



AIR QUALITY ASSESSMENT

FOR

SMITHY BRIDGE ROAD, LITTLEBOROUGH

AQ60795r1

22/09/2022

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EXECUTIVE SUMMARY

Ensafe Consultants were commissioned by Taylor Wimpey UK to undertake an Air Quality Assessment in support of a proposed residential development at Smithy Bridge Road, Littleborough.

The proposal comprises the redevelopment of the site to provide up to 199 homes and associated infrastructure.

Due to the scale of the development, there is potential for the proposals to cause impacts at sensitive receptors during the construction and operational phases. Additionally, given the proximity to the Greater Manchester Combined Authority Air Quality Management Area and to the A58, there is potential to expose future site users to elevated pollutant concentrations. 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 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 predict 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 Rochdale Metropolitan Borough Council.

The dispersion modelling results indicated that annual mean pollutant concentrations across the application site were below the relevant air quality objectives at proposed sensitive locations. 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** 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 Rochdale Metropolitan Borough Council Local Plan and National Planning Policy Framework.

1.0 INTRODUCTION

1.1 Background

Ensafe Consultants has been commissioned by Taylor Wimpey Strategic Land, hereafter referred to as “the Client” to undertake an Air Quality Assessment in support of a proposed development, comprising of the residential development of up to 199 units, herein after referred to as the “Proposed Development”.

Ensafe (formerly REC Ltd) undertook an Air Quality Assessment (ref: AQ105076r5) for the Proposed Development site in May 2019. Following on from submission of the original planning application (ref. 19/00881/FUL), the site is undergoing an update to the proposed scheme resulting in changes to the site layout and composition. Due to the nature of the updates, there is little potential for additional air quality impacts to arise above those previously assessed.

As such, it is considered that the conclusions of the previously submitted assessment (AQ105076r5) would remain valid and provide a conservative approach. It is therefore considered that no further assessment is necessary, and furthermore air quality should not be viewed as a constraint to planning approval. This assessment provides the findings of the original assessment and this approach has been approved by the Projects Officer at Rochdale Metropolitan Borough Council (RMBC).

1.2 Site Location and Context

The application site is located Smithy Bridge Road, Littleborough at approximate National Grid Reference (NGR) 392050, 415350. Reference should be made to Figure 1 within Appendix A for a location plan.

The application site is located within 1km of the Greater Manchester Combined Authority (GMCA) Air Quality Management Area (AQMA), which has been declared due to exceedances of the annual mean Air Quality Objective (AQO) for nitrogen dioxide (NO₂). Subsequently, the Proposed Development has the potential to introduce future 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 NO₂ and particulate matter (PM₁₀ 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 NO₂ and PM₁₀ and PM_{2.5} 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 RMBC Local Planning Policy.

1.3 Limitations

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

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2.0 LEGISLATION, GUIDANCE AND POLICY

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

- European Union (EU) Directive 2008/50/EC;
- The NPPF, updated on 20th July 2021;
- The National Planning Practice Guidance (NPPG), relevant chapters produced on 1st November 2019;
- Section 82 of the Environment Act (Part IV), updated 9th November 2021;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs (DEFRA), 2007¹;
- The Air Quality Standards (Amendment) Regulations (2016);
- Local Air Quality Management Technical Guidance 2016 LAQM.TG(16), DEFRA, April 2021²;
- Guidance on the Assessment of Dust from Demolition and Construction, Institute of Air Quality Management (IAQM), v1.1, June 2016³;
- Land-Use Planning and Development Control: Planning for Air Quality, Environmental Protection UK (EPUK) and IAQM, January 2017⁴; and
- Rochdale Adopted Core Strategy, RMBC, October 2016⁵

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. Air Quality Limit Values (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 (2021) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by DEFRA and published in July 2007¹. The AQS sets out AQOs that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedances over a specified timescale. These are generally in line with the AQLVs, although the requirements for compliance vary slightly.

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

Table 1: Air Quality Objectives

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

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

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

2 Local Air Quality Management Technical Guidance 2016 LAQM.TG(16), DEFRA, 2021

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, 2017

5 Rochdale Adopted Core Strategy, RMBC, 2016

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

The RMBC Local Plan⁵ consists of a series of planning documents, of which the Core Strategy sets the spatial vision and strategy for the district. The Core Strategy was adopted in October 2016 and provides a series of key policies that will guide the scale, location and type of development in the area until 2028. As such, the policies contained within the Core Strategy provides the current basis for the determination of planning applications within RMBC's area of administration.

- **Policy G9 – Reducing the impact of pollution, contamination and land instability**

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

- a) Focusing on measures that reduce air pollution in Air Quality Management Areas, and other areas where pollution levels are unacceptable, particularly around motorways and main roads;

[...]

- **Policy T2 – Improving accessibility**

Initiatives will incorporate "smarter choice" measures to provide incentives to change travel behaviour, through reallocation of road space, parking policies/control and fiscal measures in favour of sustainable travel.

b) We will require Transport Assessments (TA) and Travel Plans (TP) for:

[...]

- iii. Developments located in, or having an impact on, Air Quality Management Areas;
- iv. Areas where the Council has defined initiatives or targets to reduce traffic, restrict development growth, promote public transport, walking and cycling or measures to promote low emissions and tackle poor air quality;

[...]

- **Policy DM1 – General development requirements**

All development proposals, including changes of use of land and buildings, extensions and alterations, will be expected to demonstrate that they:

- 1. Do not have an adverse impact on health, through its impact or the effect of existing problems e.g. land contamination, or poor air quality;

[...]

- **Policy DM2 – Delivering planning contributions and infrastructure**

[...]

- 3. All types of development

For all types of development, including housing, we will seek contributions for any infrastructure or other measures necessary to mitigate any on site or off-site impacts from the development.

These contributions may cover, dependent on need:

[...]

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

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

3.0 METHODOLOGY

There is the potential for the Proposed Development to expose future site users to elevated NO₂, PM₁₀ and PM_{2.5} concentrations, as well as to cause impacts at sensitive locations during the construction and operational phases.

This has been assessed in accordance with the following methodology, as agreed with the Projects Officer at RMBC on 24/02/2022.

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 three types to reflect their different potential impacts. These are:

- Earthworks;
- Construction; and
- Trackout

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

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

A desk top survey will be undertaken to identify human and ecological receptors within the relevant assessment buffers specified by the IAQM guidance³. Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

Following the identification of sensitive receptors, a site is then allocated a risk category which is assigned to each activity, based on the scale and nature of the works, as well as the sensitivity of the area to dust impacts.

The assigned magnitude and sensitivity will then determine the overall risk and appropriate mitigation measures to be employed during construction phase activities.

The IAQM guidance³ is provided in Appendix D, with the details of the assessor's qualifications and experience. 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 (NO₂, PM₁₀ and PM_{2.5}) generated during the operational phase.

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:

- 2017 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).

Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2017 have been used within the dispersion model. The use of 2023 traffic data and 2017 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, Appendix C for details of the full assessment results and Appendix D for sensitivity analysis.

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 guidance⁴.

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 guidance⁴ 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 guidance⁴.

Following the prediction of impacts at discrete receptor locations utilising the criteria in Table 3 the EPUK and IAQM guidance⁴ 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 NO₂ concentration of 41µg/m³ should attract less significance than an annual mean of 51µg/m³.

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 close proximity to GMCA AQMA. Subsequently, the proposals have potential to introduce new receptors into an area of elevated NO₂, PM₁₀ 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 (2021), GMCA has undertaken review and assessment of air quality within their area of administration. This process has indicated that annual mean concentrations of NO₂ are above the AQO within their administration. As such, one AQMA has been declared, the closest being described as:

- *GMCA Rochdale AQMA - This is the part of the Greater Manchester Combined Authority AQMA located within the Rochdale Metropolitan Borough Council area.*

The application site is located 1.1km east of the AQMA. As such, there is potential for the Proposed Development to introduce future site users into an area of elevated annual mean NO₂ concentrations, and to cause air quality impacts within this sensitive area during the construction and operational phases. This has been considered within this report

RMBC 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

RMBC monitors pollutant concentrations using continuous and periodic methods throughout their area of administration. A review of the most recent Air Quality Report⁶ indicates that the closest continuous monitor operated by RMBC to the proposed development is Oldham Crompton Way, located at NGR: 393887, 409191. This is approximately 6.3km south of the development boundary. Due to the distance between the development and monitoring sites, similar pollutant concentrations would not be anticipated, and this source of data has not been considered further within this report.

RMBC also monitor NO₂ concentrations across the borough using passive diffusion tubes. A review of the most recent air quality monitoring data indicated one diffusion tubes located within the vicinity of the application site, presented in Table 4.

Table 4: Diffusion Tube Monitoring Results

ID	Site Name	Type	NGR (m)		Dist' to Site (m)	Annual Mean Concentration (µg/m ³)		
			X	Y		2017	2018	2019
RO12ANO	Halifax road, Wardle	Roadside	392061	415678	140	40.1	31.4	39.4

As indicated in Table 4, annual mean AQO for NO₂ was exceeded at the diffusion tube in 2017 and NO₂ concentrations have improved within the area. This confirms that the approach in the original assessment (ref: 105076r5) is worst-case.

Reference should be made to Figure 2 within Appendix A for a graphical representation of the monitoring locations.

4.3 Background Pollutant Concentrations

The total concentration of a pollutant is comprised of explicit local emission sources (such as roads and industrial

sources) and the background component. The background component consists of indeterminate sources which are transported into an area from further away by meteorological conditions. Background pollutant concentrations are therefore the ambient level of pollution that is not affected by local sources of pollution.

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

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

- NGR: 511500, 249500.

Data for this location was downloaded from the DEFRA website⁷. For the purpose of this assessment, background concentrations are summarised in Table 5 for the verification year (2017) and the predicted development opening year (2023).

Table 5: Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)	
	2017	2023
NO _x	20.04	15.22
NO ₂	14.32	11.20
PM ₁₀	10.46	9.86
PM _{2.5}	7.14	6.66

As indicated in Table 5, background pollutant concentrations of NO₂, PM₁₀ or PM_{2.5} are below the relevant AQOs detailed in Table 1.

