

**Air Quality Assessment**  
**Queens Road, Barnsley**

**Client: Beecroft & Price Properties & Ecogise Properties Ltd**

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## Report Issue

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## **Executive Summary**

Redmore Environmental Ltd was commissioned by Beecroft & Price Properties & Ecogise Properties Ltd to undertake an Air Quality Assessment in support of a residential development at 32 Queens Road, Barnsley.

An Air Quality Assessment was undertaken to:

- Assess potential impacts associated with fugitive dust emissions during the construction phase of the proposed development;
- Assess potential impacts associated with road transport emissions during the operational phase of the proposed development;
- Assess risk of exposure of future residents to any existing air quality issues; and,
- Identify any requirement for mitigation measures.

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 the identified site-specific control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed using standard screening criteria. Based on the scale of the proposals, road traffic exhaust emission impacts were not predicted to be significant.

The proposal has the potential to expose future residents to elevated pollution levels. Dispersion modelling was therefore undertaken in order to predict concentrations across the site as a result of emissions from the highway network. Results were subsequently verified using local monitoring data.

The results of the dispersion modelling indicated that predicted pollutant concentrations were below the relevant criteria across the development. As such, the site is considered suitable for the proposed end use from an air quality perspective and mitigation is not required.

The requirements of the 'Air Quality and Emissions Good Practice Planning Guidance' were taken into consideration during the undertaking of the assessment. The scale of the development was determined, and the required level of mitigation identified.

Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

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## **1.0 INTRODUCTION**

### **1.1 Instruction**

1.1.1 Redmore Environmental Ltd was commissioned by Beecroft & Price Properties & Ecogise Properties Ltd to undertake an Air Quality Assessment in support of a residential development at 32 Queens Road, Barnsley.

### **1.2 Site Location and Context**

1.2.1 The site is located at 32 Queens Road, Barnsley, S71 1AR, at approximate National Grid Reference (NGR): 434899, 406476. The relevant Local Authority (LA) is Barnsley Metropolitan Borough Council (BMBC). Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise the construction of six residential units with associated parking and infrastructure.

### **1.3 Assessment Scope**

1.3.1 The proposals have the potential to cause air quality impacts at sensitive locations. As such, an Air Quality Assessment was undertaken to:

- Assess potential impacts associated with fugitive dust emissions during the construction phase of the development;
- Assess potential impacts associated with road transport emissions during the operational phase of the development;
- Assess risk of exposure of future residents to any existing air quality issues; and,
- Identify any requirement for mitigation measures.

1.3.2 This is detailed in the following report.

## **2.0 LEGISLATION AND POLICY**

### **2.1 Legislation**

2.1.1 The Air Quality Standards Regulations (2010) and subsequent amendments include Air Quality Limit Values (AQLVs) for the following pollutants:

- Nitrogen dioxide (NO<sub>2</sub>);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM<sub>10</sub>);
- Particulate matter with an aerodynamic diameter of less than 2.5µm (PM<sub>2.5</sub>);
- Benzene; and,
- Carbon monoxide.

2.1.2 Air Quality Target Values have also been provided for several additional pollutants. It should be noted that the AQLV for PM<sub>2.5</sub> stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

2.1.3 The Air Quality Strategy (AQS) was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published on 28<sup>th</sup> April 2023<sup>1</sup>. The document contains standards, objectives and measures for improving ambient air quality, including a number of Air Quality Objectives (AQOs). These are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 The Environmental Improvement Plan 2023<sup>2</sup> was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to PM<sub>2.5</sub>. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

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<sup>1</sup> AQS: Framework for Local Authority Delivery, DEFRA, 2023.

<sup>2</sup> Environmental Improvement Plan 2023, DEFRA, 2023.

2.1.5 Table 1 presents the AQOs and Interim Target for pollutants considered within this assessment.

**Table 1 Air Quality Objectives/Interim Target**

Pollutant	Air Quality Objective/Interim Target	
	Concentration ( $\mu\text{g}/\text{m}^3$ )	Averaging Period
NO <sub>2</sub>	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM <sub>10</sub>	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
PM <sub>2.5</sub>	12 <sup>(a)</sup>	Annual mean

Note: (a) Interim Target to be achieved by end of January 2028.

2.1.6 Table 2 summarises the advice provided in DEFRA guidance<sup>3</sup> on where the AQOs for pollutants considered within this report apply.

**Table 2 Examples of Where the Air Quality Objectives Apply**

Averaging Period	Objective Should Apply At	Objective 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

<sup>3</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
1-hour mean	<p>All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets)</p> <p>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</p> <p>Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer</p>	Kerbside sites where the public would not be expected to have regular access

## 2.2 **Local Air Quality Management**

2.2.1 LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

## 2.3 **Dust**

2.3.1 The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2016) and subsequent amendments, such as construction sites, is that provided in Section 79 of Part III of the Environmental Protection Act (1990). The Act defines nuisance as:

"any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance."

2.3.2 Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of

the Environmental Protection Act (1990). The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practicable means.

## **2.4 National Planning Policy**

2.4.1 The revised National Planning Policy Framework<sup>4</sup> (NPPF) was published in December 2023 and sets out the Government's planning policies for England and how these are expected to be applied.

2.4.2 The purpose of the planning system is to contribute to the achievements of sustainable development. In order to ensure this, the NPPF recognises three overarching objectives including the following of relevance to air quality:

"c) an environmental objective - to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

2.4.3 Chapter 15 of the NPPF details objectives in relation to conserving and enhancing the natural environment. It states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) preventing new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality [...]"

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<sup>4</sup> NPPF, Ministry of Housing, Communities and Local Government, 2023.

2.4.4 The NPPF specifically recognises air quality as part of delivering sustainable development and states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

2.4.5 The implications of the NPPF have been considered throughout this assessment.

## **2.5 National Planning Practice Guidance**

2.5.1 The National Planning Practice Guidance<sup>5</sup> (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6<sup>th</sup> March 2014 and updated on 1<sup>st</sup> November 2019 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. What air quality considerations does planning need to address?
2. What is the role of plan-making with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?
5. When could air quality be relevant to the planning development management process?
6. What specific issues may need to be considered when assessing air quality impacts?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

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<sup>5</sup> <https://www.gov.uk/guidance/air-quality--3>.

2.5.2 These were reviewed and the relevant guidance considered as necessary throughout the undertaking of this assessment.

## **2.6 Local Planning Policy**

2.6.1 The Barnsley Local Plan<sup>6</sup> was adopted by BMBC on 3<sup>rd</sup> January 2019. A review of the document indicated the following policies of relevance to this assessment:

"Policy GD1 General Development

Proposals for development will be approved if:

[...]

Any adverse impact on the environment, natural resources, waste and pollution is minimised and mitigated;

[...]."

"Policy Poll1 Pollution Control and Protection

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.

We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.

Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate."

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<sup>6</sup> Barnsley local Plan, BMBC, 2019.

"Policy AQ1 Development in Air Quality Management Areas

"Development which impacts on areas sensitive to air pollution in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in terms of air quality (including residents, employees, visitors and customers), taking into account any suitable and proportionate mitigation required for the development.

We will only allow residential development which impacts on areas sensitive to air pollution, where the developer provides an assessment that shows living conditions will be acceptable for future residents, subject to any required mitigation.

We will only allow development which impacts on areas sensitive to air pollution which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality, subject to any required mitigation.

Furthermore, development which impacts on areas sensitive to air pollution due to traffic emissions will be expected to demonstrate suitable and proportionate mitigation relative to the increased traffic emissions generated by the development."

2.6.2 The above policies were taken into consideration throughout the undertaking of the assessment.

## **2.7 Air Quality and Emissions Good Practice Planning Guidance**

2.7.1 BMBC produced the 'Air Quality and Emissions Good Practice Planning Guidance'<sup>7</sup> in November 2021. This identifies air quality factors that should be taken into account with regard to land-use planning and development. This was considered as necessary throughout the assessment.

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<sup>7</sup> Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2021.

### **3.0 METHODOLOGY**

#### **3.1 Introduction**

3.1.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases, as well as expose future residents to elevated pollution levels. These issues have been assessed in accordance with the following methodology.

#### **3.2 Construction Phase Assessment**

3.2.1 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 V2.2'<sup>8</sup>.

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

- Earthworks;
- Construction; and,
- Trackout.

3.2.3 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<sub>10</sub>.

3.2.4 The assessment steps are detailed below.

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<sup>8</sup> Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

### Step 1 - Screen the Need for an Assessment

3.2.5 Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 250m from the boundary or 50m from the construction vehicle route up to 250m from the site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the site, or the construction vehicle route up to 250m from the site entrance, then the assessment also proceeds to Step 2.

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

### Step 2 - Assess the Risk of Dust Impacts

3.2.7 Step 2 assesses the risk of potential dust impacts. A site is allocated 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).

3.2.8 The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

3.2.9 Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 3.

