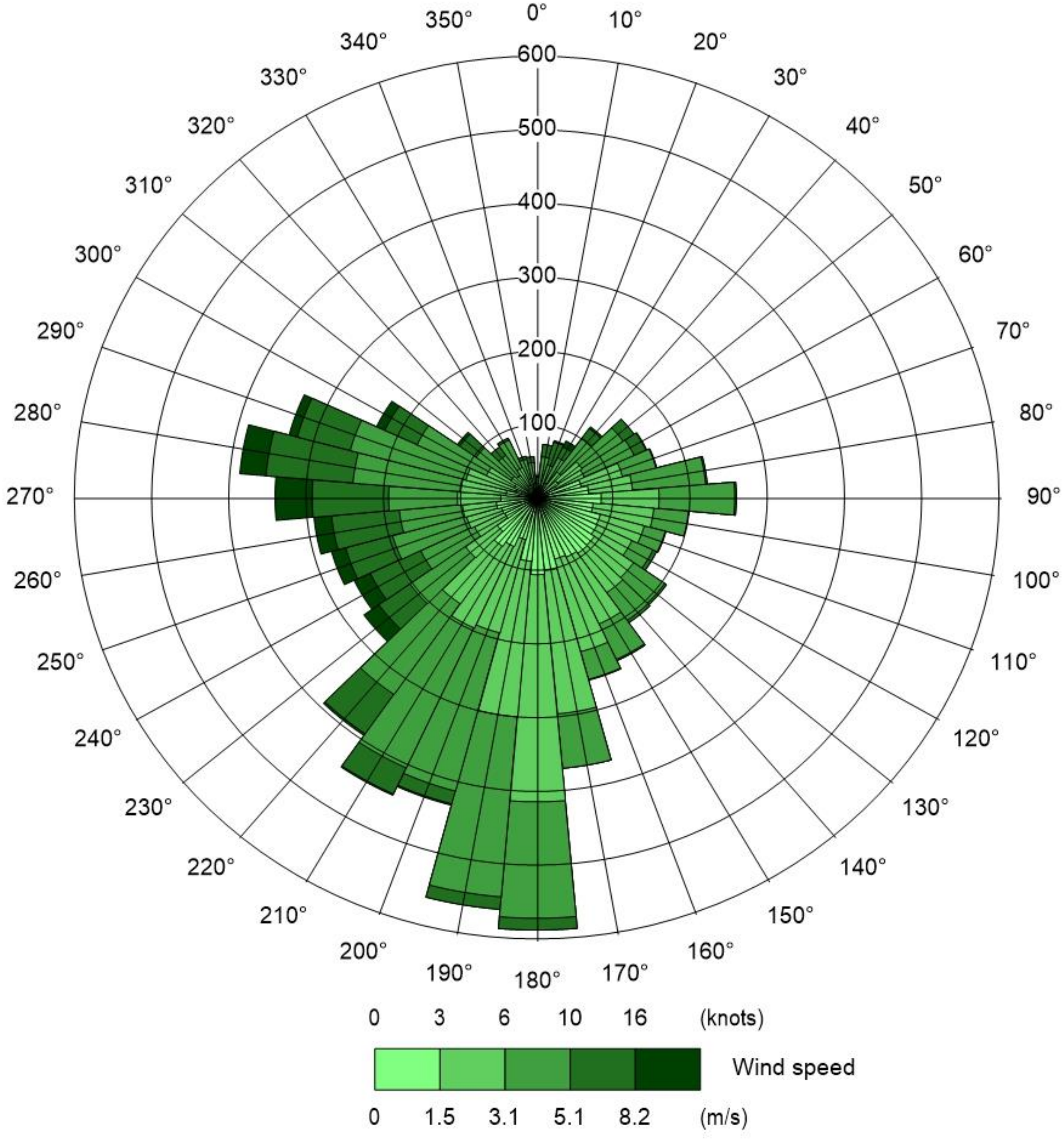
Project

Air Quality Assessment
Brunswick Mill, Manchester

Project Number

AQ3683

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300
www.ensafe.co.uk



Title

Figure 5

Wind Rose 2019
Manchester Meteorological Station

Project

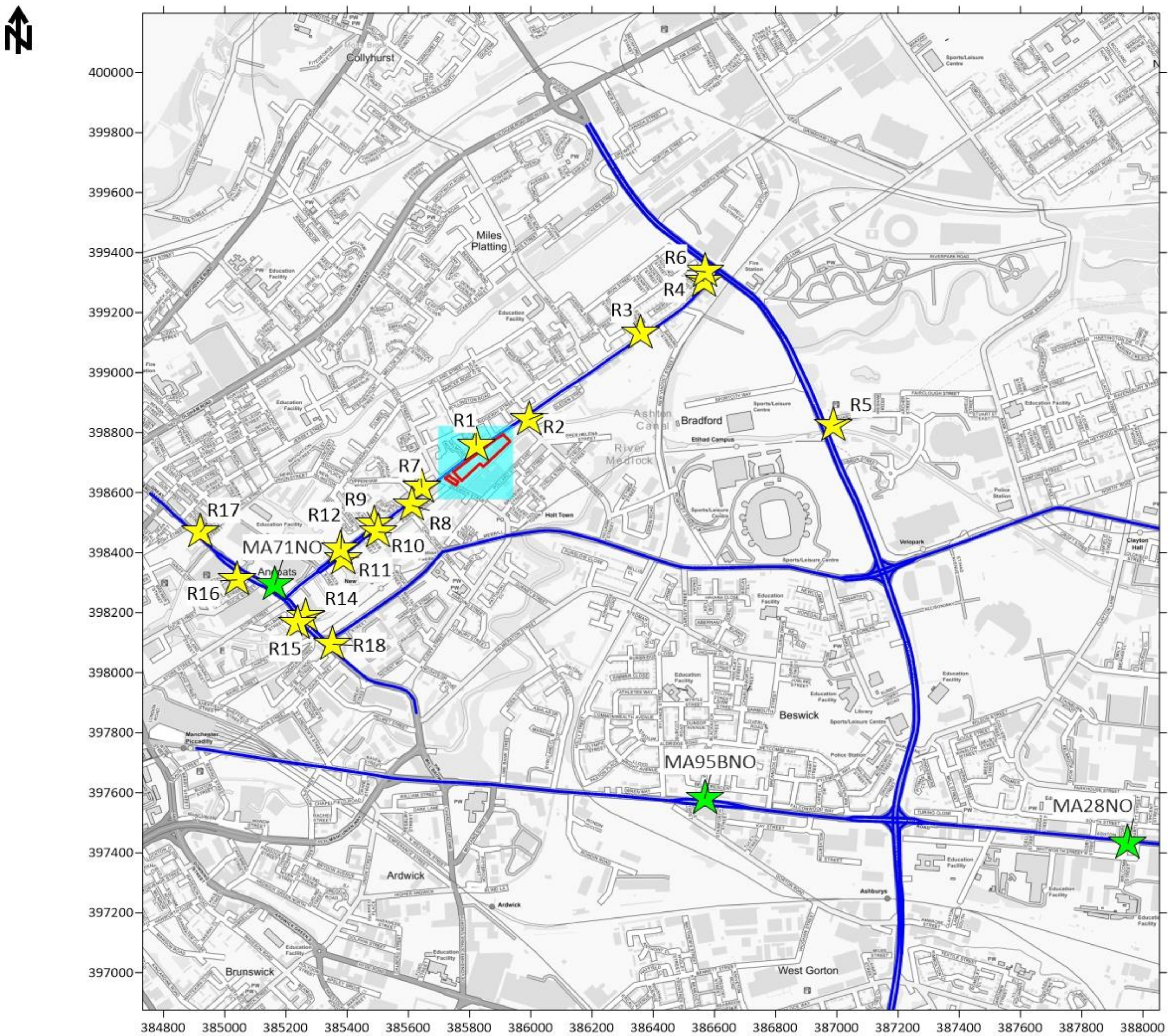
Air Quality Assessment
Brunswick Mill, Manchester