4.4 Sensitive Receptors

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

4.4.1 Construction Phase Sensitive Receptors

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

Human receptors sensitive to potential dust impacts during, 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

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

Distance from Site Boundary (m)	Approximate Number of Human Receptors
20 – 50	More than 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 north or south of Smithy Bridge Road and/or via Brooklyn Avenue, 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 area. There is likely to have been a history of dust generating activities due to commuting and redevelopment processes in the locality.
The likelihood of concurrent dust generating activity on nearby sites.	A review of the RMBC planning portal indicated that there are no large-scale planning applications within the vicinity of the site.
Pre-existing screening between the source and the receptors	There is very limited vegetation present along all boundaries. If retained, this could provide limited 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 and south west of the development. As such, properties to the north and north east of the site would be most affected by dust emissions
Conclusions drawn from local topography	The topography of the area appears to be predominantly flat. As such, there are no constraints to dust dispersion.

Guidance	Comment
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)	
		X	Y
R1	Educational - Smithy Bridge Primary School	392716.8	415172.4
R2	Residential - 8 Smithy Bridge Road	392487.2	415335.5
R3	Residential - 2 South View Road	392377.6	415515.3
R4	Residential - 33 Stopford Avenue	392376.4	415565.6
R5	Residential - 69 Old Road	392269.0	415684.2
R6	Residential - 750 Halifax Road	392231.0	415745.1
R7	Residential - 144 New Road	392390.7	415858.5
R8	Residential - 149 New Road	392311.5	415778.1
R9	Residential - 775 Halifax Road	392199.7	415753.5
R10	Educational - St Andrews C of E Primary School	392231.2	415873.9
R11	Residential - 3 Dearnley Close	392297.9	415807.0
R12	Residential - 13 Union Road	392142.3	415818.1
R13	Residential - 761 Halifax Road	392097.2	415706.4
R14	Residential - 701 Halifax Road	391996.7	415651.0
R15	Belvoir Residential Home	391989.0	415619.4
R16	Residential - Stott Street	391940.4	415531.8
R17	Residential - 622 Halifax Road	391952.4	415599.8
R18	Residential - 3 William Street	391977.7	415497.8
R19	Residential - 657 Halifax Road	391865.2	415588.6
R20	Residential - 1 Holland Street	391878.4	415561.8
R21	Residential - 18 Holland Street	391909.8	415450.8
R22	Hurstead House Nursing Home	391770.8	415642.6
R23	Residential - 578 Halifax Road	391811.9	415532.7
R24	Residential - 1 George Street	391711.5	415481.3
R25	Residential - 555 Halifax Road	391580.5	415445.8
R26	Residential - 452 Halifax Road	391498.0	415377.9

Receptors modelled at 1.5m to represent the average UK “breathing height” above ground level. 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

There is no scope for demolition in order to prepare the site for construction. Subsequently, this aspect of the construction phase dust risk assessment has not been considered further.

Earthworks

The Proposed Development site is estimated to cover an area greater than 10,000m². The magnitude of potential dust emissions related to earthwork activities is therefore considered large.

Construction

The proposals comprise the construction of 199 residential units. Given the scale of the Proposed Development the total building and infrastructure volume is greater than 100,000m². 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 greater than 100m. The magnitude of potential dust emissions from trackout is therefore considered large.

Table 10: Dust Emission Magnitude

Magnitude of Activities		
Earthworks	Construction	Trackout
Large	Large	Large

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, the desk top study indicated are approximately more than 100 sensitive receptors within 350m of the Proposed Development boundary and more than 100 within 50m of the anticipated trackout routes.

Based on the assessment criteria detailed in Appendix 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 PM₁₀ is 10.46µg/m³ 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 phase activities 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		
	Earthworks	Construction	Trackout
Dust Soiling	High	High	High
Human Health	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		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	High
Human Health	Low	Low	Low

5.1.5 Step 3 – Mitigation

The IAQM guidance³ provides a number of potential mitigation measures to reduce impacts during the construction phase. These measures have been adapted for the Proposed Development site as summarised in Table 13.

Table 13: Fugitive Dust Mitigation Measures

Issue	Control Measure
Communications	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary • Develop and implement a stakeholder communications plan that includes community engagement • 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 LA
Site Management	• Record all dusty and air quality complaints and make the complaints log available to the LA when asked • Record any exceptional incidents that cause dust/or air emissions, and the action taken to resolve the situation • Make complaints log available to LA when asked • Hold regular liaison meetings with other high-risk construction sites that are within 500m of the site boundary. Ensuring plans are co-ordinated and dust and particulate matter emission are minimised
Monitoring	• Undertake daily on-site and off-site inspection where receptors are nearby to monitor dust • Carry out regular site inspections to monitor compliance with the DMP • Increase frequency of site inspections when activities with a high potential to produce dust are being carried out
Preparing & Maintaining Site	• Plan site layout so that machinery and dust causing activities are located away from receptors • Fully enclose site or specific operations where there is a high potential for dust production and the site as active for an extensive period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods • Remove materials that have a potential to produce dust from site as soon as possible • Cover, seed or fence stockpiles to prevent wind whipping Use water as dust suppressant where applicable
Operating Vehicle/Machinery & Sustainable Travel	• All vehicles to switch off engines - no idling vehicles • Avoid the use of diesel or petrol powered generators where practicable • Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph in unsurfaced haul roads • Produce a Construction Logistics Plan to manage sustainable deliveries • Implement a Travel Plan that supports and encourages sustainable travel
Operations	• Cutting equipment to use water as dust suppressant or suitable local extract ventilation

Issue	Control Measure
	• Ensure adequate water supply on the site for effective dust/particulate matter suppression/mitigation • Use enclosed chutes and covered skips • Minimise drop heights • Ensure equipment is readily available on site to clean any spillages
Waste Management	• No bonfires or burning of waste materials
Earthworks & Construction	• Re-vegetate earthworks and exposed areas • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate • Only remove the cover in small areas during work and not all at once • Avoid scabbling • Ensure sand and other aggregates are stored and not able to dry out, unless it is required for a specific process • Ensure bulk cement and other fine powder materials are delivered and stored to prevent escape
Trackout	• Plan site layout so that machinery and dust causing activities are located away from receptors • Fully enclose site or specific operations where there is a high potential for dust production and the site as active for an extensive period • Avoid site runoff of water or mud • Keep site fencing, barriers and scaffolding clean using wet methods • Remove materials that have a potential to produce dust from site as soon as possible • Cover, seed or fence stockpiles to prevent wind whipping Use water as dust suppressant where applicable

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 guidance³.

5.2 Operational Phase Assessment

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

5.2.1 Future Exposure

Annual mean NO₂, PM₁₀ and PM_{2.5} 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 to 9 within Appendix A.

Background NO₂ PM₁₀ and PM_{2.5} levels are likely to be lower at elevated heights due to increased distance from emission sources, such as roads. Therefore, predicted concentrations at heights above ground floor level are considered acceptable in regards to future exposure and have not been assessed further.

Nitrogen Dioxide (NO₂)

Predicted annual mean NO₂ concentrations across the Proposed Development site during the DS scenario are summarised in Table 14.

Table 14: Modelling Results - Annual Mean NO₂ at Proposed Development

Floor Level	Predicted 2023 Annual Mean NO ₂ Concentration (µg/m ³)
Ground (1.5m)	14.49 - 16.56

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 NO₂ levels at the Proposed Development site should not be viewed as a constraint to development.

Predictions of 1-hour NO₂ concentrations were not produced as part of the dispersion modelling assessment. LAQM.(TG16)² states if annual mean NO₂ concentrations are below 60µg/m³ then it is unlikely that the 1-hour AQO will be exceeded. As such, based on the results in Table 14, it is not predicted that on-site concentrations will exceed the 1-hour mean AQO for NO₂.

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

Particulate Matter (PM₁₀ & PM_{2.5})

Predicted annual mean PM₁₀ and PM_{2.5} concentrations across the Proposed Development site during the DS scenario are summarised in Table 15.

Table 15: Modelling Results - Annual Mean PM₁₀ and PM_{2.5} at Proposed Development

Floor Level	Predicted 2023 Annual Mean Concentration (µg/m ³)	
	PM ₁₀	PM _{2.5}
Ground (1.5m)	10.49 – 10.97	7.45 – 8.11

The predicted concentrations shown in Table 15 indicate that there were no exceedances of the annual mean AQOs for PM₁₀ or PM_{2.5} throughout the modelling area. As such, it is considered that annual mean PM levels at the Proposed Development site should not be viewed as a constraint to development.

Based on the results of the dispersion modelling assessment, the site is considered to be suitable for proposed end use without the implementation of mitigation techniques to protect future site users from elevated PM₁₀ and PM_{2.5} concentrations.

5.2.2 Impact Assessment - Predicted Concentrations at Existing Sensitive Use

Based on data from the appointed traffic consultant, i-Transport, it is expected that there will be 980 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.

Predicted impacts on annual mean NO₂ PM₁₀ and PM_{2.5} concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at 26 sensitive receptor locations 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.

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 , PM ₁₀ and PM _{2.5} concentrations were predicted to be negligible at all sensitive receptors. The sensitive locations represent worst-case locations and therefore it is unlikely that any other receptors would be significantly affected by the Proposed Development.
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 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: • <0.01% to 1.2% for NO₂, • <0.01% to 0.24% for PM₁₀; and • <0.01% to 0.28% for PM_{2.5} Therefore, resultant impacts were predicted to be negligible at all receptor locations
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 no exceedances of the annual mean for NO ₂ , PM ₁₀ and PM _{2.5} at any location within the assessment extents.
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 no exceedances of the annual mean AQO for NO ₂ , PM ₁₀ and PM _{2.5} at any sensitive receptor location within the modelling extents at sensitive

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.

The use of 2023 traffic data and 2017 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.

6.0 CONCLUSION

Ensaf Consultants were commissioned by the Client to undertake an Air Quality Assessment in support of a proposed residential development at Smithy Bridge Road, Littleborough.

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

Dispersion modelling was undertaken to quantify annual mean NO₂, PM₁₀ and PM_{2.5} concentrations across the application to assess suitability for proposed use. Modelling results were subsequently verified using RMBC local monitoring data.

The dispersion modelling results indicated that annual mean NO₂, PM₁₀ 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 NO₂, PM₁₀ and PM_{2.5} concentrations as a result of operational phase exhaust emissions were predicted to be **negligible** at all 26 sensitive receptor locations 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.