**Table 3 Construction Dust - Magnitude of Emission**

Magnitude	Activity	Criteria
Large	Earthworks	<ul style="list-style-type: none"> <li>• Total site area greater than 110,000m<sup>2</sup></li> <li>• Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size)</li> <li>• More than 10 heavy earth moving vehicles active at any one time</li> <li>• Formation of bunds greater than 6m in height</li> </ul>

Magnitude	Activity	Criteria
	Construction	<ul style="list-style-type: none"> <li>Total building volume greater than 75,000m<sup>3</sup></li> <li>On site concrete batching</li> <li>Sandblasting</li> </ul>
	Trackout	<ul style="list-style-type: none"> <li>More than 50 Heavy Duty Vehicle (HDV) trips per day</li> <li>Potentially dusty surface material (e.g. high clay content)</li> <li>Unpaved road length greater than 100m</li> </ul>
Medium	Earthworks	<ul style="list-style-type: none"> <li>Total site area 18,000m<sup>2</sup> to 110,000m<sup>2</sup></li> <li>Moderately dusty soil type (e.g. silt)</li> <li>5 to 10 heavy earth moving vehicles active at any one time</li> <li>Formation of bunds 3m to 6m in height</li> </ul>
	Construction	<ul style="list-style-type: none"> <li>Total building volume 12,000m<sup>3</sup> to 75,000m<sup>3</sup></li> <li>Potentially dusty construction material (e.g. concrete)</li> <li>On site concrete batching</li> </ul>
	Trackout	<ul style="list-style-type: none"> <li>20 to 50 HDV trips per day</li> <li>Moderately dusty surface material (e.g. high clay content)</li> <li>Unpaved road length 50m to 100m</li> </ul>
Small	Earthworks	<ul style="list-style-type: none"> <li>Total site area less than 18,000m<sup>2</sup></li> <li>Soil type with large grain size (e.g. sand)</li> <li>Less than 5 heavy earth moving vehicles active at any one time</li> <li>Formation of bunds less than 3m in height</li> </ul>
	Construction	<ul style="list-style-type: none"> <li>Total building volume less than 12,000m<sup>3</sup></li> <li>Construction material with low potential for dust release (e.g. metal cladding or timber)</li> </ul>
	Trackout	<ul style="list-style-type: none"> <li>Less than 20 HDV trips per day</li> <li>Surface material with low potential for dust release</li> <li>Unpaved road length less than 50m</li> </ul>

3.2.10 Step 2B defines the sensitivity of the area around the development to potential dust impacts. The sensitivities of specific receptors are summarised in Table 4.

**Table 4 Construction Dust - Sensitivities of People and Ecological Receptors**

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	<ul style="list-style-type: none"> <li>• Users expect high levels of amenity</li> <li>• High aesthetic or value property</li> <li>• People expected to be present continuously for extended periods of time</li> <li>• Locations where members of the public are exposed over a time period relevant to the AQO for PM<sub>10</sub>. e.g. residential properties, hospitals, schools and residential care homes</li> </ul>	<ul style="list-style-type: none"> <li>• Internationally or nationally designated site e.g. Special Area of Conservation</li> </ul>
Medium	<ul style="list-style-type: none"> <li>• Users would expect to enjoy a reasonable level of amenity</li> <li>• Aesthetics or value of their property could be diminished by soiling</li> <li>• 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</li> </ul>	<ul style="list-style-type: none"> <li>• Nationally designated site e.g. Sites of Special Scientific Interest</li> </ul>
Low	<ul style="list-style-type: none"> <li>• Enjoyment of amenity would not reasonably be expected</li> <li>• Property would not be expected to be diminished in appearance</li> <li>• Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads</li> </ul>	<ul style="list-style-type: none"> <li>• Locally designated site e.g. Local Nature Reserve</li> </ul>

3.2.11 The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in Table 5.

**Table 5 Construction Dust - 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 250
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 250
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

3.2.12 Table 6 outlines the criteria for determining the sensitivity of the area to human health impacts.

**Table 6 Construction Dust - Sensitivity of the Area to Human Health Impacts**

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

Receptor Sensitivity	Background Annual Mean PM <sub>10</sub> Concentration	Number of Receptors	Distance from the Source (m)			
			Less than 20	Less than 50	Less than 100	Less than 250
	24 - 28µg/m <sup>3</sup>	More than 10	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low
	Less than 24µg/m <sup>3</sup>	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low

3.2.13 Table 7 outlines the criteria for determining the sensitivity of the area to ecological impacts.

**Table 7 Construction Dust - 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

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

3.2.15 Table 8 outlines the risk category from earthworks, construction and trackout activities.

**Table 8 Construction Dust - Dust Risk Category from Earthworks, Construction and Trackout Activities**

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

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### **Step 3 - Site-specific Mitigation**

3.2.16 Step 3 requires the identification of site-specific mitigation measures within the IAQM guidance<sup>9</sup> 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 - Determine Significance**

3.2.17 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**.

3.2.18 The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. The IAQM guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

## **3.3 Operational Phase Assessment**

### **Potential Development Impacts**

3.3.1 The development has the potential to increase concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. A screening assessment was therefore undertaken using the criteria contained within the IAQM 'Land-Use Planning & Development Control: Planning for Air Quality'<sup>10</sup> guidance to determine the potential for trips generated by the development to affect local air quality.

3.3.2 The following criteria are provided to help establish when an assessment of potential impacts on the local area is likely to be considered necessary:

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<sup>9</sup> Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

<sup>10</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

A. If any of the following apply:

- 10 or more residential units or a site area of more than 0.5ha; or,
- More than 1,000 m<sup>2</sup> of floor space for all other uses or a site area greater than 1ha.

B. Coupled with any of the following:

- The development has more than 10 parking spaces; or,
- The development will have a centralised energy facility or other centralised combustion process.

3.3.3 Should these criteria not be met, then the IAQM guidance<sup>11</sup> considers air quality impacts associated with a scheme to be **not significant** and no further assessment is required.

3.3.4 Where the above criteria are met, then the assessor should proceed to assess the development proposals against the following Stage 2 screening criteria:

- The development leads to a change of Light Duty Vehicle (LDV) flows of:
  - More than 100 AADT within an AQMA;
  - More than 500 AADT outside of an AQMA;
- The development leads to a change of HDV flows of:
  - More than 25 AADT within an AQMA;
  - More than 100 AADT outside of an AQMA;
- Introduce a new junction that would cause traffic flow to change behaviour with respect to acceleration/deceleration or introduce queueing traffic where there previously wasn't any (such as a roundabout or traffic lights); and,
- Introduce one or more significant combustion processes where there is a risk of impact to relevant receptors.

3.3.5 Should these criteria not be met, then the IAQM guidance<sup>12</sup> considers air quality impacts associated with a scheme to be **not significant** and no further assessment is required.

---

<sup>11</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

<sup>12</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

### **Potential Future Exposure**

- 3.3.6 The proposals have the potential to expose future residents to elevated pollution levels. In order to assess NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations across the development site, detailed dispersion modelling was undertaken. Reference should be made to Appendix 1 for a full description of the assessment input data.
- 3.3.7 The dispersion modelling results were compared against the relevant AQOs and Interim Target in order to determine the potential for exposure of future residents to elevated pollutant concentrations and identify appropriate mitigation, if necessary.

---

## 4.0 **BASELINE**

### 4.1 **Introduction**

4.1.1 Existing air quality conditions in the vicinity of the proposed development site were identified to provide a baseline for assessment. These are detailed in the following Sections.

### 4.2 **Local Air Quality Management**

4.2.1 As required by the Environment Act (1995), as amended by the Environment Act (2021), BMBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual and 1-hour mean NO<sub>2</sub> concentrations are above the relevant AQOs within the borough. As such, five AQMAs have been declared. The closest of these to the development is described as follows:

"AQMA No. 4 - Residential properties along the uphill carriageway of Harborough Hill Road from the gyratory."

4.2.2 The site is located approximately 20m east of the AQMA. As such, there is the potential for emissions from the development to increase pollution concentrations in this sensitive area. This has been considered throughout the assessment.

4.2.3 BMBC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

### 4.3 **Air Quality Monitoring**

4.3.1 Monitoring of pollutant concentrations is undertaken by BMBC throughout their area of jurisdiction. Recent NO<sub>2</sub> results recorded in the vicinity of the development, as provided in BMBC's '2023 Air Quality Annual Status Report (ASR)'<sup>13</sup>, are shown in Table 9. Exceedences of the AQO are shown in **bold**.

---

<sup>13</sup> 2022 Air Quality ASR, GMCA, 2023.

**Table 9 Monitoring Results**

Monitoring Location		Monitored Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )		
		2020	2021	2022
41	49 Harborough Hill Road	<b>42.4</b>	<b>51.3</b>	<b>49.7</b>
42	Mottram Street / Eldon Street	-(a)	28.2	29.6
43	Harborough Hill Road	<b>41.4</b>	<b>47.9</b>	<b>50.1</b>

Note: (a) Monitor commissioned in 2021.

4.3.2 As shown in Table 9, annual mean NO<sub>2</sub> concentrations were above the AQO of 40µg/m<sup>3</sup> at 41 - 49 Harborough Hill Road and 43 - Harborough Hill Road in recent years. As these sites are adjacent to the A61, elevated pollutant levels are to be expected. Reference should be made to Figure 2 for a map of the survey positions.

4.3.3 It is noted that pollutant concentrations recorded during 2020 and 2021 were affected by changes to travel patterns and associated exhaust emissions caused by the COVID-19 pandemic. The results should therefore be viewed with caution.

4.3.4 BMBC do not undertake monitoring of PM<sub>10</sub> and PM<sub>2.5</sub> within the vicinity of the site.

#### **4.4 Background Pollutant Concentrations**

4.4.1 Predictions of background annual mean 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 in grid square NGR: 434500, 406500. Data for this location was downloaded from the DEFRA website<sup>14</sup> for the purpose of the assessment and is summarised in Table 10.

**Table 10 Background Pollutant Concentration Predictions**

Pollutant	Predicted Background Pollutant Concentration (µg/m <sup>3</sup> )		
	2022	2024	2026
NO <sub>2</sub>	15.25	14.21	13.39

<sup>14</sup> <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>.

Pollutant	Predicted Background Pollutant Concentration ( $\mu\text{g}/\text{m}^3$ )		
	2022	2024	2026
PM <sub>10</sub>	11.29	11.06	10.94
PM <sub>2.5</sub>	7.38	7.20	7.10

4.4.2 As shown in Table 10, predicted background annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the relevant AQOs and Interim Target at the proposed development site.

#### 4.5 **Sensitive Receptors**

4.5.1 A sensitive receptor is defined as any location which may be affected by changes in air quality as a result of a development. Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 250m from the boundary. These are summarised in Table 11.

**Table 11 Earthworks and Construction Dust Sensitive Receptors**

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	10 - 100	0
Up to 50	10 - 100	0
Up to 100	More than 100	-
Up to 250	More than 100	-

4.5.2 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 250m of the site access. These are summarised in Table 12.

