

**Air Quality Assessment**  
**Land off A629, Birdsedge**

**Client: Yorkshire Land Limited**

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## **Executive Summary**

Redmore Environmental Ltd was commissioned by Yorkshire Land Limited to undertake an Air Quality Assessment in support of an outline planning application for a residential development on land off A629, Birdsedge (the site).

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; and,
- Identify any requirement for relevant 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 development. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

Review of the dispersion modelling results indicated that air quality impacts as a result of traffic generated by the development were not predicted to be significant at any sensitive location in the vicinity of the site.

A number of mitigation measures were identified in line with the requirements of the West Yorkshire Air Quality and Emissions: Technical Planning Guidance in order to reduce vehicle exhaust emissions associated with the proposals. It is considered these are appropriate for a development of this scale and nature and will further control impacts during the operational phase.

Based on the assessment results, air quality factors are not considered a constraint to the

development.

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## **1.0 INTRODUCTION**

### **1.1 Instruction**

1.1.1 Redmore Environmental Ltd was commissioned by Yorkshire Land Limited to undertake an Air Quality Assessment in support of a planning application for a residential development on land off A629, Birdsedge.

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

1.2.1 The site is located on land off A629, Birdsedge, at approximate National Grid Reference (NGR): 420340, 407830. The relevant Local Authority (LA) is Kirklees Council (KC). Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise an outline application for residential development including associated infrastructure works. All matters reserved except means of access into (but not within) the site from Penistone Road.

### **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; and,
- Identify the requirement for relevant 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 were also 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 2025<sup>2</sup> was published in December 2025, providing long term and Interim Targets in order to reduce population exposure to PM<sub>2.5</sub>. The Concentration Target for 2040 was 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 2025, DEFRA, 2025.

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

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

Pollutant	Air Quality Objective/ Interim Target/ Concentration 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>	10 <sup>(a)</sup>	Annual mean
	10 <sup>(b)</sup>	Annual mean

Note: (a) Interim Target to be achieved by 2030.

(b) Concentration Target to be achieved by 2040.

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

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

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
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 and 8-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

## 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 2024 and amended in February 2025. The document 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 achievement 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, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of

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<sup>4</sup> NPPF, Ministry of Housing, Communities and Local Government, 2024.

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 [...]."

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 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 considerations be relevant to the development management process?
6. What specific issues may need to be considered when assessing air quality impacts?

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

7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?

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 Kirklees Local Plan<sup>6</sup> (KLP) was adopted by KC on 27<sup>th</sup> February 2019. A review of the document indicated the following policies in relation to air quality which are relevant to this assessment:

"Policy LP47 - Healthy, active and safe lifestyles

The council will, with its partners, create an environment which supports healthy, active and safe communities and reduces inequality.

Healthy, active and safe lifestyles will be enabled by:

[...]

g. ensuring that the current air quality in the district is monitored and maintained and, where required, appropriate mitigation measures included as part of new development proposals; [...]"

"Policy LP51 - Protection and improvement of local air quality

1. Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air pollution which would unacceptably affect or cause a nuisance to the national or build environment or to people.

2. Proposals that have the potential to increase local air pollution either individually or cumulatively must be accompanied by evidence to show that the impact of the development has been assessed in accordance with the relevant

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<sup>6</sup> KLP, KC, 2019.

guidance. Development which has the potential to cause levels of local air pollution to increase to unsafe levels must incorporate sustainable mitigation measures that reduce this impact to a safe level. If sustainable measures cannot be introduced the development will not be permitted.

3. Where the development introduces new receptors into Air Quality Management Areas or Areas of Concern or near other areas of relatively poor air quality, for example near roads or junctions, the development must incorporate sustainable mitigation measures that protect the new receptors from unacceptable levels of air pollution. Where sustainable mitigation measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted."

"Policy LP52 - Protection and improvement of environmental quality

Proposals which have the potential to increase pollution from noise, vibration, light, dust, odour, shadow flicker, chemicals and other forms of pollution or increase pollution to soil or where environmentally sensitive development would be subject to significant levels of pollution, must be accompanied by evidence to show that the impacts have been evaluated and measures have been incorporated to prevent or reduce the pollution, so as to ensure it does not reduce the quality of life and well-being of people to an unacceptable level or have unacceptable impacts on the environment.

Such developments which cannot incorporate suitable and sustainable mitigation measures which reduce pollution levels to an acceptable level to protect the quality of life and well-being of people or protect the environment will not be permitted.

Where possible, all new development should improve the existing environment."

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

## **2.7 West Yorkshire Technical Planning Guidance**

2.7.1 The West Yorkshire LAs have produced the Air Quality and Emissions: Technical Planning Guidance<sup>7</sup> as part of an overarching Low Emission Strategy (LES) to reduce road transport emissions in the county. It is aimed at helping LAs deliver AQO compliance through cost effective service planning brought about by the joint working group and relevant Local Plan policies and was taken into consideration throughout the undertaking of this assessment.

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<sup>7</sup> Air Quality and Emissions: Technical Planning Guidance, West Yorkshire Low Emissions Group, 2014.

### **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. These factors 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 during 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 shown in Table 4.

**Table 4 Construction Dust - Sensitivities of Human 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

### **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**

3.3.1 The development has the potential to affect air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. Potential impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2024 - Verification;
- Assessment year Do-Minimum (DM) (predicted traffic flows in 2031 should the proposals not proceed); and,
- Assessment year Do-Something (DS) (predicted traffic flows in 2031 should the proposals be completed).

3.3.2 Reference should be made to Appendix 1 for assessment input data and details of the

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

verification process.

3.3.3 Locations sensitive to potential changes in off-site pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided by National Highways<sup>10</sup> on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance<sup>11</sup> on where the AQOs apply, as summarised in Table 2, was utilised to determine worst-case receptor positions in the vicinity of links likely to be affected by changes in traffic flows as a result of the development.

3.3.4 The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'<sup>12</sup>. Using this methodology impacts were defined based on the interaction between the predicted pollutant concentration from the DS scenario and the magnitude of change between the DM and DS scenarios, as outlined in Table 9.