Project Number

AQ3683

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE

Tel – 0161 868 1300
www.ensafe.co.uk



Legend

Site Boundary

Modelled Road Link

Cartesian Grid

Diffusion Tube Monitoring

Sensitive Receptor Locations

Title

Figure 6

ADMS-Roads Input

Project

Air Quality Assessment
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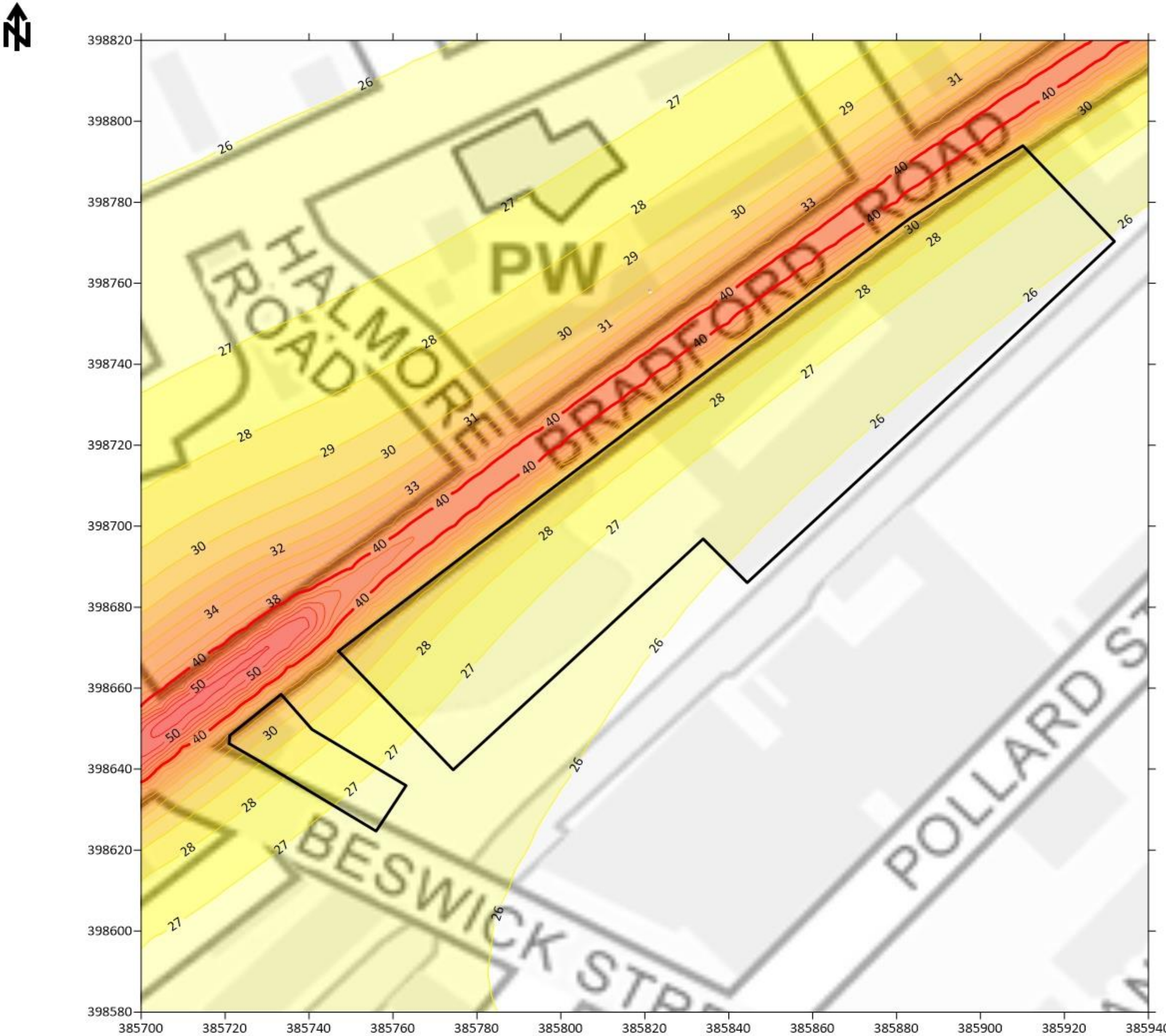
AQ3683

Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE

Tel – 0161 868 1300
www.ensafe.co.uk



Legend

Site Boundary

Predicted Annual Mean NO_2 Concentration (µg/m³)

53
52
50
48
46
44
42
40
38
36
34
33
32
31
30
29
28
27
26

Title

Figure 7

Predicted Annual Mean NO_2 Concentrations (µg/m³) 2023

Project

Air Quality Assessment
Brunswick Mill, Manchester

Project Number

AQ3683

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Legend

Site Boundary

Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)