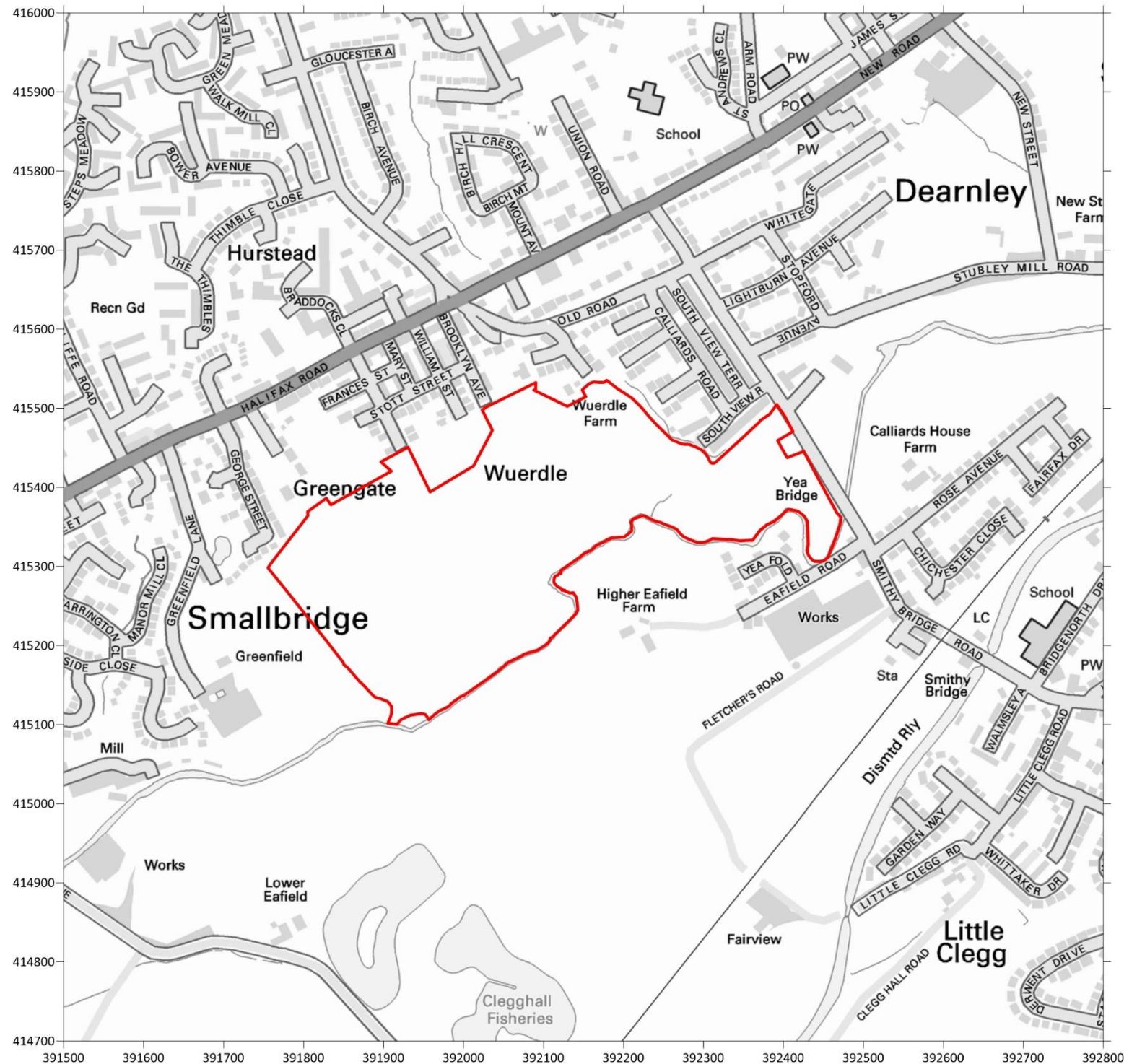
Based on the assessment results the site is considered suitable for the proposed end use and complies with the RMBC Local Plan and NPPF.

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
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
RMBC	Rochdale Metropolitan Borough Council
TEMPRO	Trip End Model Presentation Program
z ₀	Roughness Length

END OF REPORT

APPENDIX A - FIGURES



Legend

 Site Boundary

Title

Figure 1
Site Location

Project

Smithy Bridge Road, Rochdale

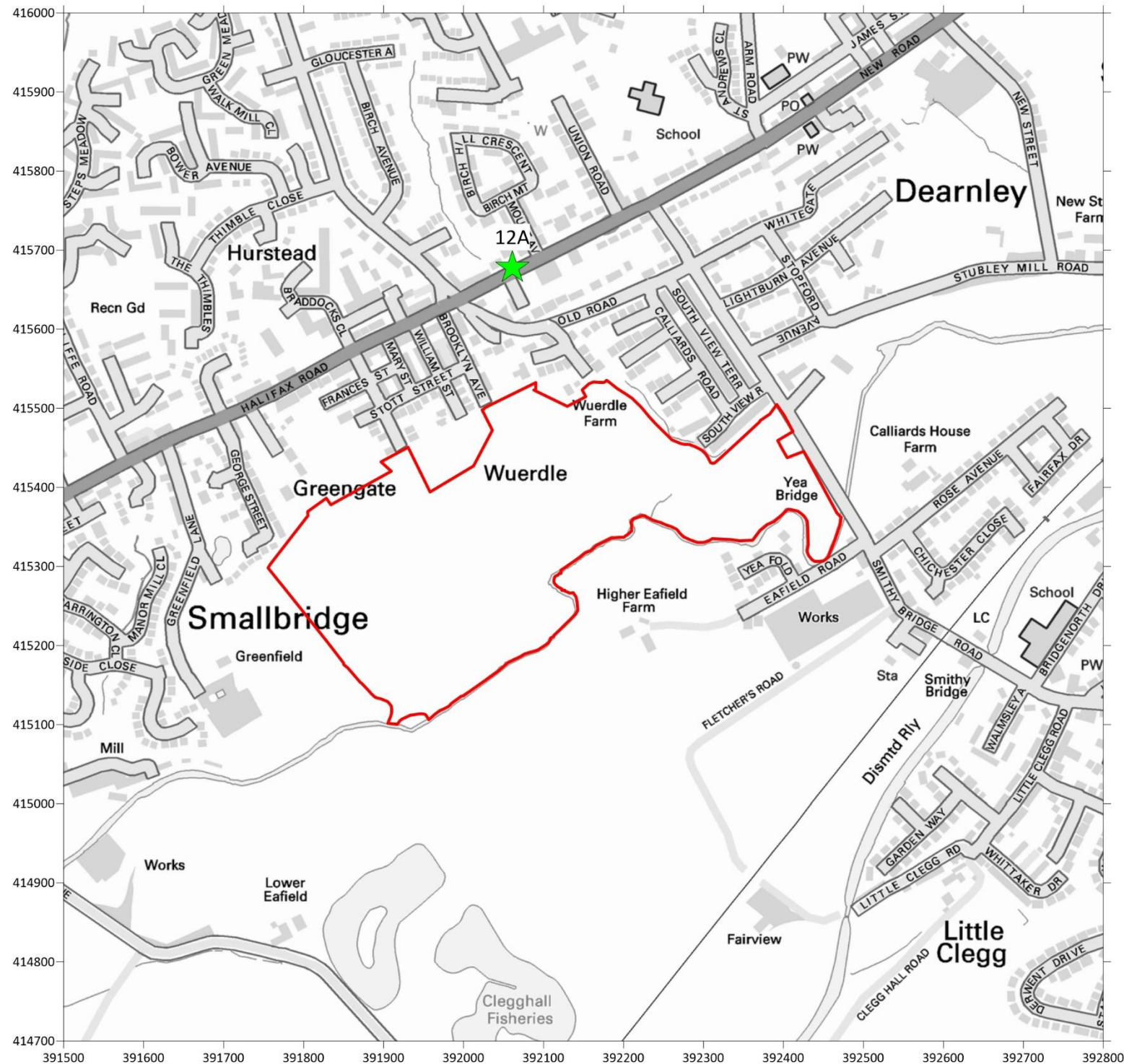
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Legend

-  Site Boundary
-  Diffusion Tube Monitoring Locations

Title

Figure 2
Diffusion Tube Monitoring Locations

Project

Smithy Bridge Road, Rochdale

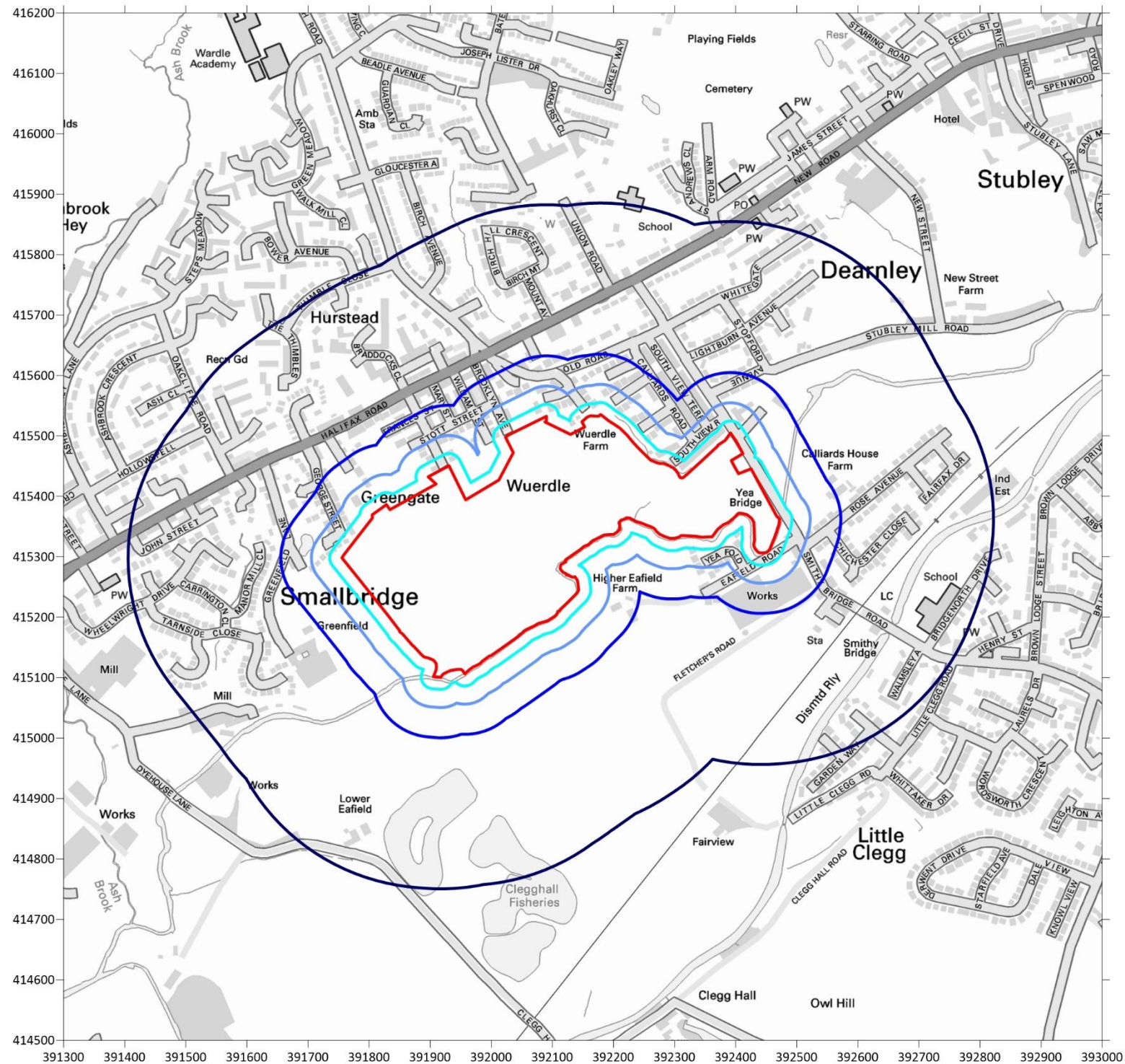
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Legend