**Table 9 Significance of Operational Phase Road Vehicle Exhaust Emission Impacts**

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO/ Concentration Target (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO/ Concentration Target	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO/ Concentration Target	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO/ Concentration Target	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO/ Concentration Target	Moderate	Moderate	Substantial	Substantial
110% or more of AQO/ Concentration Target	Moderate	Substantial	Substantial	Substantial

3.3.5 The matrix shown in Table 9 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell the impact falls within. It should be noted that changes of 0%, i.e. less than 0.5%, are described as **negligible**.

<sup>10</sup> LA 105: Air Quality, National Highways, 2024.

<sup>11</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

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

3.3.6 Following the prediction of impacts at discrete receptor locations, the IAQM document<sup>13</sup> provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts; and,
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

3.3.7 The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. Where the overall effect is **moderate** or **substantial**, the effect is likely to be considered **significant**, whilst if the impact is **slight** or **negligible**, the impact is likely to be considered **not significant**. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

3.3.8 The determination of significance relies on professional judgement and reasoning has been provided as far as practicable. The IAQM guidance<sup>14</sup> suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

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<sup>13</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

<sup>14</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

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## **4.0 BASELINE**

### **4.1 Introduction**

4.1.1 Existing air quality conditions in the vicinity of the proposed development site were identified in order 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), KC has undertaken Review and Assessment of air quality within its area of jurisdiction. This process has indicated that annual mean concentrations of NO<sub>2</sub> and daily mean PM<sub>10</sub> are above the relevant AQOs within the borough. As such, ten AQMAs have been declared. The closest of these to the site is described as follows:

"AQMA 9 Huddersfield Town Centre: The designated area incorporates roads bordering and within the Huddersfield Ring Road"

4.2.2 The AQMA is located approximately 10.1km north-west of the development. It is considered unlikely the proposals would cause air quality impacts over a distance of this magnitude. As such, the designation has not been considered further in the context of the assessment.

4.2.3 KC has concluded that concentrations of all other pollutants considered within the AQMs 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 levels is undertaken by KC throughout its area of jurisdiction. A review of the survey locations indicated that the closest position is situated approximately 6.0km west of the site. It is considered unlikely that pollution levels would be comparable over a distance of this magnitude. As such, this source of data was not considered further within the baseline.

4.3.2 It should be noted that in order to validate the air quality modelling results, monitoring results were considered within the assessment as outlined in Appendix 1.

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

4.4.1 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 in grid square NGR: 420500, 407500. Data for this location was downloaded from the DEFRA website<sup>15</sup> for the purpose of the assessment and is summarised in Table 10.

**Table 10 Background Pollutant Concentration Predictions**

Pollutant	Predicted Background Pollutant Concentration ( $\mu\text{g}/\text{m}^3$ )		
	2024	2026	2031
NO <sub>2</sub>	5.85	5.53	4.71
PM <sub>10</sub>	10.00	9.86	9.56
PM <sub>2.5</sub>	5.80	5.68	5.40

4.4.2 As shown in Table 10, predicted background concentrations are below the relevant AQOs and Concentration Target at the 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. These have been defined for dust and road vehicle exhaust emission impacts in the following Sections.

##### **Construction Phase Sensitive Receptors**

4.5.2 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 development boundary. These are summarised in Table 11.

<sup>15</sup> <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021>.

**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	More than 100	0
Up to 100	More than 100	-
Up to 250	More than 100	-

4.5.3 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 to 100	0
Up to 50	More than 100	0

4.5.4 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.

4.5.5 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 Birdsedge First School.

### Operational Phase Sensitive Receptors

4.5.6 Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study. These are summarised in Table 13.

**Table 13 Operational Phase Road Vehicle Exhaust Emission Sensitive Receptor Locations**

Receptor		NGR (m)	
		X	Y
R1	Residential - Penistone Road	420308.4	407757.0
R2	Residential - Penistone Road	420558.3	407557.0
R3	Residential - Penistone Road	420191.6	407853.2
R4	Birdsedge First School	420194.9	407817.3
R5	Residential - Penistone Road	419984.3	408153.7
R6	Residential - Penistone Road	419823.8	408551.5
R7	Residential - Lane Head Road	419569.8	408698.5
R8	Residential - Holmfirth Road	419482.6	408761.8
R9	Residential - Lane Head Road	419517.4	408783.9
R10	Residential - Barnsley Road	420252.6	408833.7
R11	Residential - Barnsley Road	420620.0	408811.0

4.5.7 Reference should be made to Figure 2 for a map of road vehicle exhaust emission sensitive receptor locations.

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## **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, groundworks, cutting, concrete batching, construction and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements both on-site and on the local road network also have the potential to result in the re-suspension of dust from haul roads and 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 between 18,000m<sup>2</sup> and 110,000m<sup>2</sup>. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **medium**.

#### **Construction**

5.3.2 Due to the size of the development, the total building volume is estimated to be between 12,000m<sup>3</sup> and 75,000m<sup>3</sup>. In accordance with the criteria outlined in Table 3, the

magnitude of potential dust emissions from construction is therefore **medium**.

### **Trackout**

5.3.3 Based on the site area, it is anticipated that the unpaved road length may be greater than 100m during certain stages of construction. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **large**.

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

### **Dust Soiling**

5.4.1 Table 11 shows that there are between 10 and 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 between 10 and 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 highest annual mean PM<sub>10</sub> background concentration at the site is 9.86µg/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 and 100 **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 more between 10 and 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 14.

**Table 14 Summary of Potential Unmitigated Dust Risks**

Potential Impact	Activity	Step 2A - Dust Emission Magnitude	Step 2B - Sensitivity of the Area	Step 2C - Risk
Dust Soiling	Earthworks	Medium	High	Medium
	Construction	Medium	High	Medium
	Trackout	Large	High	High
Human Health	Earthworks	Medium	Low	Low
	Construction	Medium	Low	Low
	Trackout	Large	Low	Low

5.5.3 As indicated in Table 14, the potential risk of dust soiling impacts is **high** from trackout and **medium** from earthworks and construction. The potential risk of human health impacts is **low** from all activities.

5.5.4 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>16</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 15. These may be reviewed prior to the

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

commencement of construction works and incorporated into a Construction Environmental Management Plan or similar if required by the LA.