**Table 12 Trackout Dust Sensitive Receptors**

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	10 - 100	0
Up to 50	10 - 100	0

4.5.3 There are no ecological receptors within 50m of the development boundary or the access route within 250m of the site entrance. As such, ecological impacts have not been assessed further within this report.

4.5.4 Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties and Queens Road Academy.

## **5.0 CONSTRUCTION PHASE ASSESSMENT**

### **5.1 Introduction**

5.1.1 There is the potential for air quality impacts as a result of the construction of the proposed development. These are assessed in the following Sections.

### **5.2 Step 1 - Screen the Need for an Assessment**

5.2.1 The undertaking of activities such as excavation, ground works, cutting, construction and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements on the local road network also have the potential to result in the re-suspension of dust from highway surfaces.

5.2.2 The potential for impacts at sensitive locations depends significantly on local meteorology during the undertaking of dust generating activities, with the most significant effects likely to occur during dry and windy conditions.

5.2.3 The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 250m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

### **5.3 Step 2a - Define the Potential Dust Emission Magnitude**

#### **Earthworks**

5.3.1 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The area of the proposed development site is less than 18,000m<sup>2</sup>. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **small**.

#### **Construction**

5.3.2 Due to the size of the development, the total building volume is likely to be less than 12,000m<sup>3</sup>. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **small**.

## **Trackout**

5.3.3 Based on the site area, it is anticipated that the unpaved road length will be less than 50m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **small**.

## **5.4 Step 2b - Define the Sensitivity of the Area**

### **Dust Soiling**

5.4.1 Table 11 shows that there are more than 10 - 100 **high** sensitivity receptors within 20m of the site boundary. The sensitivity of the area with respect to dust soiling from earthworks and construction, as defined using the criteria summarised in Table 5, is therefore considered to be **high**.

5.4.2 Table 12 shows that there are 10 to 100 **high** sensitivity receptors within 20m of the road network within 250m of the site access. The sensitivity of the area with respect to dust soiling from trackout, as defined using the criteria summarised in Table 5, is therefore considered **high**.

### **Human Health**

5.4.3 Table 10 shows the annual mean PM<sub>10</sub> background concentration at the site is 11.06µg/m<sup>3</sup>. As shown in Table 6, where the background annual mean PM<sub>10</sub> concentration is below 24µg/m<sup>3</sup> and there are between 10 - 100 than **high** sensitivity receptors within 20m of the site boundary, the sensitivity of the area with respect to human health from earthworks and construction is considered to be **low**.

5.4.4 There are 10 to 100 **high** sensitivity receptors within 20m of the road network within 250m of the site access. The sensitivity of the area with respect to human health from trackout, as defined using the criteria summarised in Table 6, is therefore considered to be **low**.

## **5.5 Step 2c - Define the Risk of Dust Impacts**

5.5.1 The derived dust emission magnitude for each activity was combined with the sensitivity of the area to determine the risk of unmitigated impacts in line with the methodology set

out in Table 8. A summary of the risk from each dust generating activity is provided in Table 13.

**Table 13 Summary of Potential Unmitigated Dust Risks**

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

5.5.2 As indicated in Table 15, the potential risk of dust soiling is **low** from earthworks, construction and trackout. The potential risk of human health effects is **negligible** from earthworks, construction and trackout.

5.5.3 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.

### 5.6 Step 3 - Site-specific Mitigation

5.6.1 The IAQM guidance<sup>15</sup> provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These have been adapted for the development site as summarised in Table 14. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

**Table 14 Fugitive Dust Emission Mitigation Measures**

Issue	Control Measure
Communications	<ul style="list-style-type: none"> <li>• 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</li> <li>• Display the head or regional office contact information</li> </ul>

<sup>15</sup> Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2023.

Issue	Control Measure
Site management	<ul style="list-style-type: none"> <li>• 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</li> <li>• Make the complaints log available to the LA upon request</li> <li>• Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Carry out regular site inspections, record inspection results, and make an inspection log available to the LA upon request</li> <li>• Increase the frequency of site inspections when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions</li> </ul>
Site preparation	<ul style="list-style-type: none"> <li>• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible</li> <li>• Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site</li> <li>• Avoid site runoff of water or mud</li> </ul>
Operating vehicle/machinery and sustainable travel	<ul style="list-style-type: none"> <li>• Ensure all vehicles switch off engines when stationary - no idling vehicles</li> <li>• Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable</li> </ul>
Operations	<ul style="list-style-type: none"> <li>• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques</li> <li>• Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate</li> <li>• Use enclosed chutes and conveyors and covered skips</li> <li>• Minimise drop heights and use fine water sprays wherever appropriate</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Avoid bonfires or burning of waste materials</li> </ul>
Construction	<ul style="list-style-type: none"> <li>• Avoid scabbling (roughening of concrete surfaces), if possible</li> <li>• Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out</li> </ul>
Trackout	<ul style="list-style-type: none"> <li>• Use water-assisted dust sweeper on access and local roads, if required</li> <li>• Avoid dry sweeping of large areas</li> <li>• Ensure vehicles entering and leaving site are covered to prevent escape of materials</li> <li>• Implement a wheel washing system, if required</li> </ul>

## 5.7 **Step 4 - Determine Significance**

5.7.1 Assuming the relevant mitigation measures outlined in Table 16 are implemented, the residual impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance<sup>16</sup>.

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<sup>16</sup> Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

---

## **6.0 OPERATIONAL PHASE ASSESSMENT**

### **6.1 Potential Development Impacts**

6.1.1 The development has the potential to increase concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site during the operational phase. Impacts have therefore been assessed using the IAQM Stage 1<sup>17</sup> screening criteria detailed in Section 3.3. The proposals include less than 10 residential properties. As such, air quality impacts associated with the scheme are predicted to be **not significant**.

### **6.2 Potential Future Exposure**

6.2.1 The proposed development has the potential to expose future residents to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Appendix 1 to quantify air quality conditions across the site. Reference should be made to Figures 3, 4 and 5 for graphical representations of predicted annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations.

6.2.2 As shown in Figure 3, annual mean NO<sub>2</sub> concentrations were predicted to be below the AQO of 40µg/m<sup>3</sup> across the site. The maximum level at the boundary was 28.48µg/m<sup>3</sup>.

6.2.3 As shown in Figure 4, annual mean PM<sub>10</sub> concentrations were predicted to be below the AQO of 40µg/m<sup>3</sup> across the site. The maximum level at the boundary was 14.62µg/m<sup>3</sup>.

6.2.4 As shown in Figure 5, annual mean PM<sub>2.5</sub> concentrations were predicted to be below the Interim Target of 12µg/m<sup>3</sup> across the site. The maximum level at the boundary was 9.19µg/m<sup>3</sup>.

6.2.5 Based on the assessment results, future residents are not predicted to be exposed to pollutant concentrations above the relevant AQOs and Interim Target. As such, the site is considered suitable for the proposed use from an air quality perspective.

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<sup>17</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

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## 6.3 **Barnsley Air Quality and Emissions Good Practice Guidance**

### **Development Classification**

6.3.1 BMBC has produced the Air Quality and Emissions Good Practice Planning Guidance<sup>18</sup> which includes advice on key considerations when undertaking an air quality assessment. The document also provides a methodology for determining the scale of a development as **minor**, **medium** or **major** and the required air quality mitigation for the relevant banding.

6.3.2 Review of the relevant criteria indicated the proposals are classified as **minor** based on the following:

- Dwelling Houses (C3) under 50 units; and,
- Did not trigger the additional criteria for a major development.

6.3.3 Based on the above, the proposals are required to implement Type 1 mitigation measures. These are summarised in the following Section.

### **Mitigation**

6.3.4 The guidance<sup>19</sup> provides a number of Type 1 mitigation options that should be considered for inclusion within **minor** developments. These were reviewed and the following included in the proposals:

- One Electric Vehicle (EV) charging point per dwelling.

6.3.5 The inclusion of the above measure is considered appropriate in the context of the assessment results and the requirements of the Air Quality and Emissions Good Practice Planning Guidance<sup>20</sup>.

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<sup>18</sup> Barnsley Air Quality and Emissions Good Practice Guidance, BMBC, 2021.

<sup>19</sup> Barnsley Air Quality and Emissions Good Practice Guidance, BMBC, 2021.

<sup>20</sup> Barnsley Air Quality and Emissions Good Practice Guidance, BMBC, 2021.

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## 7.0 CONCLUSION

- 7.1.1 Redmore Environmental Ltd was commissioned by Beecroft & Price Properties & Ecogise Properties Ltd to undertake an Air Quality Assessment in support of a planning application for a residential development at 32 Queens Road, Barnsley.
- 7.1.2 The development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases, as well as expose future residents to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken to determine baseline conditions, assess potential impacts as a result of the scheme and consider location suitability for the proposed end use.
- 7.1.3 During the construction phase of the 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. Site-specific dust control measures were subsequently determined based on the identified risk ratings. Subject to implementation, potential air quality impacts from dust generated by earthworks, construction and trackout activities are predicted to be **not significant**.
- 7.1.4 Potential impacts during the operational phase of the proposed development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. These were assessed against the IAQM<sup>21</sup> screening criteria. This indicated road traffic exhaust impacts were predicted to be **not significant**.
- 7.1.5 The proposal has the potential to expose future residents to elevated pollution levels. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict concentrations as a result of emissions from the highway network. Results were subsequently verified using local monitoring data.
- 7.1.6 The results of the dispersion modelling assessment indicated that predicted annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were below the relevant AQOs and Interim Target across the development. As such, the site is considered suitable for the proposed end use from an air quality perspective and mitigation is not required.

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<sup>21</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

7.1.7 The requirements of the BMBC Air Quality and Emissions Good Practice Planning Guidance<sup>22</sup> were taken into consideration during the undertaking of this assessment. The scale of the development was determined, and the required level of mitigation identified.

7.1.8 Based on the assessment results, air quality factors are not considered a constraint to planning consent for the development.