- 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

Smithy Bridge Road, Rochdale

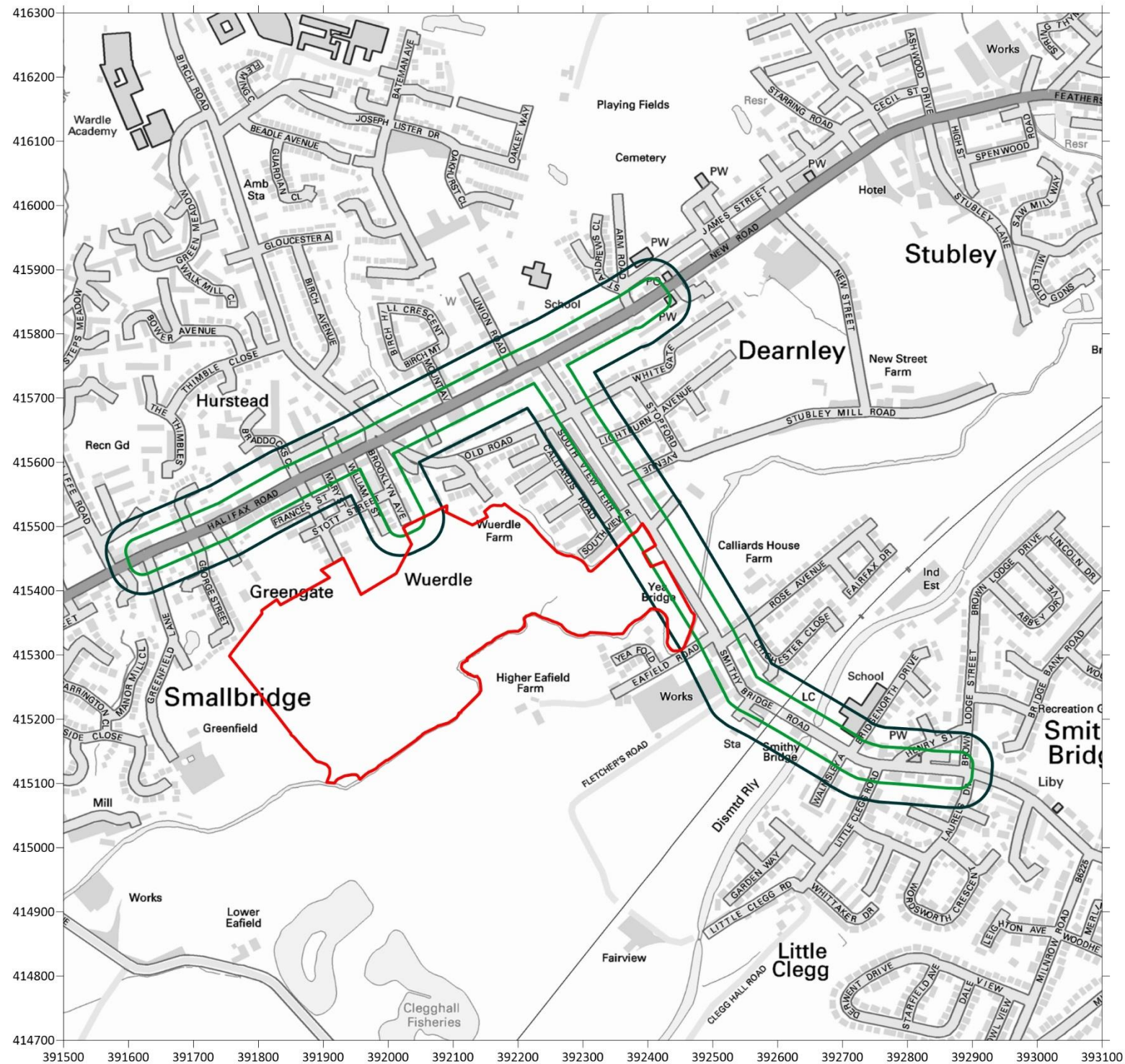
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Legend

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

Title

Figure 4
Trackout Dust Buffer Zones

Project

Smithy Bridge Road, Rochdale

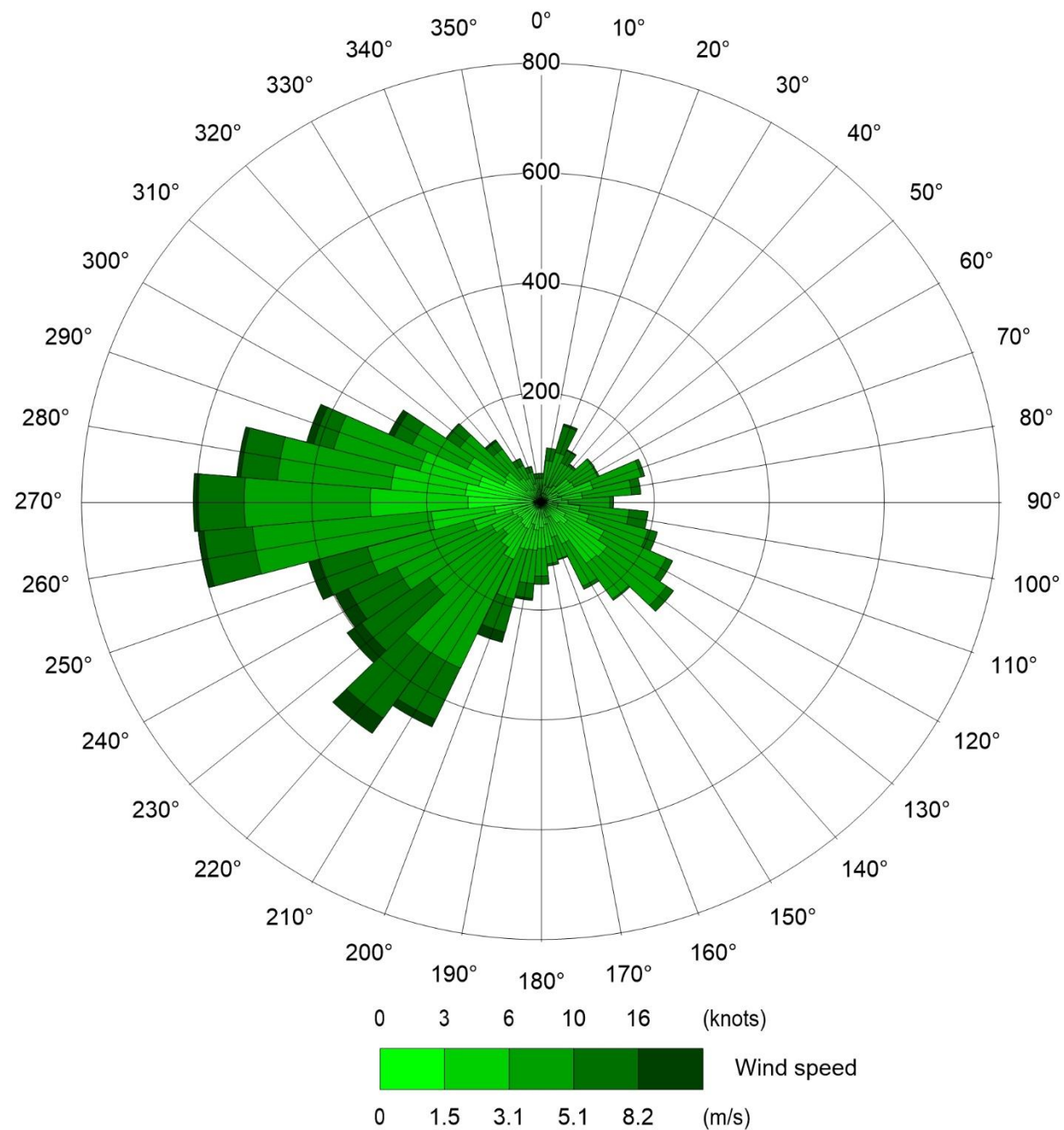
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Title