16.4
16.2
16.0
15.8
15.4
15.0
14.6
14.2
13.8
13.4
13.2
13.0
12.8

Title

Figure 8

Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$) 2023

Project

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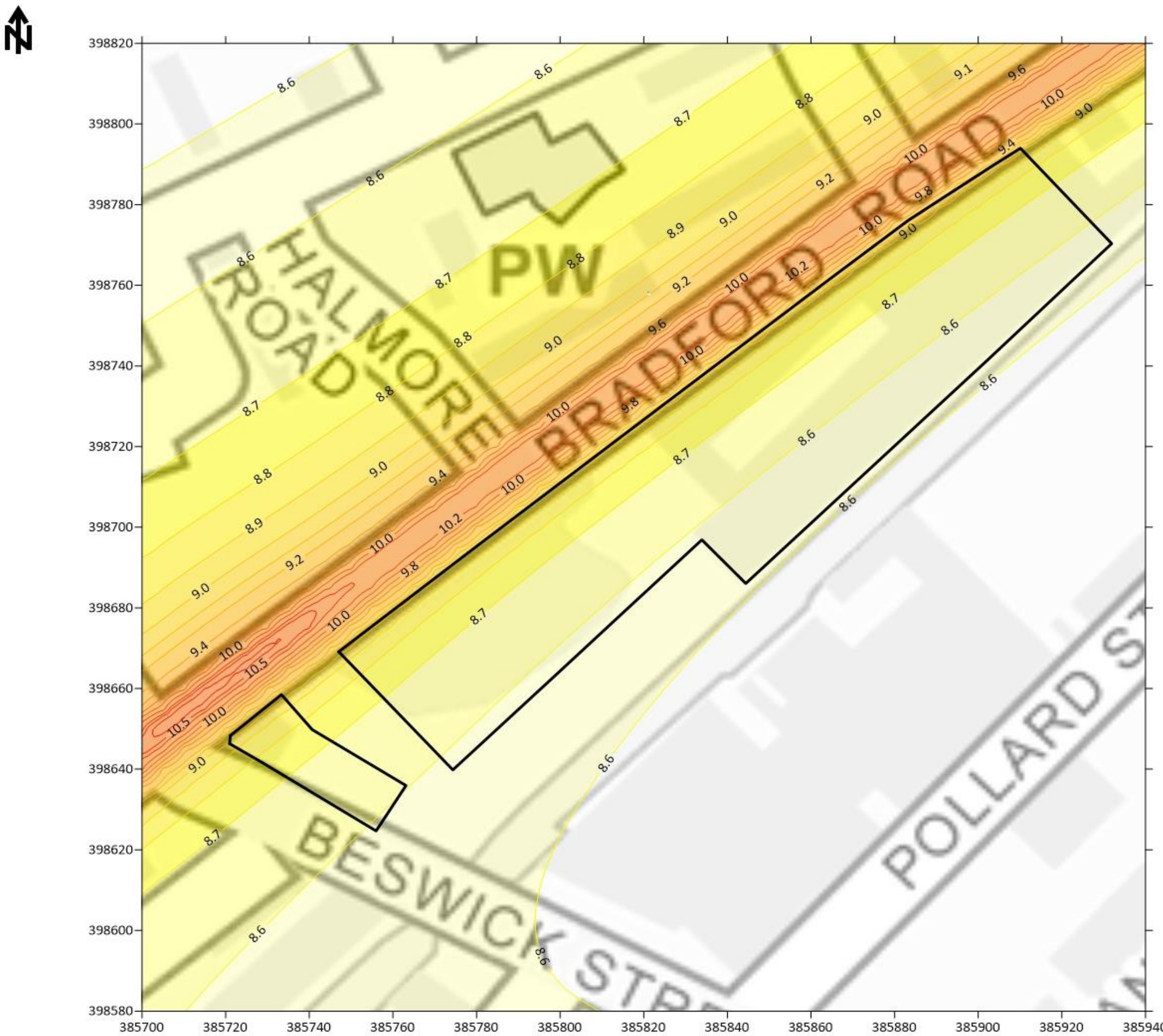

Legend

Site Boundary

10.7
10.6
10.5
10.4
10.2
10.0
9.8
9.6
9.4
9.2
9.1
9.0
8.9
8.8
8.7
8.6
8.6

Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)

Title

Figure 9

Predicted Annual Mean $PM_{2.5}$ Concentrations (µg/m³) 2023

Project

Air Quality Assessment
Brunswick Mill, Manchester

Project Number

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Ensafe Consultants
Osprey House, Broadway, Manchester M50 2UE
Tel – 0161 868 1300
www.ensafe.co.uk

APPENDIX B – ASSESSMENT INPUTS

ASSESSMENT INPUTS

The assessment was undertaken in accordance with the guidance contained within the DEFRA document LAQM.TG(16)[2] and the EPUK and IAQM guidance[4].

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: 385700, 398580 and 385940, 398820 at height of 1.5m to represent the proposed ground floor level for the 2023 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 Curtins, the appointed Transport Consultants for the scheme, and indicated that a total flow generation of 450 AADT is anticipated as a result of the Purposed Development.

Baseline traffic data for the majority of road links were obtained from the Department for Transport (DfT). Traffic data for Bradford Road and Old Mill Street was obtained from the Transport for Greater Manchester (TfGM).

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 2023 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)	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)	Data Source
L1	Ashton Old Road West	11.2	27,155	4	40	DfT
L2	Ashton Old Road West - North	9.4	13,578	4	20	DfT
L3	Ashton Old Road West - South	7	13,578	4	20	DfT
L4	Ashton Old Road West	11	27,155	4	40	DfT
L5	Ashton Old Road West - Right Turn	7	13,578	4	10	DfT
L6	Ashton Old Road West - Straight On	9.5	13,578	4	10	DfT
L7	Ashton Old Road West - Left Turn	4.3	4,773	4	10	DfT
L8	Pottery Lane Northbound	6.5	13,326	4	40	DfT
L9	Pottery Lane Northbound - Straight On	8.3	8,875	4	10	DfT
L10	Pottery Lane Northbound - Left Turn	4.9	4,438	4	10	DfT
L11	Pottery Lane Southbound	6.4	13,326	4	40	DfT
L12	Pottery Lane Southbound - Straight On	6.6	9,545	4	10	DfT
L13	Ashton Old Road East	10.3	21,159	4	40	DfT
L16	Ashton Old Road East -Right Turn	11.8	10,580	4	40	DfT
L17	Ashton Old Road East - Straight On	6.8	10,580	4	10	DfT
L18	Ashton Old Road East - Left Turn	9.4	3,523	4	10	DfT
L19	Alan Turing Way North of Ashton Old Road Northbound	3.9	14,333	4	10	DfT
L20	Alan Turing Way North of Ashton Old Road Northbound - Straight On	6.5	9,545	4	40	DfT
L21	Alan Turing Way North of Ashton Old Road Northbound - Left Turn	7	4,773	4	10	DfT
L22	Alan Turing Way North of Ashton Old Road Southbound	4.2	14,333	4	10	DfT
L23	Alan Turing Way North of Ashton Old Road Southbound - Right Turn	6.7	4,773	4	40	DfT
L24	Ashton New Road West	4.3	12,285	4	10	DfT
L25	Ashton New Road West - Straight On	8.5	6,143	4	40	DfT
L26	Ashton New Road West -Left Turn	8.6	2,045	4	10	DfT
L27	Merrill Street - Pollard Street Junction	4	12,285	4	10	DfT
L28	Pollard Street - Merrill Street Junction	6.9	12,285	4	10	DfT
L29	Pollard Street - North of Munday Street	5.4	12,285	4	10	DfT
L30	Pollard Street - South of Munday Street	12	12,285	4	25	DfT
L31	Pollard Street - Great Ancoats Street Junction	6.9	12,285	4	25	DfT
L32	Ashton New Road East	19.5	10,526	4	10	DfT
L33	Ashton New Road East - Straight On	10.5	5,263	4	40	DfT
L34	Ashton New Road East - Left Turn	8.6	1,753	4	10	DfT
L35	Alan Turing Way North of Ashton New Road Southbound	4	12,870	4	10	DfT