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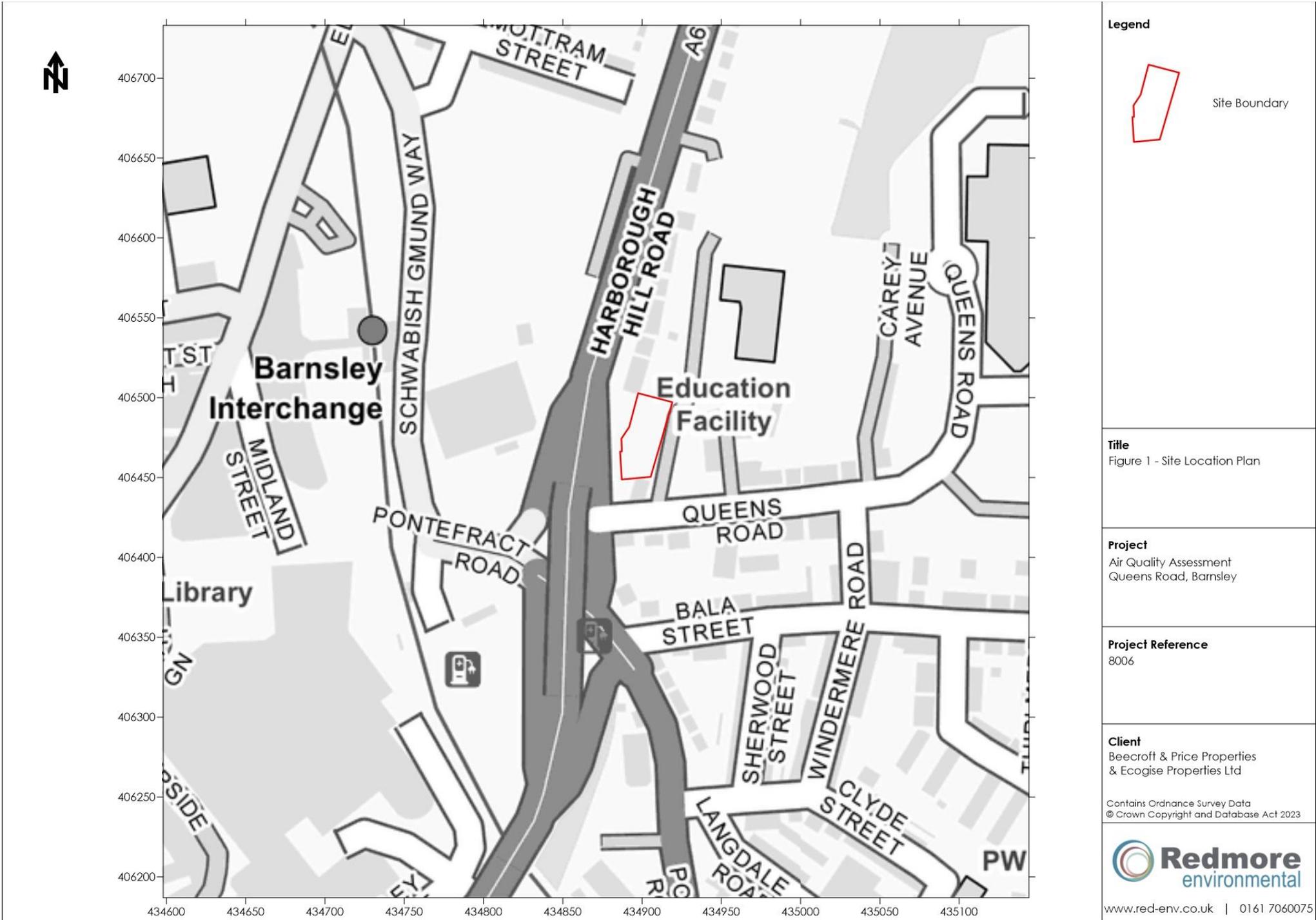
<sup>22</sup> Barnsley Air Quality and Emissions Good Practice Guidance, BMBC, 2021.

## 8.0 ABBREVIATIONS

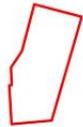
AADT	Annual Average Daily Traffic
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
ASR	Annual Status Report
BMBC	Barnsley Metropolitan Borough Council
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EB	Eastbound
EV	Electric Vehicles
GMCA	Greater Manchester Combined Authority
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NB	Northbound
NGR	National Grid Reference
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
PM <sub>10</sub>	Particulate matter with an aerodynamic diameter of less than 10µm
PM <sub>2.5</sub>	Particulate matter with an aerodynamic diameter of less than 2.5µm
SB	Southbound
SP	Slow Phase
WB	Westbound
z <sub>0</sub>	Roughness length

**Figures**

---



**Legend**



Site Boundary

**Title**

Figure 1 - Site Location Plan

**Project**

Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**

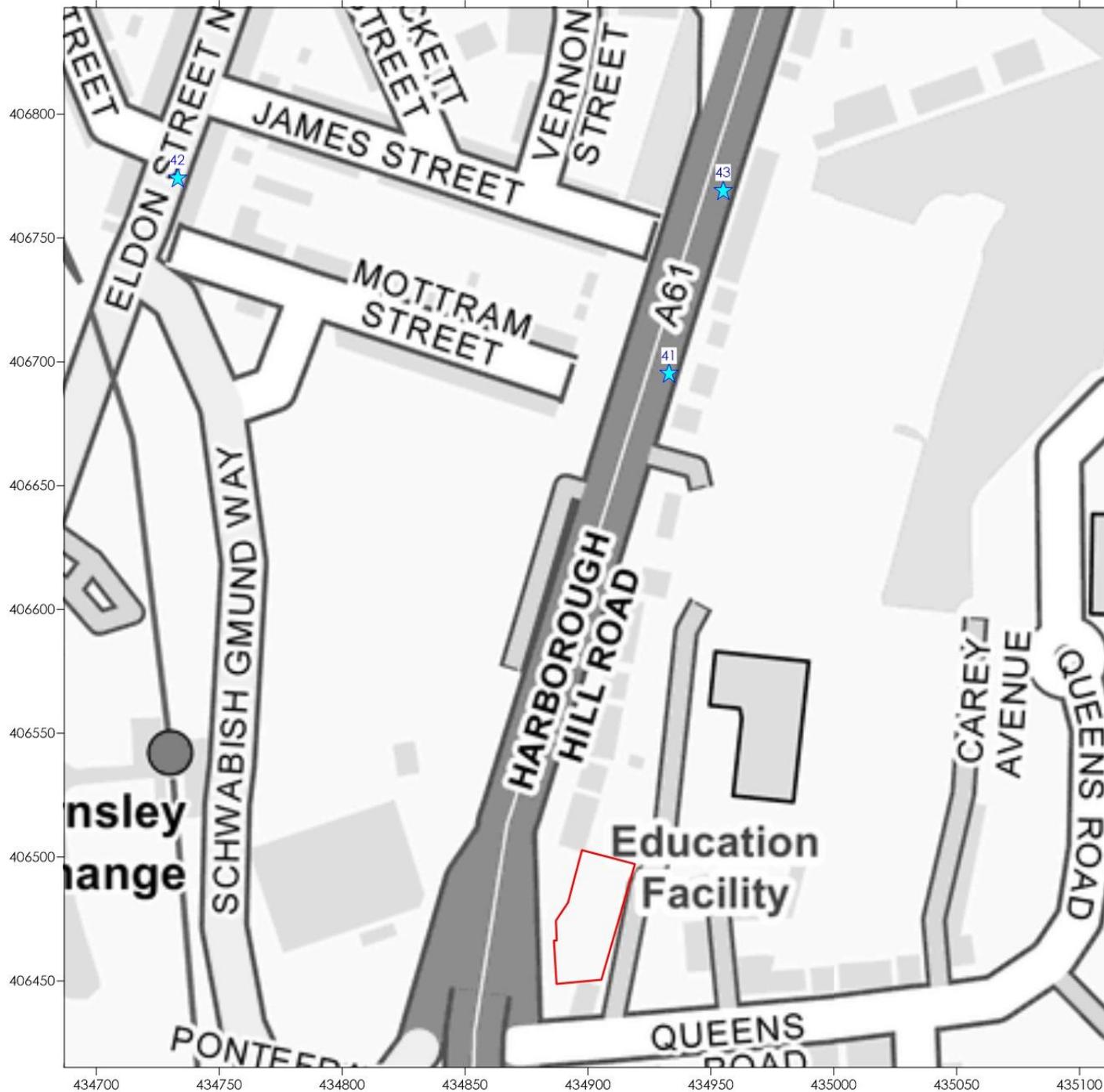
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**Client**