**Table 15 Fugitive Dust Emission Mitigation Measures**

Issue	Control Measure
Communications	<ul style="list-style-type: none"> <li>• Develop and implement a stakeholder communications plan that includes community engagement before work commences on site</li> <li>• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary</li> <li>• Display the head or regional office contact information</li> <li>• Develop and implement a Dust Management Plan, which may include measures to control other emissions, approved by the LA</li> </ul>
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> <li>• Hold regular liaison meetings with other high risk construction sites within 250m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes</li> </ul>
Monitoring	<ul style="list-style-type: none"> <li>• Undertake daily on-site and off-site inspection to monitor dust, record inspection results, and make the log available to the LA upon request</li> <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</li> <li>• Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive period</li> <li>• Avoid site runoff of water or mud</li> <li>• Keep site fencing, barriers and scaffolding clean using wet methods</li> <li>• Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used</li> <li>• Cover, seed or fence stockpiles to prevent wind whipping</li> </ul>

Issue	Control Measure
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> <li>• Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials</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> <li>• Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Avoid bonfires or burning of waste materials</li> </ul>
Earthworks	<ul style="list-style-type: none"> <li>• Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable</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(s) on the access and local roads, to remove, as necessary, any material tracked out of the site</li> <li>• Avoid dry sweeping of large areas</li> <li>• Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport</li> <li>• Implement a wheel washing system, if required</li> <li>• Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits</li> </ul>

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

5.7.1 Assuming the relevant mitigation measures outlined in Table 15 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance<sup>17</sup>.

<sup>17</sup> Guidance on the Assessment of Dust from Demolition and Construction V2.2, IAQM, 2024.

## **6.0 OPERATIONAL PHASE ASSESSMENT**

### **6.1 Introduction**

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. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

6.1.2 The assessment considered the following scenarios:

- 2024 - Verification;
- 2031 - DM; and,
- 2031 - DS.

6.1.3 The DM scenario (i.e. without development) included baseline traffic data, inclusive of anticipated growth, for the relevant assessment year. The DS scenario (i.e. with development) included baseline traffic data, inclusive of anticipated growth, in addition to predicted vehicle trips associated with the operation of the proposals.

6.1.4 For the purpose of the assessment traffic data for 2031 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emissions factors and background concentrations for 2024 were utilised within the dispersion model. The use of 2031 traffic data and 2024 emission factors is considered to provide a robust scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

6.1.5 Reference should be made to Appendix 1 for full assessment input details.

### **6.2 Potential Development Impacts**

#### **Predicted Concentrations**

6.2.1 Annual mean NO<sub>2</sub> concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 16.

**Table 16 Predicted Annual Mean NO<sub>2</sub> Concentrations**

Receptor		Predicted Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R1	Residential - Penistone Road	9.36	9.39	0.03
R2	Residential - Penistone Road	8.84	8.85	0.01
R3	Residential - Penistone Road	9.06	9.26	0.20
R4	Birdsedge First School	7.13	7.19	0.06
R5	Residential - Penistone Road	9.11	9.31	0.20
R6	Residential - Penistone Road	8.96	9.14	0.18
R7	Residential - Lane Head Road	10.19	10.35	0.16
R8	Residential - Holmfirth Road	11.18	11.23	0.05
R9	Residential - Lane Head Road	11.98	12.12	0.14
R10	Residential - Barnsley Road	9.51	9.63	0.12
R11	Residential - Barnsley Road	8.50	8.58	0.08

6.2.2 As indicated in Table 16, predicted annual mean NO<sub>2</sub> concentrations were below the AQO of 40µg/m<sup>3</sup> at all sensitive receptors in both scenarios.

6.2.3 Reference should be made to Figures 3 and 4 for graphical representations of annual mean NO<sub>2</sub> concentrations across the assessment area for the DM and DS scenarios, respectively.

6.2.4 Annual mean PM<sub>10</sub> concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 17.

**Table 17 Predicted Annual Mean PM<sub>10</sub> Concentrations**

Receptor		Predicted Annual Mean PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R1	Residential - Penistone Road	11.13	11.14	0.01
R2	Residential - Penistone Road	10.92	10.92	0.01

Receptor		Predicted Annual Mean PM <sub>10</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R3	Residential - Penistone Road	11.02	11.08	0.07
R4	Birdsedge First School	10.38	10.40	0.02
R5	Residential - Penistone Road	10.88	10.94	0.06
R6	Residential - Penistone Road	10.84	10.89	0.05
R7	Residential - Lane Head Road	11.25	11.30	0.05
R8	Residential - Holmfirth Road	11.64	11.66	0.01
R9	Residential - Lane Head Road	11.92	11.96	0.04
R10	Residential - Barnsley Road	10.68	10.70	0.02
R11	Residential - Barnsley Road	10.71	10.73	0.02

6.2.5 As indicated in Table 17, predicted annual mean PM<sub>10</sub> concentrations were below the AQO of 40µg/m<sup>3</sup> at all sensitive receptors in both scenarios.

6.2.6 Reference should be made to Figures 5 and 6 for graphical representations of annual mean PM<sub>10</sub> concentrations across the assessment area for the DM and DS scenarios, respectively.

6.2.7 Annual mean PM<sub>2.5</sub> concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 18.

**Table 18 Predicted Annual Mean PM<sub>2.5</sub> Concentrations**

Receptor		Predicted Annual Mean PM <sub>2.5</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R1	Residential - Penistone Road	6.50	6.51	0.01
R2	Residential - Penistone Road	6.39	6.39	0.00
R3	Residential - Penistone Road	6.44	6.48	0.03
R4	Birdsedge First School	6.10	6.11	0.01
R5	Residential - Penistone Road	6.39	6.43	0.03

Receptor		Predicted Annual Mean PM <sub>2.5</sub> Concentration (µg/m <sup>3</sup> )		
		DM	DS	Change
R6	Residential - Penistone Road	6.37	6.40	0.03
R7	Residential - Lane Head Road	6.58	6.60	0.03
R8	Residential - Holmfirth Road	6.78	6.79	0.01
R9	Residential - Lane Head Road	6.93	6.95	0.02
R10	Residential - Barnsley Road	6.31	6.32	0.01
R11	Residential - Barnsley Road	6.29	6.31	0.01

6.2.8 As indicated in Table 18, predicted annual mean PM<sub>2.5</sub> concentrations were below the Concentration Target of 10µg/m<sup>3</sup> at all sensitive receptors in both scenarios.