Figure 5
Wind Rose 2017 Bingley
Meteorological Station

Project

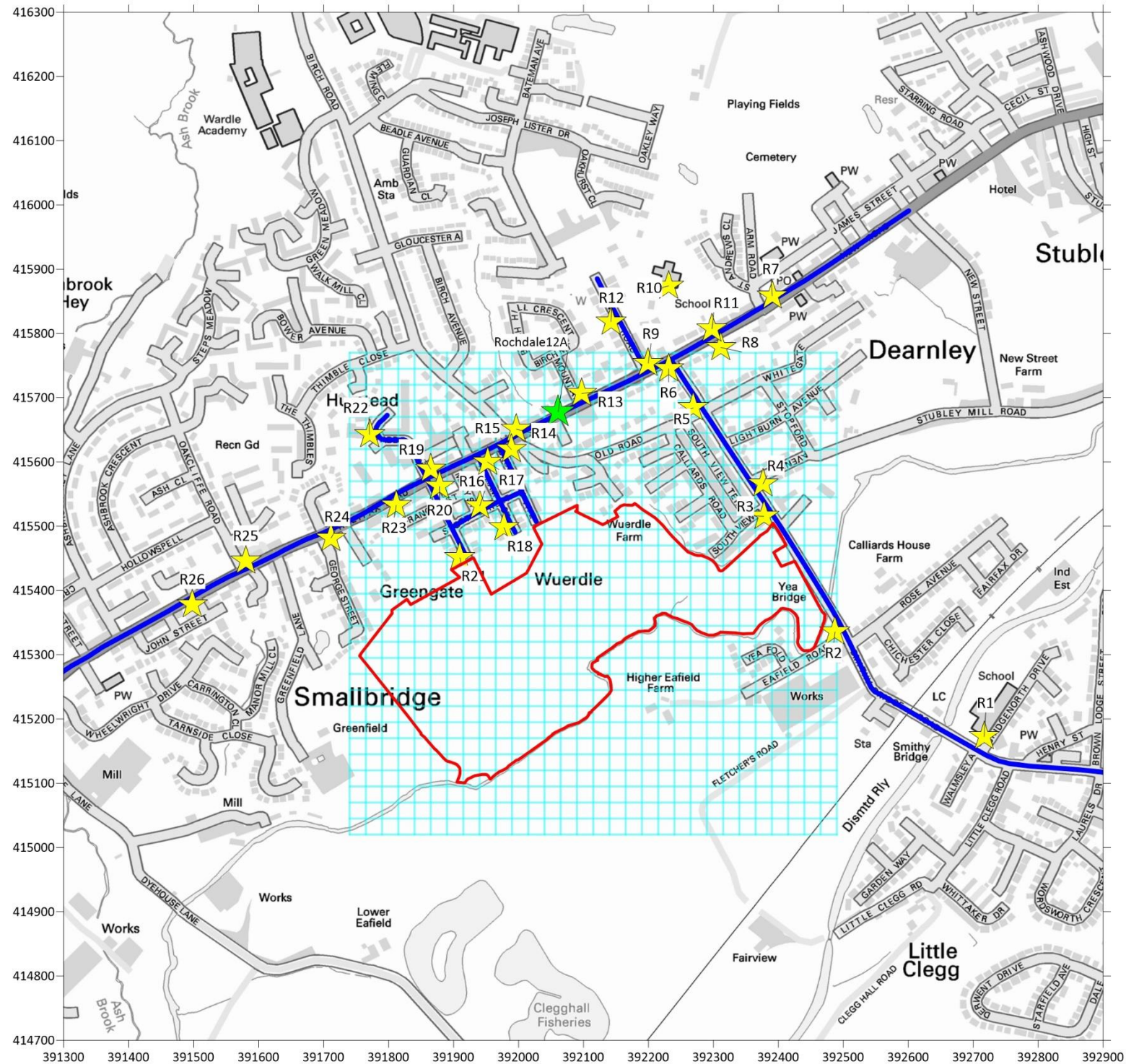
Smithy Bridge Road, Rochdale

Project Number

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- Site Boundary
- Modelled Road Link
- Cartesian Grid
- Diffusion Tube Monitoring
- Sensitive Receptor Locations

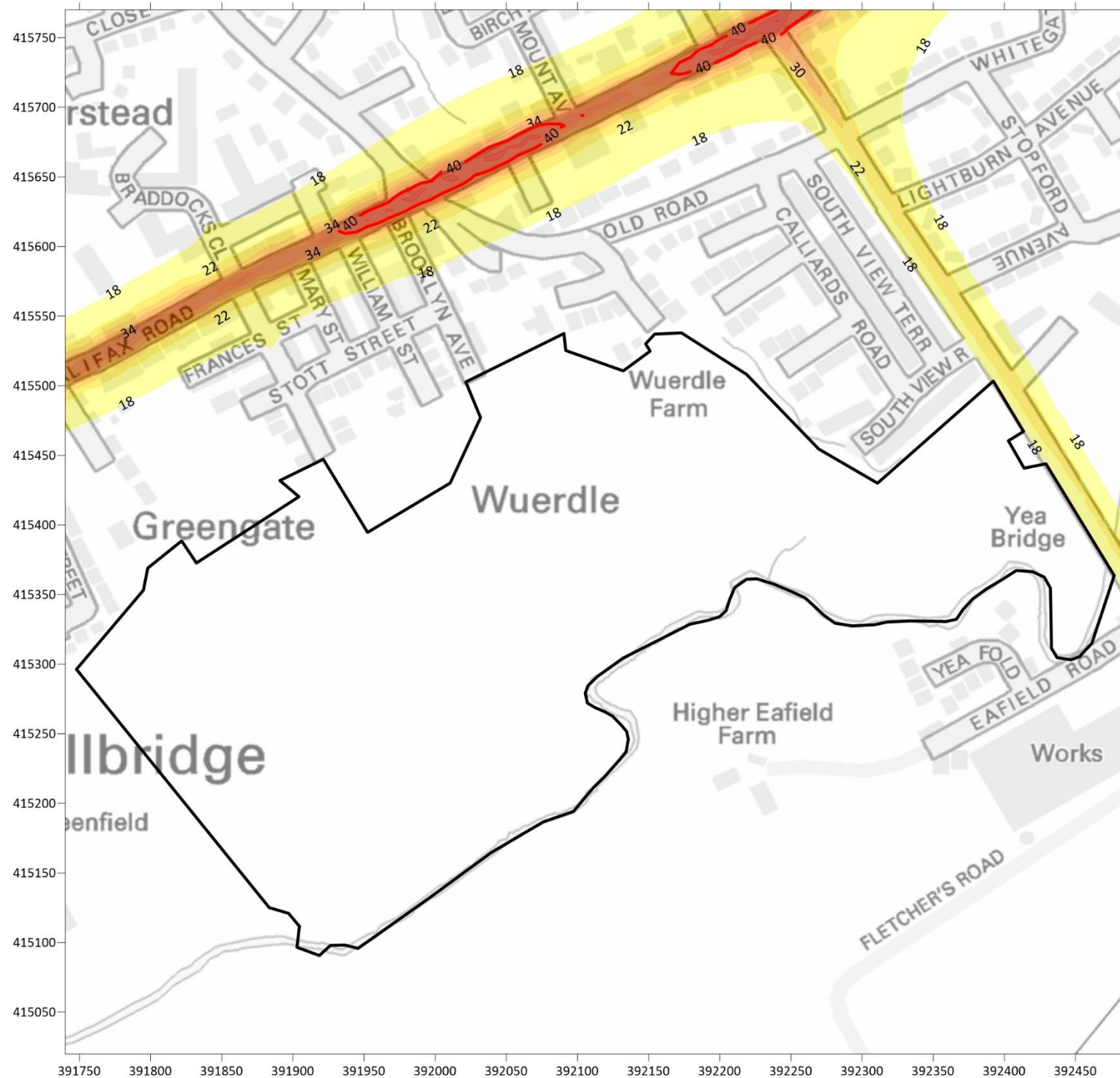
Figure 6
ADMS-Roads Input

Smithy Bridge Road, Rochdale

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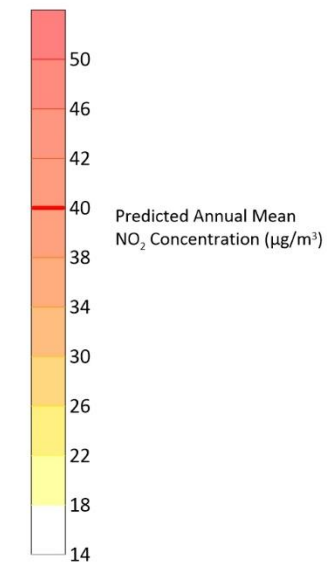
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Legend