Beecroft & Price Properties  
& Ecogise Properties Ltd

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**Legend**



Site Boundary



Monitor

**Title**

Figure 2 - Monitoring Locations

**Project**

Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**

8006

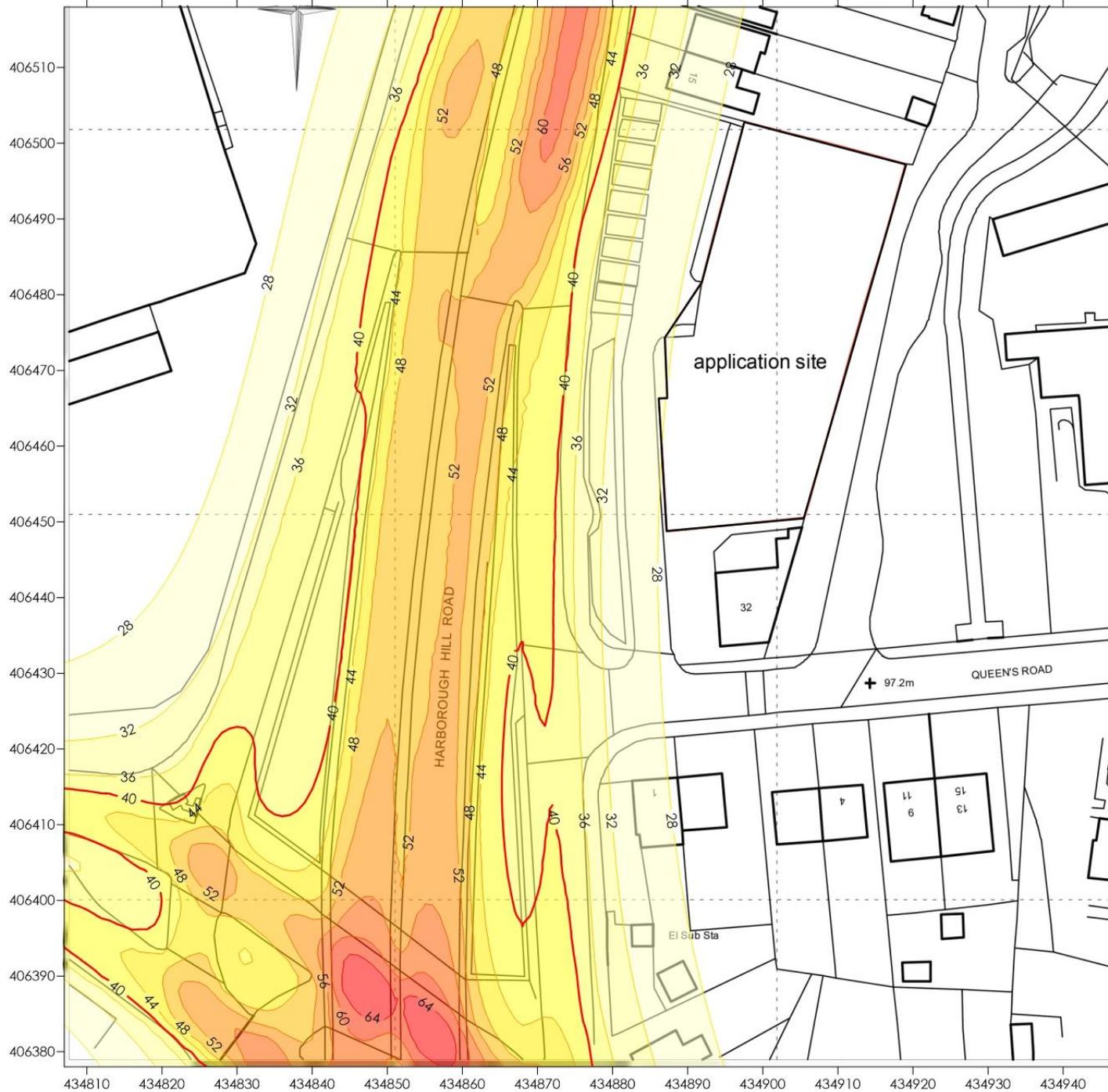
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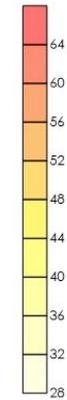
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**Legend**



Site Boundary



Annual Mean  
NO<sub>2</sub>  
Concentration  
(µg/m<sup>3</sup>)

**Title**

Figure 3 - Predicted Annual Mean  
NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)

**Project**

Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**

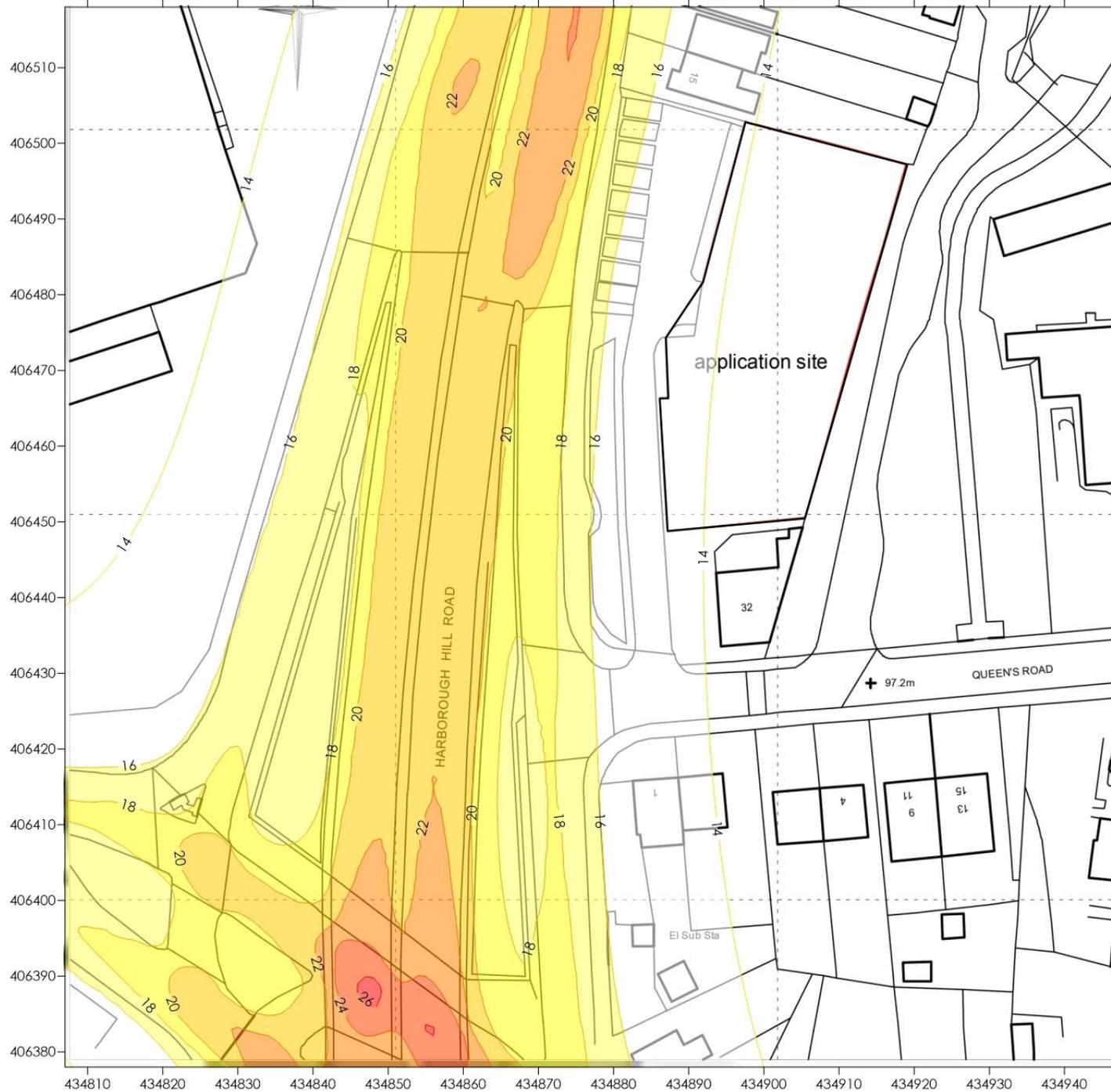
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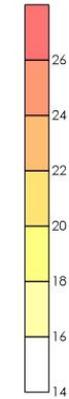




**Legend**



Site Boundary



Annual Mean  
PM<sub>10</sub>  
Concentration  
(µg/m<sup>3</sup>)

**Title**

Figure 4 - Predicted Annual Mean  
PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)

**Project**

Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**

8006

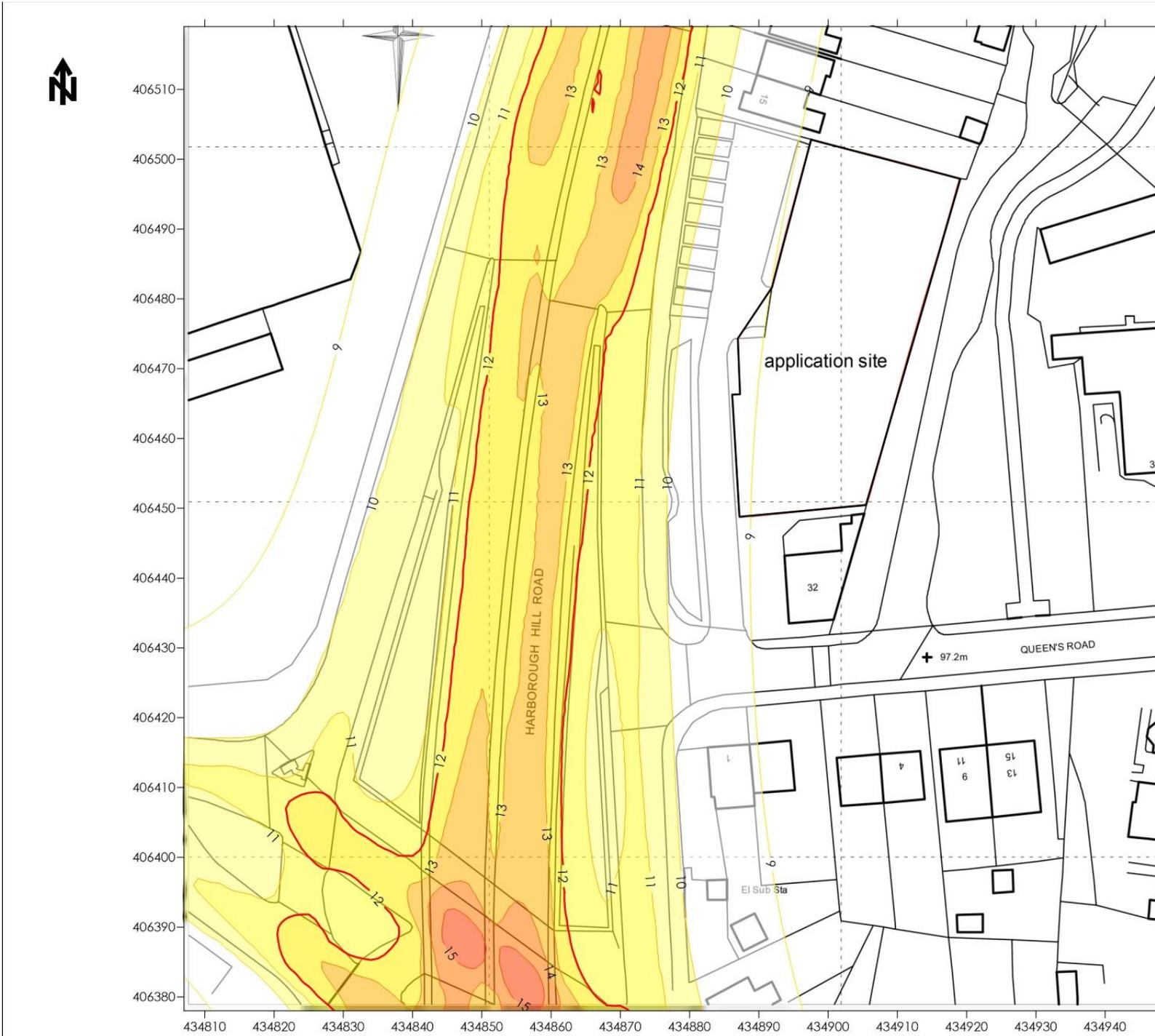
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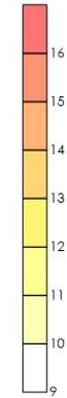
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**Legend**