Road Link		Road Width (m)	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)	Data Source
L36	Alan Turing Way North of Ashton New Road Southbound - Straight on	5.9	8,571	4	50	DfT
L37	Alan Turing Way North of Ashton New Road Southbound - Left Turn	7.5	4,286	4	10	DfT
L38	Alan Turing Way North of Ashton New Road Northbound	3.9	12,870	4	10	DfT
L39	Great Ancoats Street Northbound - Pollard Street Junction	6.1	15,632	3	50	DfT
L40	Great Ancoats Street Northbound - North of Canal	6.6	15,632	3	30	DfT
L41	Great Ancoats Street Northbound - Old Mill Street Junction	9.8	15,632	3	10	DfT
L42	Great Ancoats Street Northbound - North of Old Mill Street	9.4	15,632	3	10	DfT
L43	Great Ancoats Street Northbound - North of Ducie Street	7.5	15,632	3	15	DfT
L44	Great Ancoats Street Northbound - North of Laystall Street	9.6	15,632	3	10	DfT
L45	Great Ancoats Street Southbound - Pollard Street Junction	6.6	15,632	3	30	DfT
L46	Great Ancoats Street Southbound - North of Canal	5.6	15,632	3	10	DfT
L47	Great Ancoats Street Southbound - Old Mill Street Junction	6.7	15,632	3	30	DfT
L48	Great Ancoats Street Southbound - North of Old Mill Street Junction	9.6	15,632	3	10	DfT
L49	Great Ancoats Street Southbound - North of Ducie Street	6.5	15,632	3	15	DfT
L50	Great Ancoats Street Southbound - North of Laystall Street	8.2	15,632	3	10	DfT
L51	Fairfield Street - East of Mancunian Way	6.2	17,896	5	30	DfT
L52	Fairfield Street - West of Mancunian Way	17	17,896	5	20	DfT
L53	Old Mill Street Slowdown	8.8	10,713	4	20	TfGM
L54	Old Mill Street	15.1	10,713	4	10	TfGM
L55	Old Mill Street Northbound	8.9	10,713	4	25	TfGM
L56	Old Mill Street Southbound	2.6	10,713	4	25	TfGM
L57	Old Mill Street Slowdown at Weybridge Road	2.9	10,713	4	25	TfGM
L58	Old Mill Street North of Weybridge Road	8.5	10,713	4	10	TfGM
L59	Old Mill Street Slowdown South of Beswick Street	6.4	10,713	4	35	TfGM
L60	Old Mill Street Slowdown North of Beswick Street	9.7	10,713	4	10	TfGM
L61	Bradford Road	9.5	10,713	4	10	TfGM
L62	Bradford Road Slowdown	9.4	10,713	4	35	TfGM
L63	Great Ancoats Street	14.23	31,264	3	10	DfT
L64	Great Ancoats Street South of Pollard Street	13.9	34,842	3	35	DfT

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 2023 scenarios.

A summary of the 2023 traffic data is shown in Table B2.

Table B2: 2023 Traffic Data

Road Link		DM Scenario		DS Scenario	
		24 Hr AADT Flow	HDV Prop (%)	24 Hr AADT Flow	HDV Prop (%)
L1	Ashton Old Road West	28,600	4	28,600	4
L2	Ashton Old Road West - North	14,300	4	14,300	4
L3	Ashton Old Road West - South	14,300	4	14,300	4
L4	Ashton Old Road West	28,600	4	28,600	4
L5	Ashton Old Road West - Right Turn	14,300	4	14,300	4
L6	Ashton Old Road West - Straight On	14,300	4	14,300	4
L7	Ashton Old Road West - Left Turn	5,027	4	5,027	4
L8	Pottery Lane Northbound	14,035	4	14,035	4
L9	Pottery Lane Northbound - Straight On	9,347	4	9,347	4
L10	Pottery Lane Northbound - Left Turn	4,674	4	4,674	4
L11	Pottery Lane Southbound	14,035	4	14,035	4
L12	Pottery Lane Southbound - Straight On	10,053	4	10,053	4
L13	Ashton Old Road East	22,285	4	22,285	4
L16	Ashton Old Road East -Right Turn	11,142	4	11,142	4
L17	Ashton Old Road East - Straight On	11,142	4	11,142	4
L18	Ashton Old Road East - Left Turn	3,710	4	3,710	4
L19	Alan Turing Way North of Ashton Old Road Northbound	15,095	4	15,095	4
L20	Alan Turing Way North of Ashton Old Road Northbound - Straight On	10,053	4	10,053	4
L21	Alan Turing Way North of Ashton Old Road Northbound - Left Turn	5,027	4	5,027	4
L22	Alan Turing Way North of Ashton Old Road Southbound	15,095	4	15,095	4
L23	Alan Turing Way North of Ashton Old Road Southbound - Right Turn	5,027	4	5,027	4
L24	Ashton New Road West	12,939	4	12,939	4
L25	Ashton New Road West - Straight On	6,469	4	6,469	4
L26	Ashton New Road West -Left Turn	2,154	4	2,154	4
L27	Merrill Street - Pollard Street Junction	12,939	4	12,939	4
L28	Pollard Street - Merrill Street Junction	12,939	4	12,939	4
L29	Pollard Street - North of Munday Street	12,939	4	12,939	4
L30	Pollard Street - South of Munday Street	12,939	4	12,939	4
L31	Pollard Street - Great Ancoats Street Junction	12,939	4	12,939	4
L32	Ashton New Road East	11,086	4	11,086	4
L33	Ashton New Road East - Straight On	5,543	4	5,543	4
L34	Ashton New Road East - Left Turn	1,846	4	1,846	4