 Site Boundary



Title

Figure 7

Predicted Annual Mean NO₂
Concentrations (µg/m³) 2023 DS

Project

Smithy Bridge Road, Rochdale

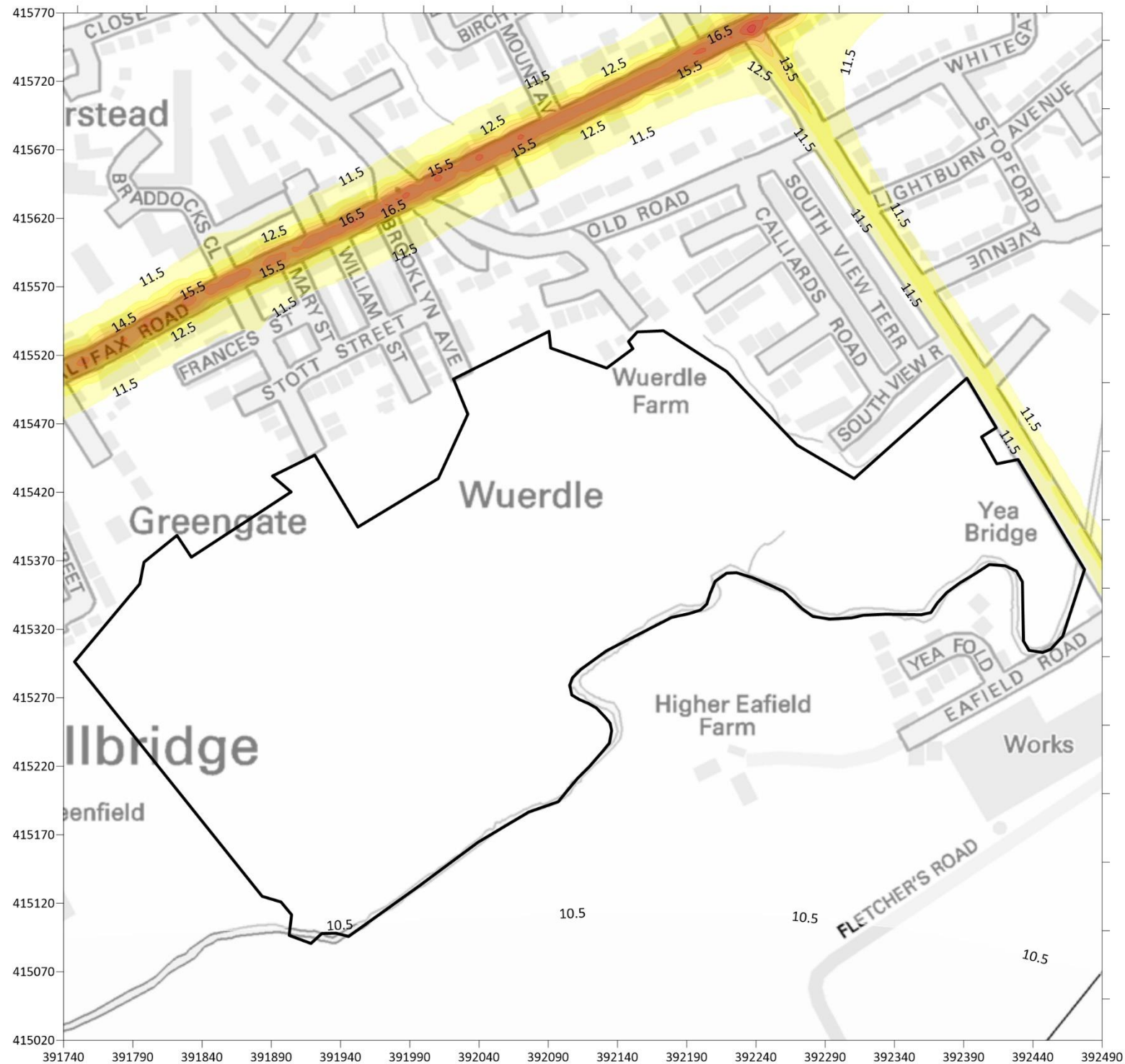
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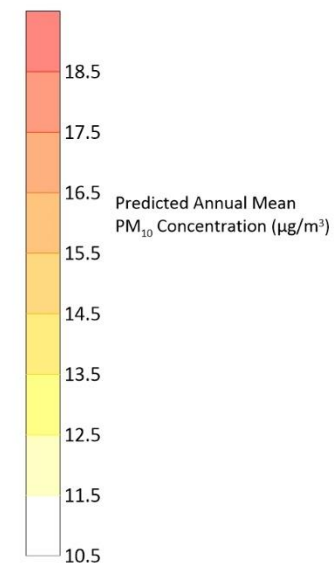


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Legend

 Site Boundary



Title

Figure 8
Predicted Annual Mean PM₁₀
Concentrations (µg/m³) 2023 DS

Project

Smithy Bridge Road, Rochdale

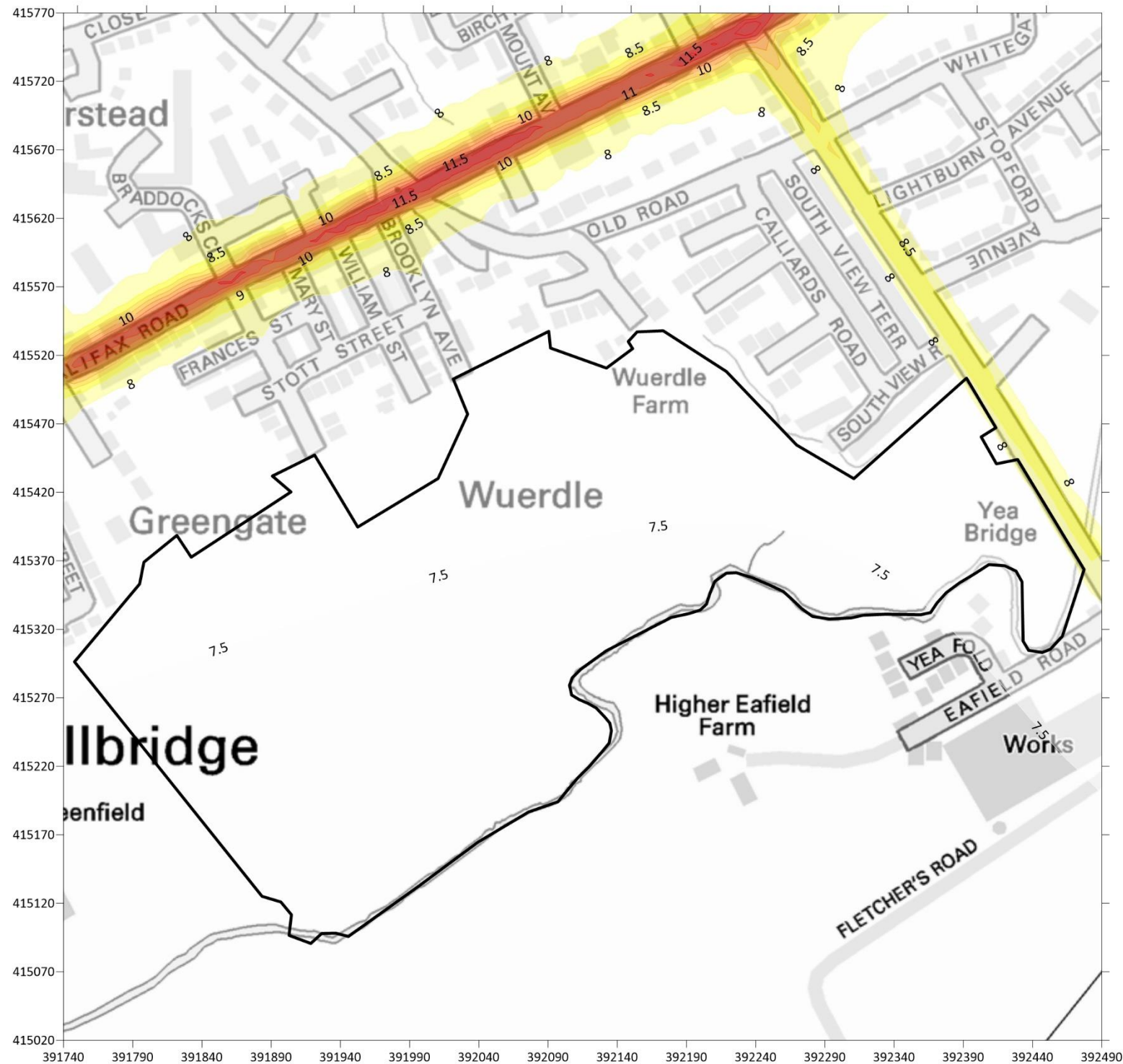
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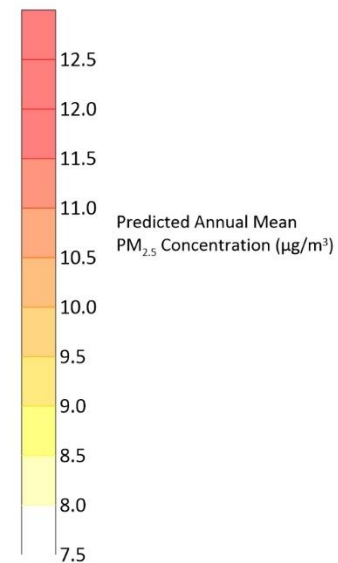


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Legend

 Site Boundary



Title

Figure 9
Predicted Annual Mean PM_{2.5}
Concentrations (µg/m³) 2023 DS

Project

Smithy Bridge Road, Rochdale

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APPENDIX B – ASSESSMENT INPUTS

ASSESSMENT INPUTS

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

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

Dispersion Model

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

The model requires input data that details the following parameters:

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

Assessment Area

Ambient concentrations were predicted over the Proposed Development site and surrounding highway network. One Cartesian grid was included in the model over the area at approximately NGR: 391740, 415020 to 392490, 415770 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 6 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 i-Transport, the appointed Transport Consultants for the scheme, and indicated that a total flow generation of 980 AADT is anticipated as a result of the Purposed Development.

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 2017 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: 2017 Verification Traffic Data

Road Link		Road Width (m)	24 Hour AADT Flow	HDV Pop (%)	Mean Vehicle Speed (km/hr)	Data Source
L1	Smithy Bridge Road South of Site	9.50	7,683	4.7	40	TC
L2	Smithy Bridge Road North of Site	7.80	8,524	2.9	40	TC
L3	Smithy Bridge Slowdown at Halifax Road and New Road	7.30	8,524	2.9	16	TC
L4	A58 New Road East of Smithy Bridge Road Slowdown	10.30	20,882	4.8	16	TC
L5	A58 New Road East of Smithy Bridge Road	8.40	20,882	4.8	40	TC
L6	A58 Halifax Road West of Smithy Bridge Road Slowdown	12.50	24,253	4.2	16	TC
L7	A58 Halifax Road West of Smithy Bridge Road	9.80	24,253	4.2	40	TC
L8	A58 Halifax Road East of Birch Road Slowdown	10.20	24,253	4.2	16	TC
L9	A58 Halifax Road West of Birch Road Slowdown	10.20	23,116	4.2	16	TC
L10	A58 Halifax Road West of William Street	8.90	23,072	4.2	40	TC
L11	A58 Halifax Road East of Holland Street	10.30	23,080	4.3	40	TC
L12	A58 Halifax Road West of Holland Street	10.20	23,368	4.2	40	TC
L13	Braddocks Close	6.90	612	0.3	24	TC
L14	Holland Street	6.80	614	2.3	24	TC
L15	William Street	6.60	145	0.0	24	TC
L16	Union Street Slowdown	6.40	1,056	1.1	16	TC
L17	Union Street	5.70	1,056	1.1	24	TC
L18	Brooklyn Ave Slowdown	10.20	145	0.00	24	TC
L19	Brooklyn Ave	5.20	145	0.00	16	TC
L20	Stotts Street Slowdown	4.70	614	2.30	24	TC
L21	Stotts Street	5.30	614	2.30	32	TC

TC – Transport Consultant

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	Smithy Bridge Road South of Site	8,436	4.64	8,707	4.64
L2	Smithy Bridge Road North of Site	9,350	2.88	10,033	2.88