Site Boundary



Annual Mean  
PM<sub>2.5</sub>  
Concentration  
(µg/m<sup>3</sup>)

**Title**

Figure 5 - Predicted Annual Mean  
PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>)

**Project**

Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**

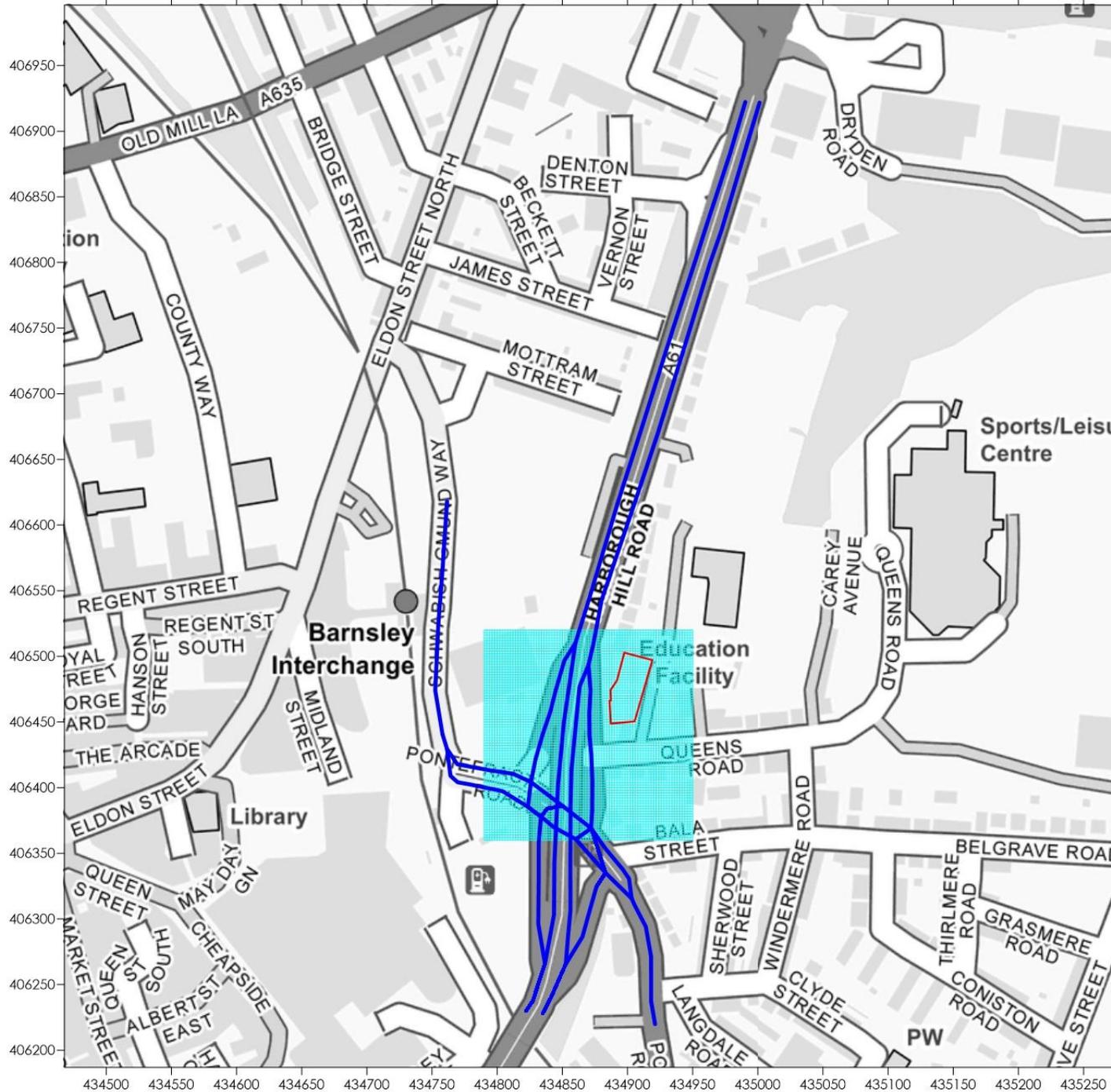
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**Legend**

-  Site Boundary
-  Output Grid
-  Road Link

**Title**

Figure 6 - ADMS-Roads Inputs

**Project**

Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**

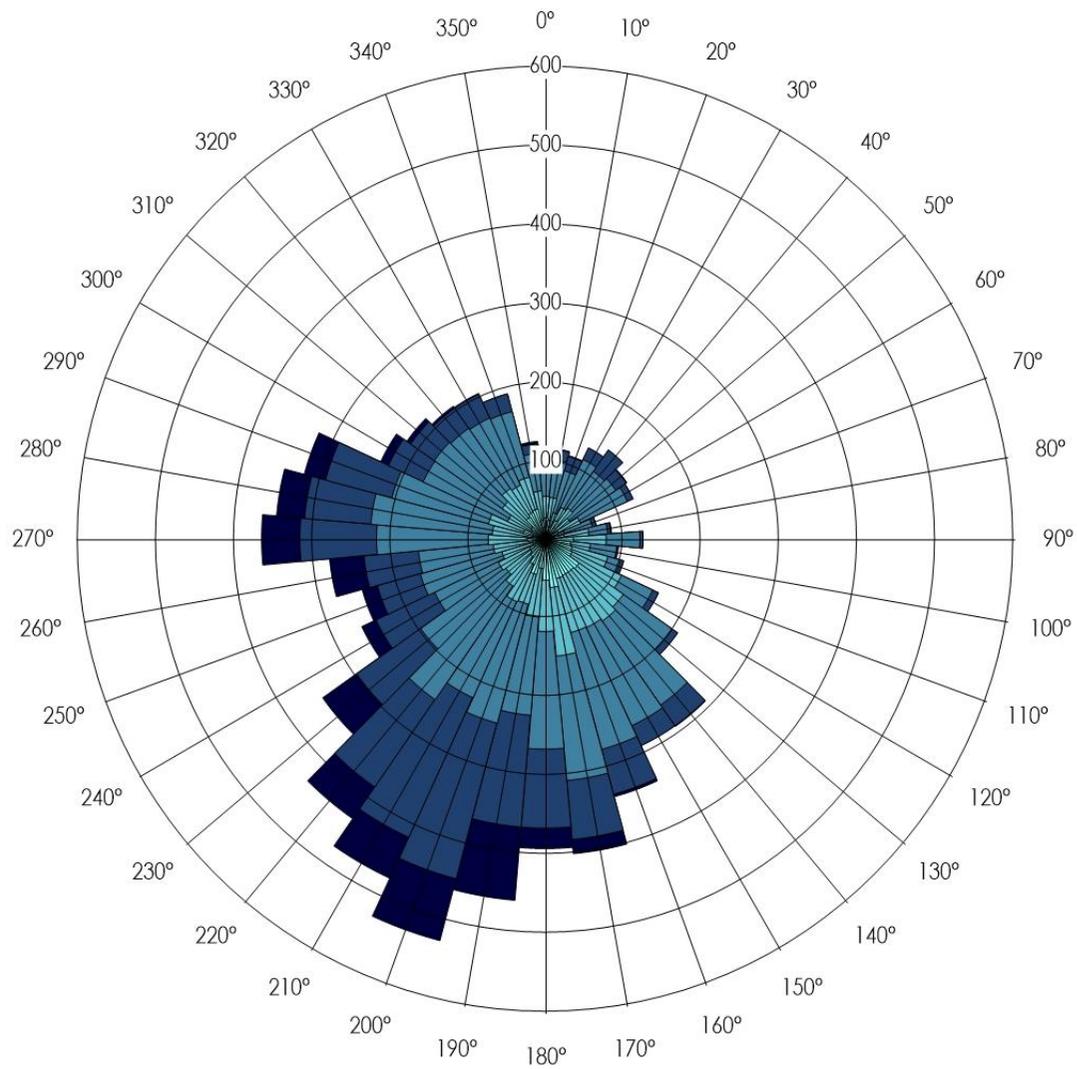
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0 3 6 10 16 (knots)



0 1.5 3.1 5.1 8.2 (m/s)

**Legend**

**Title**  
Figure 7 - Wind Rose of 2022  
Doncaster Sheffield Meteorological  
Data

**Project**  
Air Quality Assessment  
Queens Road, Barnsley

**Project Reference**  
8006

**Client**  
Beecroft & Price Properties  
& Ecogise Properties Ltd



**Appendix 1 - Assessment Input Data**

## **Introduction**

The proposed development has the potential to expose future residents to any existing air quality issues. In order to assess NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations across the site, detailed dispersion modelling was undertaken in accordance with the following methodology.