6.2.9 Reference should be made to Figures 6 and 7 for graphical representations of annual mean PM<sub>2.5</sub> concentrations across the assessment area for the DM and DS scenarios, respectively.

### Predicted Impacts

6.2.10 Predicted impacts on annual mean NO<sub>2</sub> concentrations at the sensitive receptor locations are summarised in Table 19.

**Table 19 Predicted Impacts - NO<sub>2</sub>**

Receptor		Predicted Annual Mean NO <sub>2</sub> Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R2	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R3	Residential - Penistone Road	Below 75% of AQO	1	Negligible
R4	Birdsedge First School	Below 75% of AQO	0	Negligible
R5	Residential - Penistone Road	Below 75% of AQO	1	Negligible
R6	Residential - Penistone Road	Below 75% of AQO	1	Negligible

Receptor		Predicted Annual Mean NO <sub>2</sub> Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R7	Residential - Lane Head Road	Below 75% of AQO	0	Negligible
R8	Residential - Holmfirth Road	Below 75% of AQO	0	Negligible
R9	Residential - Lane Head Road	Below 75% of AQO	0	Negligible
R10	Residential - Barnsley Road	Below 75% of AQO	0	Negligible
R11	Residential - Barnsley Road	Below 75% of AQO	0	Negligible

6.2.11 As indicated in Table 19, impacts on annual mean NO<sub>2</sub> concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

6.2.12 Predicted impacts on annual mean PM<sub>10</sub> concentrations at the sensitive receptor locations are summarised in Table 20.

**Table 20 Predicted Impacts - PM<sub>10</sub>**

Receptor		Predicted Annual Mean PM <sub>10</sub> Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R2	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R3	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R4	Birdsedge First School	Below 75% of AQO	0	Negligible
R5	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R6	Residential - Penistone Road	Below 75% of AQO	0	Negligible
R7	Residential - Lane Head Road	Below 75% of AQO	0	Negligible
R8	Residential - Holmfirth Road	Below 75% of AQO	0	Negligible
R9	Residential - Lane Head Road	Below 75% of AQO	0	Negligible
R10	Residential - Barnsley Road	Below 75% of AQO	0	Negligible
R11	Residential - Barnsley Road	Below 75% of AQO	0	Negligible

6.2.13 As indicated in Table 20, impacts on annual mean PM<sub>10</sub> concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

6.2.14 Predicted impacts on annual mean PM<sub>2.5</sub> concentrations at the sensitive receptor locations are summarised in Table 21.

**Table 21 Predicted Impacts - PM<sub>2.5</sub>**

Receptor		Predicted Annual Mean PM <sub>2.5</sub> Concentration	Predicted Conc. Change as Proportion of Concentration Target (%)	Impact Significance
R1	Residential - Penistone Road	Below 75% of Concentration Target	0	Negligible
R2	Residential - Penistone Road	Below 75% of Concentration Target	0	Negligible
R3	Residential - Penistone Road	Below 75% of Concentration Target	0	Negligible
R4	Birdsedge First School	Below 75% of Concentration Target	0	Negligible
R5	Residential - Penistone Road	Below 75% of Concentration Target	0	Negligible
R6	Residential - Penistone Road	Below 75% of Concentration Target	0	Negligible
R7	Residential - Lane Head Road	Below 75% of Concentration Target	0	Negligible
R8	Residential - Holmfirth Road	Below 75% of Concentration Target	0	Negligible
R9	Residential - Lane Head Road	Below 75% of Concentration Target	0	Negligible
R10	Residential - Barnsley Road	Below 75% of Concentration Target	0	Negligible
R11	Residential - Barnsley Road	Below 75% of Concentration Target	0	Negligible

6.2.15 As indicated in Table 21, impacts on annual mean PM<sub>2.5</sub> concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

### 6.3 Overall Impact Significance

6.3.1 The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations and the considerations outlined previously. Further justification is provided in Table 22.

**Table 22 Overall Impact Significance of Road Vehicle Exhaust Emission Impacts**

Guidance	Comment
The existing and future air quality in the absence of the development	<p>Predicted annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were below the relevant AQOs and Concentration Target at all locations in the DM and DS scenarios</p> <p>It is considered unlikely that future air quality conditions will change significantly in the absence of the development given the relatively established nature of the area</p>
The extent of current and future population exposure to the impacts	The development is not predicted to affect the population exposed to exceedences of the AQOs or Concentration Target
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	<p>It was assumed that vehicle exhaust emission rates and background concentrations will not reduce in future years. This provides conservative results when compared with DEFRA and National Highways methodologies</p> <p>Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature</p>

6.3.2 The IAQM guidance<sup>18</sup> states that only if the impact is greater than **slight**, the effect is considered **significant**. As impacts were predicted to be **negligible**, overall effects are considered **not significant**, in accordance with the stated methodology.

### 6.4 West Yorkshire Technical Planning Guidance

6.4.1 The West Yorkshire LAs have produced Air Quality and Emissions: Technical Planning Guidance<sup>19</sup> as part of an overarching LES to reduce road transport emissions in the

<sup>18</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

<sup>19</sup> Air Quality and Emissions: Technical Planning Guidance, West Yorkshire Low Emissions Group, 2014.

county. It is aimed at helping LAs deliver AQO compliance through cost effective service planning brought about by the joint working and relevant Local Plan policies.

6.4.2 The guidance 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. The proposals were classified as **medium** based on the following criteria:

- Dwelling Houses (C3) > 50 units;
- Any developments generating 100 or more two-way vehicle movements per day; and,
- Does not meet the additional trigger criteria for major developments.

6.4.3 The guidance<sup>20</sup> provides a number of mitigation options that should be considered for inclusions within **medium** developments. Those included within the proposals include the following:

- Provision of Electric Vehicle (EV) charging points;
- Provision of cycle storage; and,
- Provision of a Travel Plan.