Road Link		DM Scenario		DS Scenario	
		24 Hr AADT Flow	HDV Prop (%)	24 Hr AADT Flow	HDV Prop (%)
L35	Alan Turing Way North of Ashton New Road Southbound	13,555	4	13,600	4
L36	Alan Turing Way North of Ashton New Road Southbound - Straight on	9,027	4	9,072	4
L37	Alan Turing Way North of Ashton New Road Southbound - Left Turn	4,514	4	4,514	4
L38	Alan Turing Way North of Ashton New Road Northbound	13,555	4	13,600	4
L39	Great Ancoats Street Northbound - Pollard Street Junction	16,464	3	16,545	3
L40	Great Ancoats Street Northbound - North of Canal	16,464	3	16,545	3
L41	Great Ancoats Street Northbound - Old Mill Street Junction	16,464	3	16,545	3
L42	Great Ancoats Street Northbound - North of Old Mill Street	16,464	3	16,518	3
L43	Great Ancoats Street Northbound - North of Ducie Street	16,464	3	16,518	3
L44	Great Ancoats Street Northbound - North of Laystall Street	16,464	3	16,518	3
L45	Great Ancoats Street Southbound - Pollard Street Junction	16,464	3	16,545	3
L46	Great Ancoats Street Southbound - North of Canal	16,464	3	16,545	3
L47	Great Ancoats Street Southbound - Old Mill Street Junction	16,464	3	16,545	3
L48	Great Ancoats Street Southbound - North of Old Mill Street Junction	16,464	3	16,518	3
L49	Great Ancoats Street Southbound - North of Ducie Street	16,464	3	16,518	3
L50	Great Ancoats Street Southbound - North of Laystall Street	16,464	3	16,518	3
L51	Fairfield Street - East of Mancunian Way	18,848	5	18,848	5
L52	Fairfield Street - West of Mancunian Way	18,848	5	18,848	5
L53	Old Mill Street Slowdown	11,283	4	11,553	4
L54	Old Mill Street	11,283	4	11,553	4
L55	Old Mill Street Northbound	11,283	4	11,418	4
L56	Old Mill Street Southbound	11,283	4	11,418	4
L57	Old Mill Street Slowdown at Weybridge Road	11,283	4	11,553	4
L58	Old Mill Street North of Weybridge Road	11,283	4	11,553	4
L59	Old Mill Street Slowdown South of Beswick Street	11,283	4	11,553	4
L60	Old Mill Street Slowdown North of Beswick Street	11,283	4	11,553	4
L61	Bradford Road	11,283	4	11,463	4
L62	Bradford Road Slowdown	11,283	4	11,463	4
L63	Great Ancoats Street	32,927	3	33,035	3
L64	Great Ancoats Street South of Pollard Street	36,696	3	36,858	3

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 NOx and PM and EURO 6 vehicle fleet sub-categories.

There is current uncertainty over NO_2 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 NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 concentrations using the NO_x to NO_2 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 15km South of the Proposed Development. 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 meteorological station are summarised in Table B3.

Table B3: Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification, DM and DS Scenarios	1	Cities, Woodlands
Manchester Meteorological Station	0.3	Agricultural (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 are summarised in Table B4

Table B4: Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification, DM, DS Scenarios and Manchester Meteorological Station	30	Cities and Large Towns

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

Background Concentrations

The annual mean NO_2 concentrations detailed in Table 5, 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	2019 Predicted Background Concentration (µg/m³)
MA28NO	387500, 39750	NO_x	29.79
		NO_2	20.49
MA71NO	385500, 398500	NO_x	35.16
		NO_2	23.41
MA95BNO	386500, 397500	NO_x	28.26
		NO_2	19.63

Table B6 displays the predicted background concentrations by DEFRA used in the operational phase assessment for the sensitive receptor locations.

Table B6: Predicted Background Pollutant Concentrations at Sensitive Receptors

Monitoring Location	DEFRA Grid Square	Pollutant	2019 Predicted Background Concentration (µg/m³)
R1, R2, R7 – R16, R17, R18	385500, 398500	NO_x	35.16
		NO_2	23.41
		PM_{10}	12.56
		$PM_{2.5}$	8.32
R3, R4, R6	386500, 399500	NO_x	31.78
		NO_2	21.55
		PM_{10}	12.58
		$PM_{2.5}$	8.29
R5	386500, 398500	NO_x	28.34
		NO_2	19.65
		PM_{10}	12.48
		$PM_{2.5}$	8.20
R17	384500, 398500	NO_x	46.99
		NO_2	29.31
		PM_{10}	13.60
		$PM_{2.5}$	8.78

Similar to emission factors, background concentrations for 2019 were utilised in preference to predicted background concentrations for the development opening year (2023). 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 2023, using traffic data, meteorological data and monitoring results from this year.

MCC undertakes periodic monitoring of NO_2 concentrations at 3 roadside monitoring location within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO_2 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 NO_2 concentration and calculated road NO_x concentration are summarised in Table B7.

Table B7: Monitoring Results

Site ID	**Monitored Road NO_x Concentration (µg/m³)**	**Modelled Road NO_x Concentration (µg/m³)**	**% Difference ((Monitored Modelled)/Monitored)) * 100**
MA28NO	31.50	15.72	50
MA71NO	46.13	32.37	30
MA95BNO	49.69	24.19	51

The monitored and modelled NOx 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 **1.6968** was required to be applied to all NO_x modelling results, showing the model underestimated pollutant concentrations throughout the assessment extents.

Graph 1 is provided below.