## **Dispersion Model**

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.1.3). 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 ( $z_0$ ); and,
- Monin-Obukhov length.

The relevant inputs are detailed in the following Sections.

## **Assessment Area**

Ambient concentrations were predicted over the area NGR: 434800, 406380 to 434950, 406520. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package. It should be noted that although the grid only covered the proposed site, road links were extended in order to ensure the impact of all relevant vehicle emissions in the vicinity of the development were considered.

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Reference should be made to Figure 6 for a graphical representation of the assessment grid extents.

### **Traffic Flow Data**

Baseline traffic data for use in the assessment, including 24-hour AADT flows and fleet composition as HDV proportion, was obtained from the Department for Transport (DfT)<sup>23</sup>. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 1999 to 2022. It should be noted that the DfT web tool is referenced in DEFRA guidance<sup>24</sup> as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

The baseline traffic data was converted to the site opening year utilising a factor obtained from TEMPro (version 8.0). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

A summary of the traffic flow data is provided in Table A1.1. Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards.

**Table A1.1 Traffic Data**

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2022	2026			
L1	Harborough Hill Rd Northbound (NB) - South of Pontefract Rd Junction	11,766	12,267	6.01	7.5	65
L2	Harborough Hill Rd NB between junction	8,466	8,827	4.41	7.5	65
L3	Harborough Hill Rd NB - North of Pontefract Rd Junction	10,810	11,271	2.66	7.3	65
L4	Harborough Hill Rd NB Slip Road joining Pontefract Rd	2,942	3,067	6.01	6.1	35
L5	Slip Road between Pontefract Rd Slow Phase (SP)	2,942	3,067	6.01	6.2	25

<sup>23</sup> <https://roadtraffic.dft.gov.uk/#6/55.254/-11.107/basemap-regions-countpoints>.

<sup>24</sup> Local Air Quality Management (TG22) Technical Guidance, DEFRA, 2022.

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Road Width (m)	Avg. Vehicle Speed (km/h)
		2022	2026			
L6	Slip Road joining Harborough Hill Rd from Kendray Street	2,703	2,818	2.66	6.6	40
L7	Schwabisch Gmgund Way	8,481	8,842	5.21	11.1	45
L8	Kendray Street Southbound (SB)	4,002	4,172	5.35	6.2	25
L9	Pontefract Rd - South of Bala Street	8,481	8,842	5.21	9.8	45
L10	Pontefract Rd Northbound SP	4,479	4,670	5.09	7.4	25
L11	Harborough Hill Rd SB - North of Pontefract Rd Junction	11,825	12,329	2.29	7.4	30
L12	Harborough Hill Rd SB between junction	9,321	9,718	3.98	7.8	65
L13	Harborough Hill Rd SB - North of South of Pontefract Rd Junction	13,031	13,586	5.51	6.1	45
L14	Harborough Hill Rd SB Slip Road joining Pontefract Rd	2,956	3,082	2.29	6.2	40
L15	Harborough Hill Rd SB Slip Road joining Pontefract Rd SP	2,956	3,082	2.29	7.4	25
L16	Pontefract Rd Junction joining Harborough Hill Rd SB Slip Road SP	1,478	1,541	1.51	5.9	25
L17	Pontefract Rd joining Harborough Hill Rd SB	1,478	1,541	1.51	7.1	45
L18	Slip Road between Pontefract Road SP	739	771	3.03	9.0	25
L19	Harborough Hill Rd NB Slip Road joining Pontefract Rd SB	1,471	1,533	6.01	6.7	25

Reference should be made to Figure 6 for a graphical representation of the road link locations.

### **Emission Factors**

Emission factors were calculated using the relevant traffic flows and the Emission Factor Toolkit (version 12.0.1). This has been produced by DEFRA and incorporates COPERT 5.6 vehicle emission factors and fleet information.

There is current uncertainty over NO<sub>2</sub> concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside

levels. Therefore, 2022 emission factors were utilised in preference to the scheme opening year in order to provide robust model outputs. As predictions for 2022 were verified, it is considered the results are a robust indication of worst-case concentrations for the future year.

### **Meteorological Data**

Meteorological data used in the assessment was taken from Doncaster Sheffield Airport meteorological station over the period 1<sup>st</sup> January 2022 to 31<sup>st</sup> December 2022 (inclusive). Doncaster Sheffield Airport is located at NGR: 465930, 398920, which is approximately 32.1km south-east of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

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 7 for a wind rose of the utilised meteorological data.

### **Road Gradients**

There are a number of roads within the modelling extents with varying gradients. This causes additional vehicle emissions, particularly from HDVs, due to varied engine load associated with travelling up- and down-hill. Emission factors for links L3 and L11 were therefore adjusted using the relevant function in the EFT.

### **Roughness Length**

The  $z_0$  is a modelling parameter applied to allow consideration of surface height roughness elements. A  $z_0$  of 1m was used to describe the modelling extents. This is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'cities, woodlands'.

A  $z_0$  of 0.2m was used to describe the meteorological site. This is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'agricultural areas (min)'.

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### **Monin-Obukhov Length**

The Monin-Obukhov length provides a measure of the stability of the atmosphere. A minimum Monin-Obukhov length of 30m was used to describe the modelling extents. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

A minimum Monin-Obukhov length of 10m was used to describe the meteorological site. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'small towns <50,000'.

### **Background Concentrations**

Background NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations used in the assessment were obtained from the DEFRA mapping study for the grid square containing the site, as shown in Table 10.

Similarly to emission factors, background concentrations from 2022 were utilised throughout the assessment in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

### **NO<sub>x</sub> to NO<sub>2</sub> Conversion**

Predicted annual mean NO<sub>x</sub> concentrations were converted to NO<sub>2</sub> concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance<sup>25</sup>.

### **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;

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<sup>25</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

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- 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 the assessment model verification was undertaken for 2022 using traffic data, meteorological data and monitoring results from this year.

Monitoring of NO<sub>2</sub> concentrations was undertaken at two locations within the vicinity of roads included in the model during 2022. The results were obtained and the road contributions to total NO<sub>x</sub> concentrations calculated following the methodology contained within DEFRA guidance<sup>26</sup>. The monitored annual mean NO<sub>2</sub> concentrations and calculated road NO<sub>x</sub> concentrations are summarised in Table A1.2.

**Table A1.2 Verification - Monitoring Results**

Monitoring Location		Monitored NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	Calculated Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )
41	49 Harborough Hill Road	49.7	73.73
43	Harborough Hill Road	50.1	74.73

The annual mean road NO<sub>x</sub> concentrations predicted from the dispersion model and the 2022 road NO<sub>x</sub> concentrations calculated from the monitoring results are summarised in Table A1.3.

**Table A1.3 Verification - Modelling Results**

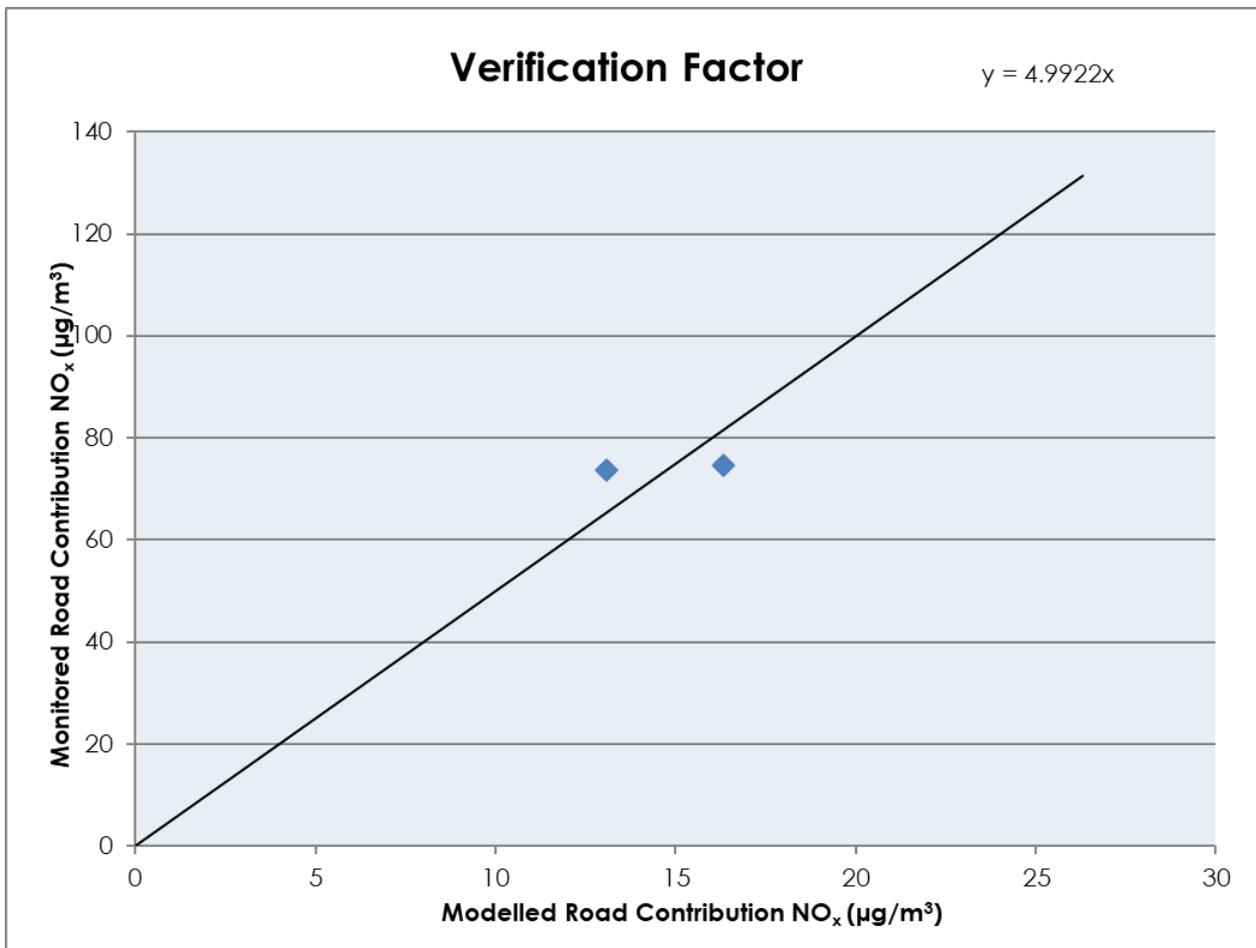
Monitoring Location		Calculated Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )	Modelled Road NO <sub>x</sub> Concentration (µg/m <sup>3</sup> )
41	49 Harborough Hill Road	73.73	13.09
43	Harborough Hill Road	74.73	16.31

The monitored and modelled road NO<sub>x</sub> concentrations were graphed and the equation of the trendline based on linear progression though zero calculated. This indicated that a verification

<sup>26</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

factor of 4.9922 was required to be applied to be applied to all road NO<sub>x</sub> modelling results, as shown in Graph .