6.4.4 The implementation of the above measures is considered appropriate for a development of this size and nature and will further assist with minimising air quality effects as a result of construction dust and vehicle exhaust emissions.

## **6.5 Interim Planning Guidance for PM<sub>2.5</sub>**

6.5.1 Interim Planning Guidance<sup>21</sup> on the consideration of the PM<sub>2.5</sub> targets identified in the Environment Act (2021) in planning decisions has been produced by DEFRA. This requires evidence that the key sources of air pollution within a development have been identified and appropriate action to minimise emissions of PM<sub>2.5</sub> and its precursors as far as is reasonably practicable be provided in support of planning applications. To assist the process, two questions and associated considerations are provided. These are summarised in Table 23, along with the development response.

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<sup>20</sup> Air Quality and Emissions: Technical Planning Guidance, West Yorkshire Low Emissions Group, 2014.

<sup>21</sup> <https://uk-air.defra.gov.uk/pm25targets/planning>.

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**Table 23 Interim Planning Guidance Questions**

Question	Response
<p>How has exposure to PM<sub>2.5</sub> been considered when selecting the development site?</p> <p>Factors to consider include:</p> <ul style="list-style-type: none"> <li>• Site proximity to people (particularly large populations and/or vulnerable groups, e.g. schools, hospitals, care homes, areas of deprivation) and the impact of the development on these</li> <li>• Site proximity to pollution sources and the impact of these on users of the development</li> <li>• Exposure and emissions during both construction and in-use</li> </ul>	<p>The development is located in the rural village of Birdledge and as such is set back from large populations. Birdledge First School is located 25m west of the proposals. However, as outlined in Section 6.2, air quality impacts associated with the development were predicted to be <b>not significant</b></p> <p>The proposals are adjacent to the A629 and associated road vehicle exhaust emissions. However, as shown in Figure 8, annual mean PM<sub>2.5</sub> concentrations are predicted to be below the Concentration Target across the site</p> <p>As outlined in Table 15, a number of mitigation measures will be used throughout the construction phase in order to reduce fugitive dust emissions as far as practicable. This will control potential exposure at off-site locations</p>
<p>What actions and/or mitigations have been considered to reduce PM<sub>2.5</sub> exposure for development users and nearby receptors and to reduce emissions of PM<sub>2.5</sub> and its precursors?</p> <p>Factors to consider include:</p> <ul style="list-style-type: none"> <li>• Site layout</li> <li>• The development's design</li> <li>• Technology used in the construction or installed for use in the development</li> <li>• Construction and future use of the development</li> </ul>	<p>In order to reduce emissions of PM<sub>2.5</sub> with associated impacts at nearby receptors and on-site, the following measures have also been included:</p> <ul style="list-style-type: none"> <li>• Provision of secure cycle storage to encourage the use of sustainable transport modes</li> <li>• Provision of EV charging points to encourage the use of low emission vehicles</li> <li>• Provision of a Travel Plan to encourage sustainable transport modes</li> </ul> <p>Further to the above, in order to reduce emissions during the construction phase, a number of mitigation measures will be used to minimise dust generation from associated activities</p>

6.5.2 Based on the responses provided in Table 23 and the results of the assessment, as outlined in Sections 5.0 and 6.0, it is considered that the development has identified key sources of air pollution and taken appropriate action to minimise emissions of PM<sub>2.5</sub>.

## 7.0 CONCLUSION

7.1.1 Redmore Environmental Ltd was commissioned by Yorkshire Land Limited to undertake an Air Quality Assessment in support of a planning application for a residential development on land off A629, Birdsedge.

7.1.2 The proposals have the potential to cause air quality impacts at sensitive locations during the construction and operational phases. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions and assess potential effects as a result of the construction and operation of the proposals.

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 proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the development. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the highway network both with and without the development in place. Results were subsequently verified using local monitoring data.

7.1.5 Review of the dispersion modelling results indicated that impacts on annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations as a result of traffic generated by the development were predicted to be **negligible** at all sensitive receptor locations. Following consideration of the relevant issues, impacts as a result of the operation of the development were considered to be **not significant**, in accordance with the IAQM guidance.

7.1.1 A number of mitigation measures were identified in line with the requirements of the West Yorkshire Air Quality and Emissions: Technical Planning Guidance<sup>22</sup> in order to reduce vehicle exhaust emissions associated with the proposals. It is considered these are

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<sup>22</sup> Air Quality and Emissions: Technical Planning Guidance, West Yorkshire Low Emissions Group, 2014.

appropriate for a development of this scale and nature and will further control impacts during the operational phase.