Graph 1 - Verification Adjustment Factor

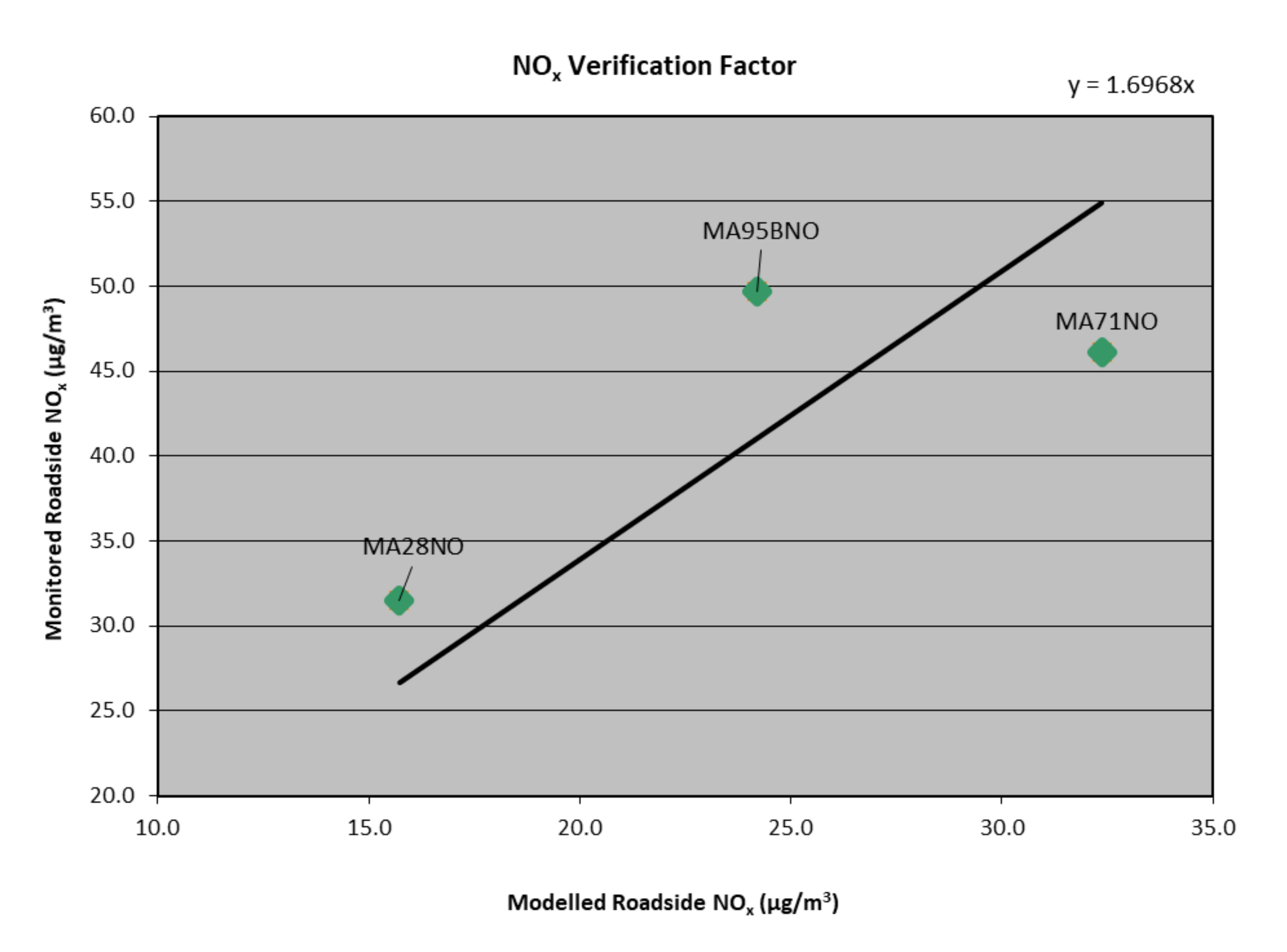


Table B8 presents the monitored annual mean NO_2 concentrations and the adjusted modelled total NO_2 concentration based on the above verification factor. Exceedances of the annual mean NO_2 AQO are highlighted in **bold**.

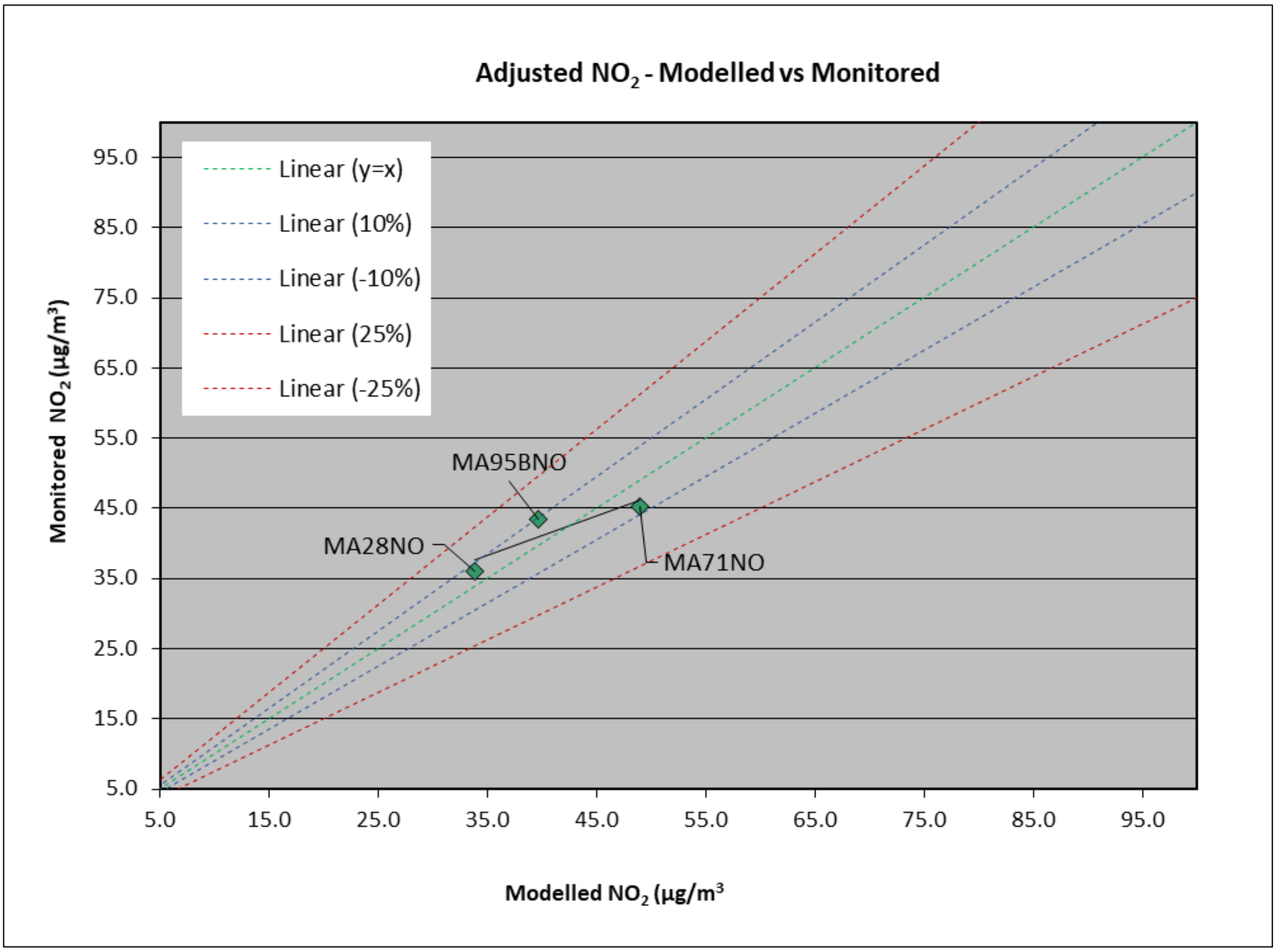
Table B8: Modelled Concentrations

Site ID	Monitored Road NO_2 Concentration (µg/m³)	Adjusted Modelled Road NO_2 Concentration (µg/m³)	% Difference ((Monitored Modelled)/Monitored)) * 100
MA28NO	36.10	33.85	6
MA71NO	45.30	49.01	-8
MA95BNO	43.40	39.63	9

As demonstrated in Table B8, the percentage difference between modelled and monitored concentrations is deemed acceptable and is less than 10% at all locations. 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 NO_2 concentrations is provided within Graph 2.3

Graph 2 – NO_2 Adjustment



As PM monitoring is not undertaken within the assessment extents, the NOx adjustment factor of **1.6968** was utilised to adjust model predictions of PM in accordance with the guidance provided within LAQM.TG(16)[2].