Road Link		DM Scenario		DS Scenario	
		24 Hr AADT Flow	HDV Prop (%)	24 Hr AADT Flow	HDV Prop (%)
L3	Smithy Bridge Slowdown at Halifax Road and New Road	9,350	2.88	10,033	2.88
L4	A58 New Road East of Smithy Bridge Road Slowdown	23,017	4.70	23,088	4.70
L5	A58 New Road East of Smithy Bridge Road	23,017	4.70	23,088	4.70
L6	A58 Halifax Road West of Smithy Bridge Road Slowdown	26,596	4.21	27,181	4.21
L7	A58 Halifax Road West of Smithy Bridge Road	26,596	4.21	27,181	4.21
L8	A58 Halifax Road East of Birch Road Slowdown	26,596	4.21	27,181	4.21
L9	A58 Halifax Road West of Birch Road Slowdown	25,356	4.19	25,891	4.19
L10	A58 Halifax Road West of William Street	25,308	4.20	25,843	4.20
L11	A58 Halifax Road East of Holland Street	25,316	4.21	25,852	4.21
L12	A58 Halifax Road West of Holland Street	25,651	4.19	26,186	4.19
L13	Braddocks Close	666	0.33	666	0.33
L14	Holland Street	721	2.13	721	2.13
L15	William Street	158	0.00	158	0.00
L16	Union Street Slowdown	1,153	1.14	1,179	1.14
L17	Union Street	1,153	1.14	1,179	1.14
L18	Brooklyn Ave Slowdown	158	0.00	158	0.00
L19	Brooklyn Ave	158	0.00	158	0.00
L20	Stotts Street Slowdown	721	2.00	721	2.00
L21	Stotts Street	721	2.00	721	2.00

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

For the 2017 Verification and 2023 Opening Year scenarios, emission factors for each road link were calculated using the relevant traffic flows and Emissions Factor Toolkit (version 8.0.1) released in 2017, which incorporates updated COPERTv5 vehicle emissions factors for NO_x and vehicle fleet information.

There is current uncertainty over NO₂ concentrations within the UK, with roadside levels not reducing as previously expected due to the implementation of new vehicle emission standards. Therefore, 2017 emission factors have been utilised for the prediction of pollution levels for the 2017 Verification and 2023 Opening Year scenarios in preference to the development opening year in order to provide a robust assessment.

Emission factors for the 2023 DM and DS scenarios were calculated using the CURED (version V3A). This calculator gives realistic, worst case emission factors for diesels for future years which utilise recent real-world emissions test data. This calculator was used exclusively for the future year 2023 DM and DS scenarios for NO_x.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO₂ concentrations using the NO_x to NO₂ Calculator (v.7.1) provided by DEFRA, which is the method detailed within LAQM.TG(16)².

Meteorological Data

Meteorological data used in this assessment was taken from Bingley meteorological station over the period 1st January 2017 to 31st December 2017 (inclusive).

Bingley meteorological station is located at approximate NGR: 408651, 435982 which is approximately 26km north-east of the Proposed Development. Although there is a large distance between the application site and Bingley the use of this data has prior approval from the Environmental Health Department at RMBC and is therefore considered to provide a reasonable representation of conditions at the development site.

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

Roughness Length

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

Table B3: Utilised Roughness Lengths

Scenario	Roughness Length (m)	ADMS Description
Verification, DM and DS Scenarios	0.5	Parkland, open suburbia
Bingley Meteorological Station	0.3	Agricultural areas (max)

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

Monin-Obukhov Length

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

Table B4: Utilised Monin-Obukhov Lengths

Scenario	Monin-Obukhov Length (m)	ADMS Description
Verification, DM and DS Scenarios	30	Mixed urban/industrial
Bingley Meteorological Station	10	small towns <50,000

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

Background Concentrations

The 2017 annual mean background 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	2017 Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)
RO12ANO		NO _x	20.04
		NO ₂	14.32

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	2017 Predicted Background Concentration ($\mu\text{g}/\text{m}^3$)
R1 to R13	392500, 415500	NO _x	20.04
		NO ₂	14.32
		PM ₁₀	10.46
		PM _{2.5}	7.14
R14 to R26	391500, 415500	NO _x	20.73
		NO ₂	14.77
		PM ₁₀	10.62
		PM _{2.5}	7.29

Similar to emission factors, background concentrations for 2017 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 2017, using traffic data, meteorological data and monitoring results from this year.

RMBC undertakes periodic monitoring of NO₂ concentrations at one roadside monitoring location within the assessment extents. The road contribution to total NO_x concentration was calculated from the monitored NO₂ result for use in the verification

process. This was undertaken following the methodology contained within DEFRA guidance LAQM.TG(16)². The monitored annual mean NO_x concentration and calculated road NO_x concentration are summarised in Table B7.

Table B7: NO_x Concentrations

Site ID	Monitored Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)	% Difference ((Monitored - Modelled)/Monitored) * 100
RO12ANO	56.03	31.00	44.67

The monitored and modelled NO_x road contribution concentrations were compared and this indicated that a verification factor of Insert Factor was required to be applied to all NO_x modelling results.

This indicated that a verification factor of **1.8074** was required to be applied to all NO_x modelling results, showing the model overestimated pollutant concentrations throughout the assessment extents.

Table B8 presents the monitored annual mean NO₂ concentrations and the adjusted modelled total NO₂ concentration based on the above verification factor. Exceedances of the annual mean NO₂ AQO are highlighted in **bold**.

Table B8: NO₂ Concentrations

Site ID	Monitored Road NO ₂ Concentration (µg/m ³)	Adjusted Modelled Road NO ₂ Concentration (µg/m ³)	% Difference ((Monitored - Modelled)/Monitored) * 100
RO12ANO	40.59	40.59	0.00

As PM₁₀ and PM_{2.5} monitoring is not undertaken within the assessment extents, the NO_x adjustment factor of **1.8074** was utilised to adjust model predictions of PM₁₀ and PM_{2.5} in accordance with the guidance provided within LAQM.TG(16)².

APPENDIX C – ASSESSMENT RESULTS

Predicted Concentrations at Sensitive Receptors

Nitrogen Dioxide (NO₂)

Annual mean NO₂ concentrations were predicted for 2023 DM and DS scenarios and are summarised in Table C1.

Table C1: Predicted Annual Mean NO₂ Concentrations

Potential Impact		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R1	Smithy Bridge Primary School	17.08	17.16	0.08
R2	8 Smithy Bridge Road	16.07	16.11	0.04
R3	2 South View Road	16.39	16.51	0.12
R4	33 Stopford Avenue	19.17	19.47	0.30
R5	69 Old Road	18.28	18.44	0.16
R6	750 Halifax Road	31.39	31.80	0.41
R7	144 New Road	27.89	27.89	0.00
R8	149 New Road	22.04	22.14	0.10
R9	775 Halifax Road	29.99	30.32	0.33
R10	St Andrews C Of E Primary School	16.00	16.04	0.04
R11	3 Dearnley Close	25.05	25.14	0.09
R12	13 Union Road	16.37	16.42	0.05
R13	761 Halifax Road	24.61	24.88	0.27
R14	701 Halifax Road	31.07	31.40	0.33
R15	Belvoir Residential Home	25.31	25.57	0.26
R16	Stott Street	17.28	17.33	0.05
R17	622 Halifax Road	23.32	23.49	0.17
R18	3 William Street	16.19	16.22	0.03
R19	657 Halifax Road	25.74	26.00	0.26
R20	1 Holland Street	21.86	21.99	0.13
R21	18 Holland Street	15.96	15.99	0.03
R22	Hurstead House Nursing Home	16.19	16.22	0.03
R23	578 Halifax Road	23.29	23.46	0.17
R24	1 George Street	23.85	23.99	0.14
R25	555 Halifax Road	24.52	24.78	0.26
R26	452 Halifax Road	25.74	26.00	0.26

As indicated in Table C1, annual mean NO₂ concentrations were below the relevant AQO at all receptor locations considered.

Predicted impacts on annual mean NO₂ concentrations are summarised in Table C2.

Table C2: Predicted NO₂ Impacts

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	Smithy Bridge Primary School	0.20	75% or Less of the AQO	Negligible
R2	8 Smithy Bridge Road	0.10	75% or Less of the AQO	Negligible
R3	2 South View Road	0.30	75% or Less of the AQO	Negligible
R4	33 Stopford Avenue	0.75	75% or Less of the AQO	Negligible
R5	69 Old Road	0.40	75% or Less of the AQO	Negligible
R6	750 Halifax Road	1.03	76-94% of the AQO	Negligible
R7	144 New Road	0.00	75% or Less of the AQO	Negligible
R8	149 New Road	0.25	75% or Less of the AQO	Negligible
R9	775 Halifax Road	0.83	75% or Less of the AQO	Negligible
R10	St Andrews C Of E Primary School	0.10	75% or Less of the AQO	Negligible
R11	3 Dearnley Close	0.23	75% or Less of the AQO	Negligible
R12	13 Union Road	0.13	75% or Less of the AQO	Negligible
R13	761 Halifax Road	0.67	75% or Less of the AQO	Negligible
R14	701 Halifax Road	0.82	76-94% of the AQO	Negligible
R15	Belvoir Residential Home	0.65	75% or Less of the AQO	Negligible
R16	Stott Street	0.12	75% or Less of the AQO	Negligible
R17	622 Halifax Road	0.42	75% or Less of the AQO	Negligible
R18	3 William Street	0.07	75% or Less of the AQO	Negligible
R19	657 Halifax Road	0.65	75% or Less of the AQO	Negligible
R20	1 Holland Street	0.32	75% or Less of the AQO	Negligible
R21	18 Holland Street	0.07	75% or Less of the AQO	Negligible
R22	Hurstead House Nursing Home	0.07	75% or Less of the AQO	Negligible
R23	578 Halifax Road	0.43	75% or Less of the AQO	Negligible
R24	1 George Street	0.35	75% or Less of the AQO	Negligible
R25	555 Halifax Road	0.65	75% or Less of the AQO	Negligible
R26	452 Halifax Road	0.65	75% or Less of the AQO	Negligible

As indicated in Table C2 impacts on annual mean NO₂ 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 of the main report.

Particulate Matter (PM₁₀)

Annual mean PM₁₀ concentrations were predicted for 2023 DM and DS scenarios and are summarised Table C3.