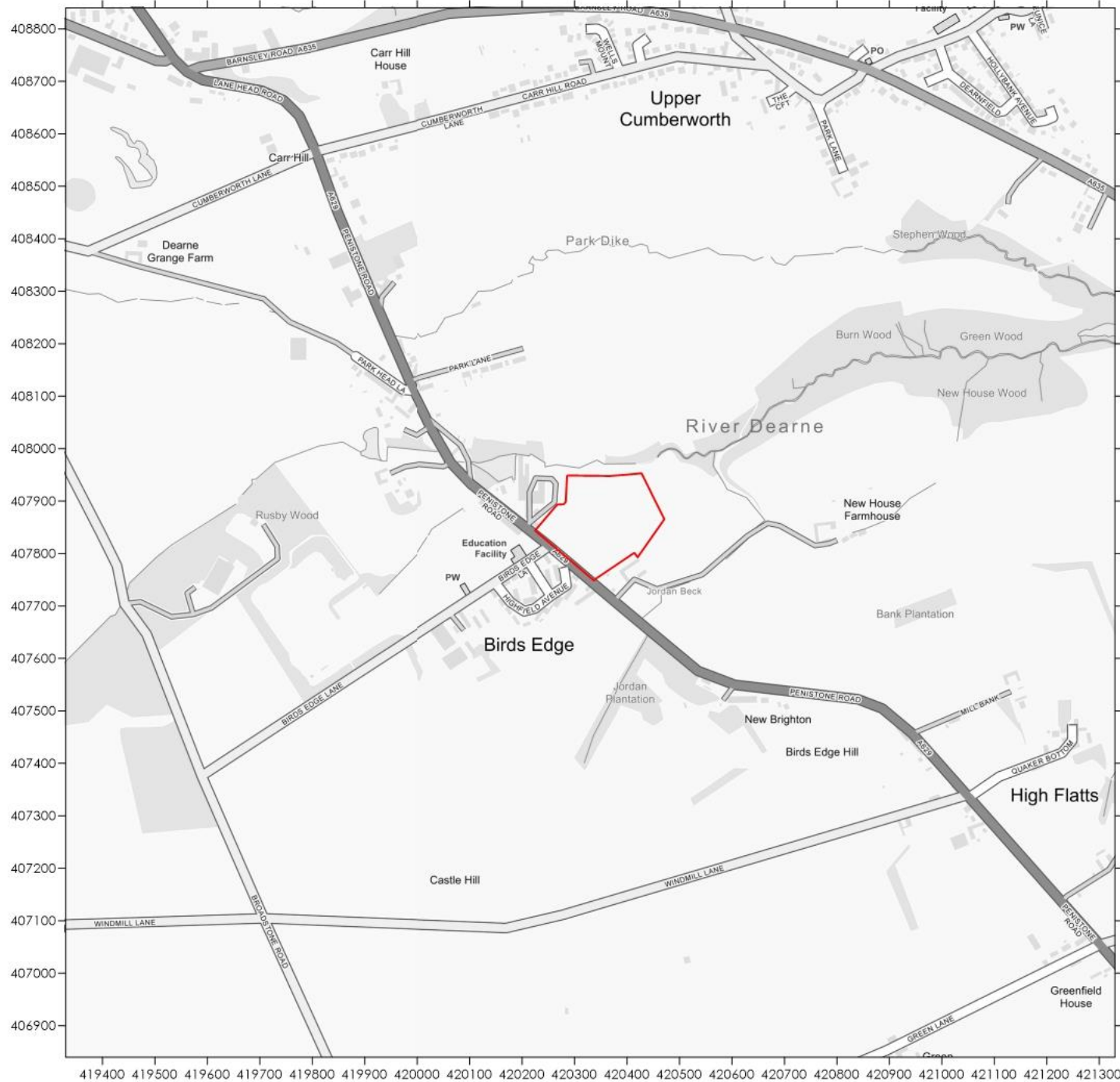
7.1.2 Based on the assessment results, air quality factors are not considered a constraint to the development.

## 8.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
ASR	Annual Status Report
BMBC	Barnsley Metropolitan Borough Council
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DS	Do-Something
EFT	Emissions Factor Toolkit
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
KC	Kirklees Council
KLP	Kirklees Local Plan
LA	Local Authority
LAQM	Local Air Quality Management
LES	Low Emissions Strategy
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 Practice 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
SP	Slow Phase
z <sub>0</sub>	Roughness length