APPENDIX C – ASSESSMENT RESULTS

Predicted Concentrations at Sensitive Receptors

Nitrogen Dioxide (NO_2)

Annual mean NO_2 concentrations were predicted for 2023 DM and DS scenarios and are summarised in Table C1. Reference should be made to Figure 6 for a graphical representation of these locations.

Table C1: Predicted Annual Mean NO_2 Concentrations

Potential Impact		Predicted Annual Mean NO_2 Concentration (µg/m^3)		
		DM	DS	Change
R1	55 Bradford Road	30.66	30.75	0.09
R2	26 Bradford Road	28.39	28.46	0.07
R3	331 Bradford Road	30.39	30.51	0.12
R4	6 The Mews	33.00	33.14	0.14
R5	2 Stuart Street	27.61	27.63	0.02
R6	19 The Mews	30.26	30.33	0.07
R7	143 Old Mill Street	32.78	32.95	0.17
R8	130 Piercy Street	29.45	29.54	0.09
R9	18 Tavery Close	38.57	38.78	0.21
R10	88 Old Mill Street	33.81	33.93	0.12
R11	Old Mill Street New Apartments	31.57	31.64	0.07
R12	Weavers Quay	**40.77**	**40.94**	0.17
R13	Islington Wharf Mews	34.61	34.75	0.14
R14	151 Great Ancoats Street	39.44	39.51	0.07
R15	James Brindley Basin	37.42	37.48	0.06
R16	40 Laystall Street	30.43	30.46	0.03
R17	83 Pickford Streets	**41.80**	**41.84**	0.04
R18	Eastbank Tower	37.05	37.10	0.05
R19	Pollard Street New Apartments	**41.98**	**42.09**	0.11

As indicated in Table AIII.1, annual mean NO_2 concentrations were above the relevant AQO at 3 receptor locations considered. Critically these exceedances were predicted in the DM and DS scenario. The remaining 16 human receptor locations were predicted to experience NO_2 concentrations below the relevant AQO.

Predicted impacts on annual mean NO_2 concentrations are summarised in Table C2.

Table C2: Predicted NO_2 Impacts

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	55 Bradford Road	0.23	76-94% of AQO	Negligible
R2	26 Bradford Road	0.18	75% or Less of AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R3	331 Bradford Road	0.23	76-94% of AQO	Negligible
R4	6 The Mews	0.18	75% or Less of AQO	Negligible
R5	2 Stuart Street	0.30	76-94% of AQO	Negligible
R6	19 The Mews	0.35	76-94% of AQO	Negligible
R7	143 Old Mill Street	0.05	75% or Less of AQO	Negligible
R8	130 Piercy Street	0.17	75% or Less of AQO	Negligible
R9	18 Tavery Close	0.43	76-94% of AQO	Negligible
R10	88 Old Mill Street	0.23	75% or Less of AQO	Negligible
R11	Old Mill Street New Apartments	0.53	95-102% of AQO	*Slight*
R12	Weavers Quay	0.30	76-94% of AQO	Negligible
R13	Islington Wharf Mews	0.18	76-94% of AQO	Negligible
R14	151 Great Ancoats Street	0.42	103-109% of AQO	Negligible
R15	James Brindley Basin	0.35	76-94% of AQO	Negligible
R16	40 Laystall Street	0.18	95-102% of AQO	Negligible
R17	83 Pickford Streets	0.15	76-94% of AQO	Negligible
R18	Eastbank Tower	0.08	76-94% of AQO	Negligible
R19	Pollard Street New Apartments	0.10	103-109% of AQO	Negligible

As indicated in Table C2 impacts on annual mean NO_2 concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be negligible at 18 receptor locations and slight at one sensitive receptor location. The slight impact is marginally above the threshold for negligible effects. Had the change in concentration between DM and DS been 0.04µg/m^3 less at this receptor location, associated impacts would have been deemed negligible. It is therefore considered that the overall impacts as a result of the proposed development are **not significant.**

Further justifications are discussed in Section 5.2.3 of the main report.

Particulate Matter (PM_{10})

Annual mean PM_{10} concentrations were predicted for 2023 DM and DS scenarios and are summarised Table C3.

Table C3: Predicted Annual Mean PM_{10} Concentrations

Potential Impact		Predicted Annual Mean PM_{10} Concentration (µg/m^3)		
		DM	DS	Change
R1	55 Bradford Road	13.85	13.87	0.02
R2	26 Bradford Road	13.45	13.46	0.01
R3	331 Bradford Road	14.20	14.22	0.02
R4	6 The Mews	14.45	14.48	0.03
R5	2 Stuart Street	14.10	14.10	0.00
R6	19 The Mews	14.10	14.11	0.01

Potential Impact		Predicted Annual Mean PM_{10} Concentration (μg/m^3)		
		DM	DS	Change
R7	143 Old Mill Street	14.18	14.21	0.03
R8	130 Piercy Street	13.57	13.59	0.02
R9	18 Tavery Close	14.80	14.83	0.03
R10	88 Old Mill Street	14.16	14.18	0.02
R11	Old Mill Street New Apartments	13.84	13.85	0.01
R12	Weavers Quay	15.44	15.47	0.03
R13	Islington Wharf Mews	14.29	14.32	0.03
R14	151 Great Ancoats Street	14.98	14.99	0.01
R15	James Brindley Basin	14.55	14.56	0.01
R16	40 Laystall Street	13.47	13.47	0.00
R17	83 Pickford Streets	15.96	15.97	0.01
R18	Eastbank Tower	15.13	15.14	0.01
R19	Pollard Street New Apartments	15.06	15.08	0.02

As indicated in Table AIII.5 annual mean PM_{10} concentrations were below the relevant AQO at all receptor locations considered.

Predicted impacts on annual mean PM_{10} concentrations are summarised in Table C4.