Table C3: Predicted Annual Mean PM₁₀ Concentrations

Potential Impact		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R1	Smithy Bridge Primary School	16.45	16.47	0.02
R2	8 Smithy Bridge Road	16.20	16.21	0.01
R3	2 South View Road	16.26	16.29	0.03
R4	33 Stopford Avenue	16.92	17.00	0.08
R5	69 Old Road	16.63	16.66	0.03
R6	750 Halifax Road	19.12	19.21	0.09
R7	144 New Road	19.20	19.21	0.01
R8	149 New Road	17.41	17.43	0.02
R9	775 Halifax Road	18.87	18.94	0.07
R10	St Andrews C of E Primary School	16.13	16.14	0.01
R11	3 Dearnley Close	19.31	19.33	0.02
R12	13 Union Road	17.27	17.28	0.01
R13	761 Halifax Road	18.13	18.18	0.05
R14	701 Halifax Road	20.04	20.11	0.07
R15	Belvoir Residential Home	18.93	18.99	0.06
R16	Stott Street	17.44	17.45	0.01
R17	622 Halifax Road	18.75	18.79	0.04
R18	3 William Street	17.18	17.19	0.01
R19	657 Halifax Road	19.58	19.64	0.06
R20	1 Holland Street	17.49	17.53	0.04
R21	18 Holland Street	17.14	17.14	<0.01
R22	Hurstead House Nursing Home	17.18	17.19	0.01
R23	578 Halifax Road	17.89	17.93	0.04
R24	1 George Street	18.04	18.07	0.03
R25	555 Halifax Road	18.22	18.27	0.05
R26	452 Halifax Road	16.45	16.47	0.02

As indicated in Table C3 annual mean PM₁₀ concentrations were below the relevant AQO at all receptor locations considered.

Predicted impacts on annual mean PM₁₀ concentrations are summarised in Table C4.

Table C4: Predicted PM₁₀ Impacts

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R1	Smithy Bridge Primary School	0.05	75% or Less of the AQO	Negligible
R2	8 Smithy Bridge Road	0.03	75% or Less of the AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R3	2 South View Road	0.07	75% or Less of the AQO	Negligible
R4	33 Stopford Avenue	0.20	75% or Less of the AQO	Negligible
R5	69 Old Road	0.08	75% or Less of the AQO	Negligible
R6	750 Halifax Road	0.23	75% or Less of the AQO	Negligible
R7	144 New Road	0.03	75% or Less of the AQO	Negligible
R8	149 New Road	0.05	75% or Less of the AQO	Negligible
R9	775 Halifax Road	0.18	75% or Less of the AQO	Negligible
R10	St Andrews C Of E Primary School	0.03	75% or Less of the AQO	Negligible
R11	3 Dearnley Close	0.05	75% or Less of the AQO	Negligible
R12	13 Union Road	0.03	75% or Less of the AQO	Negligible
R13	761 Halifax Road	0.13	75% or Less of the AQO	Negligible
R14	701 Halifax Road	0.18	75% or Less of the AQO	Negligible
R15	Belvoir Residential Home	0.15	75% or Less of the AQO	Negligible
R16	Stott Street	0.02	75% or Less of the AQO	Negligible
R17	622 Halifax Road	0.10	75% or Less of the AQO	Negligible
R18	3 William Street	0.03	75% or Less of the AQO	Negligible
R19	657 Halifax Road	0.15	75% or Less of the AQO	Negligible
R20	1 Holland Street	0.10	75% or Less of the AQO	Negligible
R21	18 Holland Street	<0.01	75% or Less of the AQO	Negligible
R22	Hurstead House Nursing Home	0.03	75% or Less of the AQO	Negligible
R23	578 Halifax Road	0.10	75% or Less of the AQO	Negligible
R24	1 George Street	0.08	75% or Less of the AQO	Negligible
R25	555 Halifax Road	0.13	75% or Less of the AQO	Negligible
R26	452 Halifax Road	0.05	75% or Less of the AQO	Negligible

As indicated in Table C4 impacts on annual mean PM₁₀ 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 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	Smithy Bridge Primary School	10.37	10.38	0.01

Potential Impact		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R2	8 Smithy Bridge Road	10.37	10.37	<0.01
R3	2 South View Road	10.36	10.37	0.01
R4	33 Stopford Avenue	10.36	10.37	0.01
R5	69 Old Road	10.36	10.37	0.01
R6	750 Halifax Road	11.17	11.20	0.03
R7	144 New Road	10.82	10.84	0.02
R8	149 New Road	10.79	10.82	0.03
R9	775 Halifax Road	10.65	10.68	0.03
R10	St Andrews C Of E Primary School	10.51	10.52	0.01
R11	3 Dearnley Close	11.57	11.59	0.02
R12	13 Union Road	11.79	11.81	0.02
R13	761 Halifax Road	10.71	10.74	0.03
R14	701 Halifax Road	12.11	12.14	0.03
R15	Belvoir Residential Home	12.66	12.73	0.07
R16	Stott Street	12.44	12.48	0.04
R17	622 Halifax Road	12.37	12.41	0.04
R18	3 William Street	11.47	11.49	0.02
R19	657 Halifax Road	10.97	10.98	0.01
R20	1 Holland Street	10.83	10.86	0.03
R21	18 Holland Street	10.98	11.00	0.02
R22	Hurstead House Nursing Home	11.44	11.48	0.04
R23	578 Halifax Road	10.90	10.91	0.01
R24	1 George Street	11.46	11.48	0.02
R25	555 Halifax Road	11.11	11.12	0.01
R26	452 Halifax Road	10.37	10.38	0.01

As indicated in Table C5 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	Smithy Bridge Primary School	0.04	75% or Less of the AQO	Negligible
R2	8 Smithy Bridge Road	<0.01	75% or Less of the AQO	Negligible
R3	2 South View Road	0.04	75% or Less of the AQO	Negligible
R4	33 Stopford Avenue	0.04	75% or Less of the AQO	Negligible

Potential Impact		% Change in Concentration Relative to AQO	Long Term Average Concentration	Impact
R5	69 Old Road	0.04	75% or Less of the AQO	Negligible
R6	750 Halifax Road	0.12	75% or Less of the AQO	Negligible
R7	144 New Road	0.08	75% or Less of the AQO	Negligible
R8	149 New Road	0.12	75% or Less of the AQO	Negligible
R9	775 Halifax Road	0.12	75% or Less of the AQO	Negligible
R10	St Andrews C of E Primary School	0.04	75% or Less of the AQO	Negligible
R11	3 Dearnley Close	0.08	75% or Less of the AQO	Negligible
R12	13 Union Road	0.08	75% or Less of the AQO	Negligible
R13	761 Halifax Road	0.12	75% or Less of the AQO	Negligible
R14	701 Halifax Road	0.12	75% or Less of the AQO	Negligible
R15	Belvoir Residential Home	0.28	75% or Less of the AQO	Negligible
R16	Stott Street	0.16	75% or Less of the AQO	Negligible
R17	622 Halifax Road	0.16	75% or Less of the AQO	Negligible
R18	3 William Street	0.08	75% or Less of the AQO	Negligible
R19	657 Halifax Road	0.04	75% or Less of the AQO	Negligible
R20	1 Holland Street	0.12	75% or Less of the AQO	Negligible
R21	18 Holland Street	0.08	75% or Less of the AQO	Negligible
R22	Hurstead House Nursing Home	0.16	75% or Less of the AQO	Negligible
R23	578 Halifax Road	0.04	75% or Less of the AQO	Negligible
R24	1 George Street	0.08	75% or Less of the AQO	Negligible
R25	555 Halifax Road	0.04	75% or Less of the AQO	Negligible
R26	452 Halifax Road	0.04	75% or Less of the 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 PM₁₀ and PM_{2.5}.

The assessment steps are detailed below.

Step 1

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

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

Step 2

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

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

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied. Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table D1.

Table D1: Construction Dust - Magnitude of Emission

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

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

Step 2B defines the sensitivity of the area around the development site for construction, earthworks and trackout. The factors influencing the sensitivity of the area are shown in Table 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 PM₁₀ e.g. residential properties, hospitals, schools and residential care homes	
Medium	- Users would expect to enjoy a reasonable level of amenity - Aesthetics or value of their property could be diminished by soiling - People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	Nationally designated site e.g. Sites of Special Scientific Interest
Low	- Enjoyment of amenity would not reasonably be expected - Property would not be expected to be diminished in appearance - Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads	Locally designated site e.g. Local Nature Reserve

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

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

These factors were considered in the undertaking of this assessment.

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

RACHAEL HARRISON

Air Quality Consultant

BSc (Hons), AMIEnvSc, AIAQM

KEY EXPERIENCE

Rachael 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.

SELECT PROJECTS SUMMARY

- Prescott Garden Centre - for a residential development of 227 dwellings.
- Keighley Road, Halifax – Air Quality assessment with dust and odour for residential development adjacent farm.
- New Bedford Road, Luton -AQA for residential redevelopment adjacent rail station
- Sovereign Crescent- AQA for ecological impacts on designated sites as a result of residential development.
- Banbury Magistrates Court – Production of AQA for redevelopment of existing building for residential use.
- Meat Market, Glasgow – AQA for development of residential units

ES Chapters

- Halsnead - Production of a number of ES chapters for large-scale residential developments
- Reading Metropolitan – Road, Rail and Energy Assessment for large-scale mixed use multi storey buildings
- Warburton Lane - EIA for a medium scale residential development within Manchester
- C02 Central Dock - EIA for a large scale residential development of 650 dwellings

Odour Assessments

- Wright Street, Renfrew – Quantitative odour assessment in support of a proposed residential development adjacent to a waste water treatment works.
- Optimus Point, Leicester - Qualitative assessment in support of a warehouse development in close proximity to existing vape production.
- Café Torelli, Kew - Kitchen odour risk assessment in support of a existing coffee shop and hot food takeaway.

London Experience

- The Bear Project - AQA for a mixed use development located within the Lewisham AQMA.
- Summerstown, Merton- AQA for a residential development located within the Merton AQMA and AQN Assessment
- Old Police Station - AQA for a residential development located within the Richmond AQMA
- Kings George's gate, Tolworth - AQA for mixed use scheme in AQMA in Kingston upon Thames, including an AQN and vertical slice modelling.
- Rotherhithe Street, Southwark - AQA for a residential development within the Southwark AQMA

Car Park Developments

- Radcliffe/Whitefield/Hollinwood Park & Rides – A series of extension to existing P&R facilities within Greater Manchester
- Beck Hill MSCP – Development of a multistorey car park in place of existing surface car park.
- Welwyn MSCP - Development of a multistorey car park in place of existing surface car park.

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
- Odour Acuity Certified Master of Science