**Figures**

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**Legend**



**Title**  
Figure 1 - Site Location Plan

**Project**  
Air Quality Assessment  
Land off A629, Birdsedge

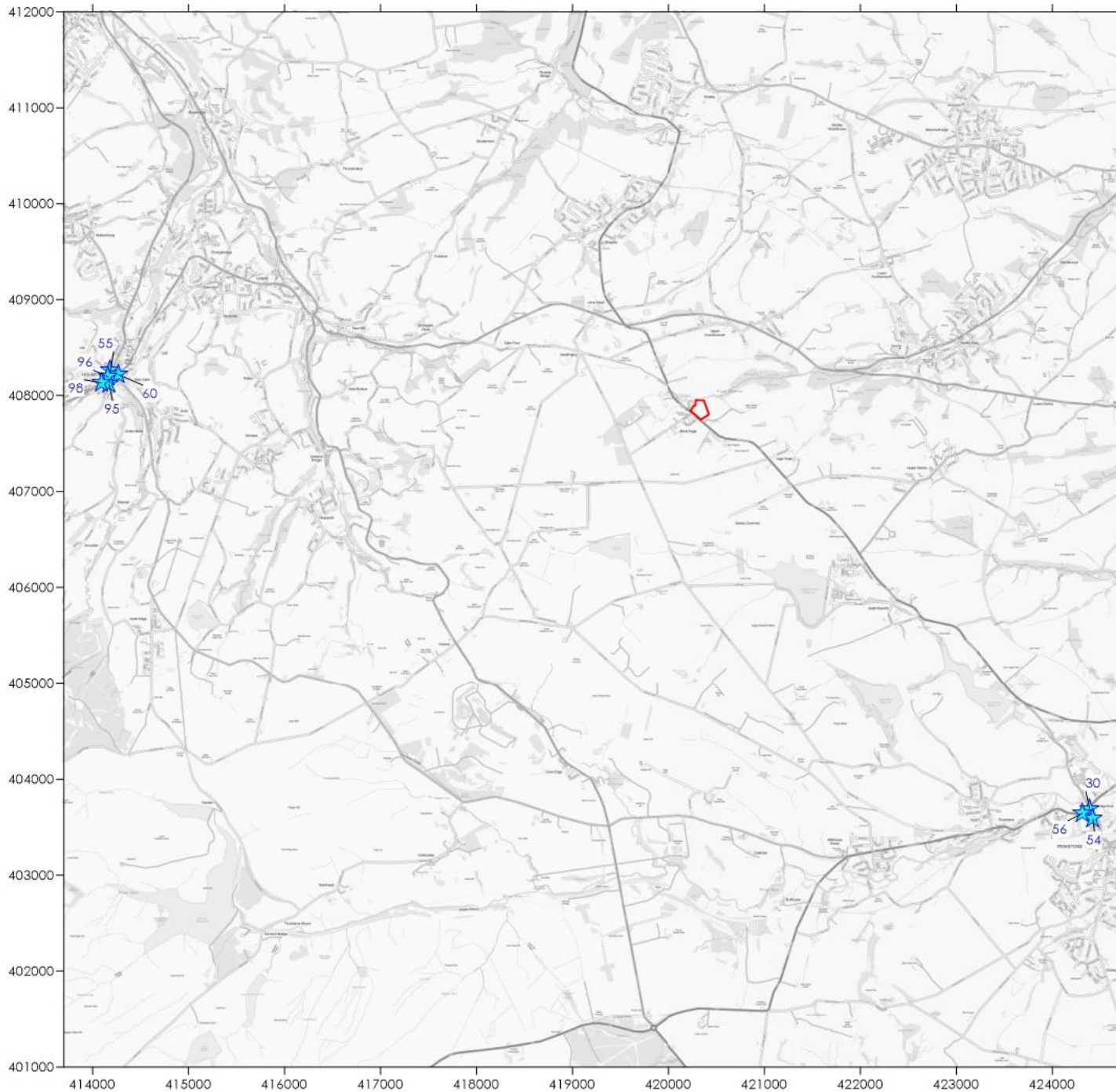
**Project Reference**  
10464

**Client**  
Yorkshire Land Limited

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**Legend**

-  Site Boundary
-  Monitor

**Title**

Figure 2 - Monitoring Locations

**Project**

Air Quality Assessment  
Land off A629, Birdsedge

**Project Reference**

10464

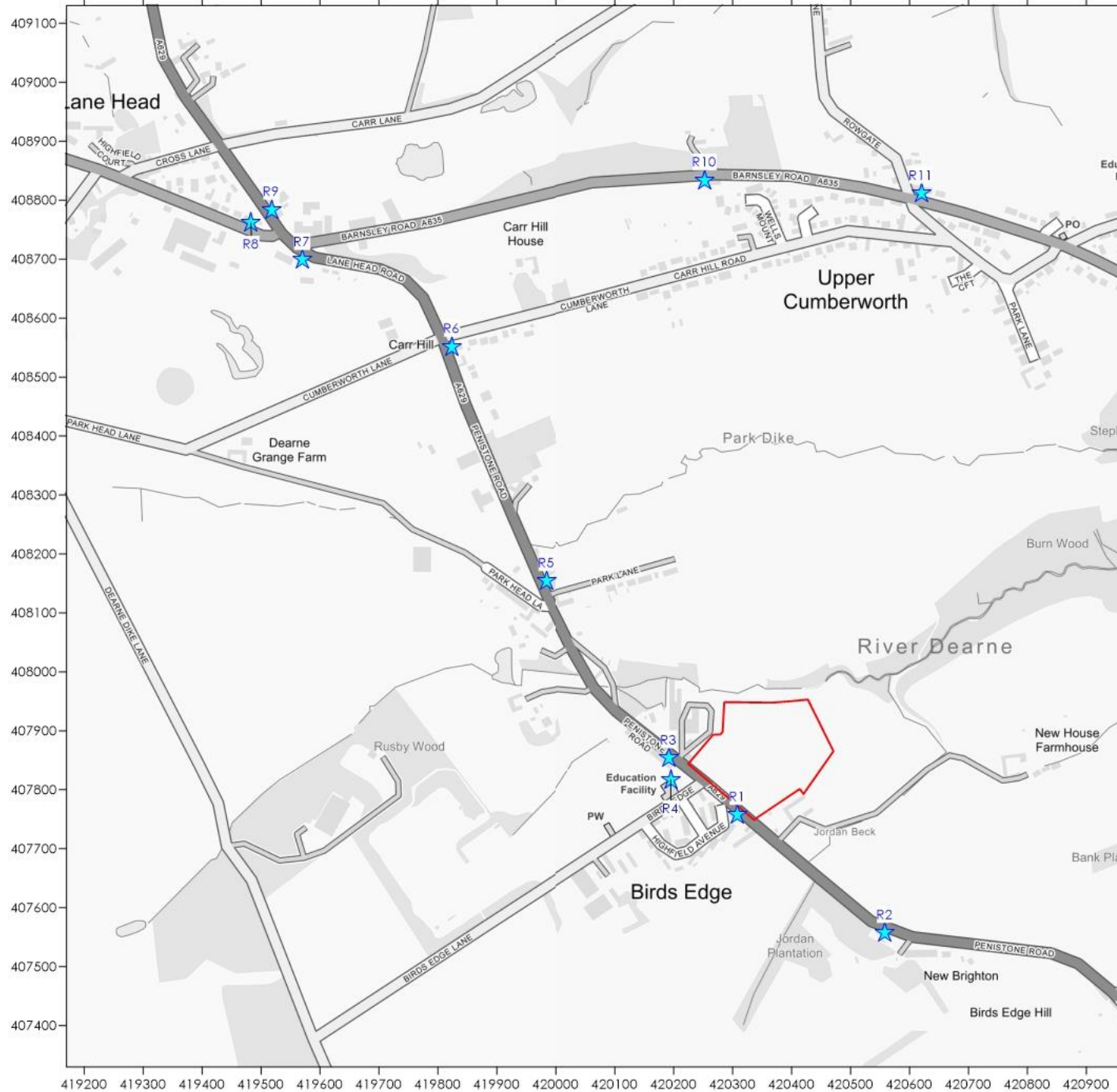
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**Legend**

-  Site Boundary
-  Receptor

**Title**

Figure 2 - Road Vehicle Exhaust Emissions Sensitive Receptor Locations

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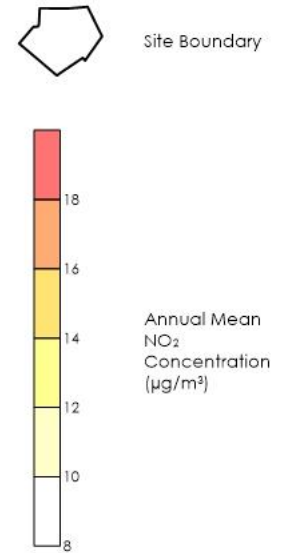
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**Legend**



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

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Air Quality Assessment  
Land off A629, Birdsedge

**Project Reference**  
10464

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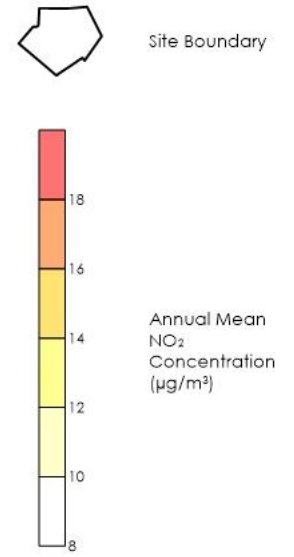
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**Legend**