**Graph 1 NO<sub>x</sub> Verification Factor**



Monitoring of PM<sub>10</sub> and PM<sub>2.5</sub> concentrations is not undertaken within the assessment extents. The NO<sub>x</sub> verification factor was therefore used to adjust model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance<sup>27</sup>.

<sup>27</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

**Appendix 2 - Curricula Vitae**

### KEY EXPERIENCE:

Jethro is a Chartered Environmentalist and Director of Redmore Environmental with specialist experience in the air quality and odour sectors. His key capabilities include:

- Production and management of Air Quality, Dust and Odour Assessments for a wide-range of clients from the retail, residential, infrastructure, commercial and industrial sectors.
- Production and co-ordination of Environmental Permit applications for a variety of industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads, ADMS-5, AERMOD-PRIME and BREEZE-ROADS. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of Environmental Impact Assessments and scoping reports for developments throughout the UK.
- Provision of expert witness services at Planning Inquiries.
- Design and project management of pollutant monitoring campaigns.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Provision of expert advice to local government and international environmental bodies, as well as involvement in production of industry guidance.

### SELECT PROJECTS SUMMARY:

#### Industrial

Shanks Waste Management - Odour Assessments of two waste management facilities to support Environmental Permit Applications.

Tatweer Petroleum - dispersion modelling of Bahrain oil field.

Doha South Sewage Treatment Works - AQA for works extension in Qatar.

IRIS Environmental Appraisal Report Reviews, Isle of Man Government - odour assessment reviews.

Lankem, Greater Manchester - Environmental Permit Application for chemical manufacturing plant.

Newport Docks Bulk Drying, Pelleting and CHP Facility - air quality EIA for gas CHP.

Springshades, Leicester - Environmental Permit Variation Application for textile manufacturing plant.

Valspar, Chester - Odour Assessment and production of Odour Management Plan for a paint manufacturing plant in response to neighbour complaints.

Agrivert - dispersion modelling of odour and CHP emissions from numerous AD plants.

James Cropper Paper Mill, Cumbria - air quality EIA, Environmental Permit Variation and Human Health Risk Assessment for new biomass boiler adjacent to SSSI.

Rigg Approach, Leyton - Air Quality Assessment in support of waste transfer site.

Lynchford Lane Waste Transfer Station - biomass facility energy recovery plant.

Barnes Wallis Heat and Power, Cobham - biomass facility adjacent to AQMA.

#### Residential

Wood St Mill, Bury - residential development adjacent to scrap metal yard.

Hyams Lane, Holbrook - Odour Assessment to support residential development adjacent to sewage works.

North Wharf Gardens, London - peer review of EIA undertaken in large residential development.

Loxford Road, Alford - Air Quality EIA for residential development, included consideration of impacts from associated package sewage works

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre.

Castleford Growth Delivery Plan - baseline air quality constraints assessment for town redevelopment.

York St, Bury - residential development adjacent to AQMA.

Temple Point Leeds - residential development adjacent to M1.

#### Commercial and Retail

Etihad Stadium - Air Quality EIA for the extension to the capacity of the Etihad Stadium, Manchester.

Wakefield College - redevelopment of city centre campus in AQMA.

Manchester Airport Cargo Shed - commercial development.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

National Youth Theatre, Islington - redevelopment to provide new arts space and accommodation.

### KEY EXPERIENCE:

Olly is a Principal Environmental Consultant with specialist experience in the air quality sector. His key capabilities include:

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads and ADMS-6. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of Environmental Impact Assessments (EIAs) and scoping reports for developments throughout the UK.
- Advanced canyon modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Assessment of fugitive dust impacts from a range of development sizes and mineral extraction sites.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.
- Organisation and delivery of bespoke monitoring programmes for a range of projects.

### SELECT PROJECTS SUMMARY:

#### **Medlock Street, Manchester**

Air Quality Environmental Impact Assessment in support of the development of 1,014 purpose-built student accommodation units. Detailed dispersion modelling was undertaken in order to assess the potential for exposure of future occupants to any existing issues at the site, as well as air quality impacts associated with vehicles travelling to and from the scheme during operation. Modelling included complex road geometries, as well as advanced canyon inputs. The results indicated air quality conditions did not present an issue to planning consent.

#### **Anstey Lane, Leicester**

Odour Assessment in support of a residential-led development on land off Anstey Lane, Leicester. The proposals were located in close proximity to a number of eating and drinking establishments. As such, the Local Authority raised concerns that odour emissions may cause loss of amenity to future residents. A programme of Field Odour Surveys was undertaken to assess odour impacts from said premises. Results indicated odour effects at the site did not represent a constraint to planning consent.

#### **Whitings Road, Barnet**

Air Quality Neutral Assessment in support of a residential development comprising 35 units to determine compliance with the London Plan. Detailed consultation was undertaken with the Local Authority to ensure they were satisfied with the proposed measures aimed at reducing road vehicle exhaust emissions associated with the scheme. Following discussions and implementation of the identified strategies, compliance with the London Plan was achieved.

#### **Honeycombe Beach, Bournemouth**

Air Quality Assessment to determine air quality conditions within a covered car park serving a residential complex and evaluate the effectiveness of the existing ventilation system. Monitoring of pollutant concentrations over a three-month period at four locations at the site was undertaken. Internal concentrations of pollutants were below the relevant Work Exposure Limits (WELs) at all locations. As such, natural ventilation was considered to provide adequate control of internal air quality.

#### **Brill Place, Camden**

Organisation and delivery of a bespoke ambient monitoring programme to address a planning condition. The project included identification of appropriate monitoring equipment, agreement of the technical specifications and sampling positions with the Local Authority, as well as delivery of a text alert system to notify residents of exceedences of the relevant trigger levels and appropriate action to be taken to reduce exposure.

#### **Matching Airport, Abbeystead**

Air Quality Assessment in support of a flexible generation facility. Dispersion modelling was undertaken to determine potential changes in pollution levels as a result of emissions from the installation and consider potential impacts at nearby sensitive receptor locations. Predicted concentrations of NO<sub>2</sub> were below the relevant air quality criteria at all locations of relevant exposure across all meteorological data sets modelled. The overall effects of the development were predicted to be not significant.

#### KEY EXPERIENCE:

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

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle exhaust emissions using ADMS-Roads. Studies have included assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality
- Assessment of construction dust impacts from a range of development sizes
- Measurement and assessment of indoor air quality in support of BREEAM accreditation. He has conducted Total Volatile Organic Compound (TVOC) and formaldehyde monitoring at numerous commercial developments throughout the UK in pursuit of the relevant credit specified under BREEAM category Hea 02 'Indoor Air Quality'.
- Periodic bioaerosol monitoring campaigns for permitted waste facilities in support of permit compliance.

#### SELECT PROJECTS SUMMARY:

##### **Wellington Road North, Stockport**

Air Quality Assessment in support of a mixed-use development located within an Air Quality Management Area (AQMA). The development had the potential to expose future residents to elevated pollution levels and cause impacts at sensitive locations. Detailed dispersion modelling and construction dust assessment indicated air quality factors were not a constraint to the development.

##### **Lindridge Road, Sutton Coldfield**

Air Quality Assessment in support of a 76-bed, three-storey care home located in within an AQMA. The development had the potential to expose future residents to elevated pollution concentrations and cause impacts at sensitive locations. Detailed dispersion modelling was undertaken using ADMS-roads to assess pollutant concentrations across the development and a comparison was made between overall concentrations with and without the development in place. Results indicated pollutant concentrations were below the relevant standards across the site and impacts associated with the development were not significant.

##### **Mount Road, Gorton**

Air Quality Assessment in support of a full planning application proposing the erection of a youth, sports and community hub, an apartment building consisting of 36 apartments and 267 dwellinghouse located within an AQMA. Using sensitive receptors, located in areas where increased road traffic may affect NO<sub>2</sub> concentrations, a

comparison was made between overall concentrations with and without the development in place. Results revealed pollutant concentrations were below the relevant standards across the site and impacts associated with the development were not significant.

##### **Bolton Road, Bradford**

Air Quality Assessment in support of a residential development on land off Bolton Road, Bradford. The development had the potential to expose future occupants to elevated pollution levels due to its proximity to the A6307. Dispersion modelling was undertaken in order to predict pollutant concentration across the proposed development site as a result of emission from the highway network. This indicated the predicted concentrations were below the relevant standards across the site.

##### **Premdor Ltd, Darton**

Air Quality Assessment in support of an extension to a manufacturing facility in Darton. The development had the potential to cause air quality impacts at sensitive locations due to its proximity to a nearby AQMA and the M1. Dispersion modelling was undertaken using ADMS-Roads to predict pollutant concentrations at the sensitive locations as a result of emissions from the highway network both with and without the development in place. Results indicated that the pollutant concentrations as a result of traffic generated by the development were predicted to be negligible at all sensitive receptor locations.