Table C4: Predicted PM_{10} Impacts

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	55 Bradford Road	0.05	75% or Less of AQO	Negligible
R2	26 Bradford Road	0.03	75% or Less of AQO	Negligible
R3	331 Bradford Road	0.05	75% or Less of AQO	Negligible
R4	6 The Mews	0.08	75% or Less of AQO	Negligible
R5	2 Stuart Street	0.00	75% or Less of AQO	Negligible
R6	19 The Mews	0.02	75% or Less of AQO	Negligible
R7	143 Old Mill Street	0.08	75% or Less of AQO	Negligible
R8	130 Piercy Street	0.05	75% or Less of AQO	Negligible
R9	18 Tavery Close	0.07	75% or Less of AQO	Negligible
R10	88 Old Mill Street	0.05	75% or Less of AQO	Negligible
R11	Old Mill Street New Apartments	0.02	75% or Less of AQO	Negligible
R12	Weavers Quay	0.08	75% or Less of AQO	Negligible
R13	Islington Wharf Mews	0.08	75% or Less of AQO	Negligible
R14	151 Great Ancoats Street	0.02	75% or Less of AQO	Negligible
R15	James Brindley Basin	0.02	75% or Less of AQO	Negligible
R16	40 Laystall Street	0.00	75% or Less of AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R17	83 Pickford Streets	0.02	75% or Less of AQO	Negligible
R18	Eastbank Tower	0.02	75% or Less of AQO	Negligible
R19	Pollard Street New Apartments	0.05	75% or Less of AQO	Negligible

As indicated in Table C4 impacts on annual mean PM_{10} concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all 19 receptor locations. It is therefore considered that the overall impacts as a result of the Proposed Development are **not significant.** Further justifications are discussed in Section 5.2.3 of the main report.

Particulate Matter ($PM_{2.5}$)

Annual mean $PM_{2.5}$ concentrations were predicted for 2023 DM and DS scenarios and are summarised Table C5.

Table C5: Predicted Annual Mean $PM_{2.5}$ Concentrations

Potential Impact		Predicted Annual Mean PM_{10} Concentration (μg/m^3)		
		DM	DS	Change
R1	55 Bradford Road	9.08	9.09	0.01
R2	26 Bradford Road	8.84	8.85	0.01
R3	331 Bradford Road	9.24	9.26	0.02
R4	6 The Mews	9.40	9.42	0.02
R5	2 Stuart Street	9.14	9.14	0.00
R6	19 The Mews	9.19	9.19	0.00
R7	143 Old Mill Street	9.27	9.29	0.02
R8	130 Piercy Street	8.92	8.93	0.01
R9	18 Tavery Close	9.67	9.69	0.02
R10	88 Old Mill Street	9.28	9.29	0.01
R11	Old Mill Street New Apartments	9.08	9.09	0.01
R12	Weavers Quay	10.03	10.05	0.02
R13	Islington Wharf Mews	9.35	9.37	0.02
R14	151 Great Ancoats Street	9.77	9.78	0.01
R15	James Brindley Basin	9.52	9.53	0.01
R16	40 Laystall Street	8.87	8.88	0.01
R17	83 Pickford Streets	10.17	10.17	0.00
R18	Eastbank Tower	9.83	9.83	0.00
R19	Pollard Street New Apartments	9.85	9.86	0.01

As indicated in Table AIII.5 annual mean $PM_{2.5}$ concentrations were below the relevant AQO at all receptor locations considered.

Predicted impacts on annual mean $PM_{2.5}$ concentrations are summarised in Table C6.

Table C6: Predicted $PM_{2.5}$ Impacts

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	55 Bradford Road	0.04	75% or Less of AQO	Negligible
R2	26 Bradford Road	0.04	75% or Less of AQO	Negligible
R3	331 Bradford Road	0.08	75% or Less of AQO	Negligible
R4	6 The Mews	0.08	75% or Less of AQO	Negligible
R5	2 Stuart Street	0.00	75% or Less of AQO	Negligible
R6	19 The Mews	0.00	75% or Less of AQO	Negligible
R7	143 Old Mill Street	0.08	75% or Less of AQO	Negligible
R8	130 Piercy Street	0.04	75% or Less of AQO	Negligible
R9	18 Tavery Close	0.08	75% or Less of AQO	Negligible
R10	88 Old Mill Street	0.04	75% or Less of AQO	Negligible
R11	Old Mill Street New Apartments	0.04	75% or Less of AQO	Negligible
R12	Weavers Quay	0.08	75% or Less of AQO	Negligible
R13	Islington Wharf Mews	0.08	75% or Less of AQO	Negligible
R14	151 Great Ancoats Street	0.04	75% or Less of AQO	Negligible
R15	James Brindley Basin	0.04	75% or Less of AQO	Negligible
R16	40 Laystall Street	0.04	75% or Less of AQO	Negligible
R17	83 Pickford Streets	0.00	75% or Less of AQO	Negligible
R18	Eastbank Tower	0.00	75% or Less of AQO	Negligible
R19	Pollard Street New Apartments	0.04	75% or Less of AQO	Negligible

As indicated in Table C6 impacts on annual mean $PM_{2.5}$ concentrations as a result of road vehicle exhaust emissions associated with the development were predicted to be **negligible** at all receptor locations. It is therefore considered that the overall impacts as a result of the Proposed Development are **not significant.** Further justifications are discussed in Section 5.2.3.

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 PM_{10} 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 D1.

Table D1: Construction Dust - Magnitude of Emission

Magnitude	Activity	Criteria
Large	Demolition	• Total building volume greater than 50,000m^3 • 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 10,000m^2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • More than 10 heavy earth moving vehicles active at any one time

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 100,000m^3 • On site concrete batching • Sandblasting
	Trackout	• More than 50 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	Demolition	• Total building volume 20,000m^3 to 50,000m^3 • Potentially dusty construction material • Demolition activities 10m to 20m above ground level
	Earthworks	• Total site area 2,500m^2 to 10,000m^2 • Moderately dusty soil type (e.g. silt) • 5 to 10 heavy earth moving vehicles active at any one time • Formation of bunds 4m to 8m in height • Total material moved 20,000 tonnes to 100,000 tonnes
	Construction	• Total building volume 25,000m^3 to 100,000m^3 • Potentially dusty construction material (e.g. concrete) • On site concrete batching
	Trackout	• 10 to 50 HDV trips per day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50m to 100m
Small	Demolition	• Total building volume under 20,000m^3 • 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 2,500m^2 • Soil type with large grain size (e.g. sand) • Less than 5 heavy earth moving vehicles active at any one time • Formation of bunds less than 4m in height • Total material moved less than 20,000 tonnes • Earthworks during wetter months
	Construction	• Total building volume less than 25,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	• <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 D2.

Table D2: 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 PM_{10} 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 D3.

Table D3: 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 D4 outlines the sensitivity of the area to human health impacts.

Table D4: 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 D5 outlines the sensitivity of the area to ecological impacts.

Table D5: 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 D6 outlines the risk category from demolition activities.

Table D6: 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 D7 outlines the risk category from earthworks and construction activities.

Table D7: 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 D8 outlines the risk category from trackout.

Table D8: 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 E – 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