**Title**  
Figure 4 - Predicted Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>) Do-Something

**Project**  
Air Quality Assessment  
Land off A629, Birdsedge

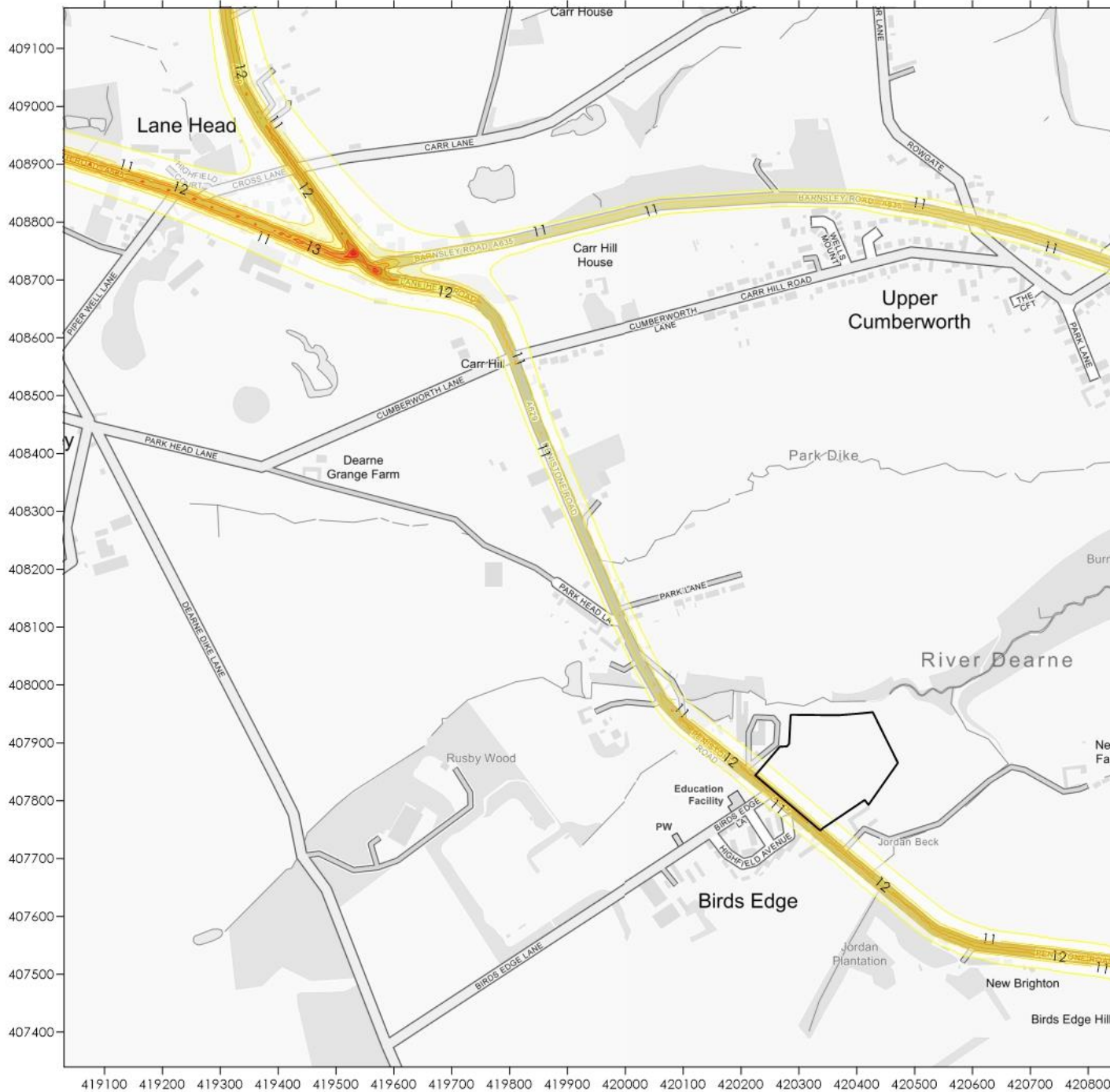
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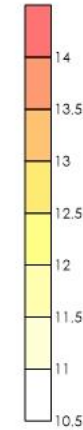
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**Legend**



Site Boundary



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

**Title**

Figure 5 - Predicted Annual Mean  
PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)  
Do-Minimum

**Project**

Air Quality Assessment  
Land off A629, Birdsedge

**Project Reference**

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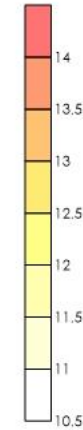
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**Legend**



Site Boundary



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

**Title**

Figure 6 - Predicted Annual Mean  
PM<sub>10</sub> Concentrations (µg/m<sup>3</sup>)  
Do-Something

**Project**

Air Quality Assessment  
Land off A629, Birdsedge

**Project Reference**

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**Client**

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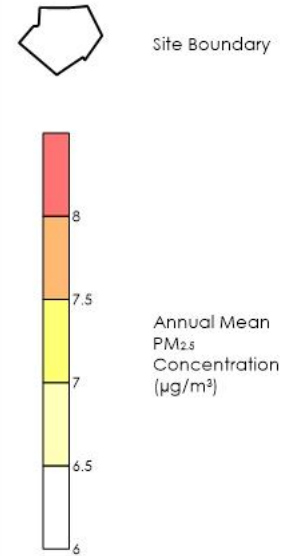
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**Legend**



**Title**  
Figure 7 - Predicted Annual Mean PM<sub>2.5</sub> Concentrations ( $\mu\text{g}/\text{m}^3$ ) Do-Minimum

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Air Quality Assessment  
Land off A629, Birdsedge

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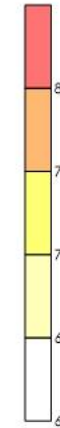
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**Legend**



Site Boundary



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

**Title**

Figure 8 - Predicted Annual Mean  
PM<sub>2.5</sub> Concentrations (µg/m<sup>3</sup>)  
Do-Something

**Project**

Air Quality Assessment  
Land off A629, Birdsedge

**Project Reference**

10464

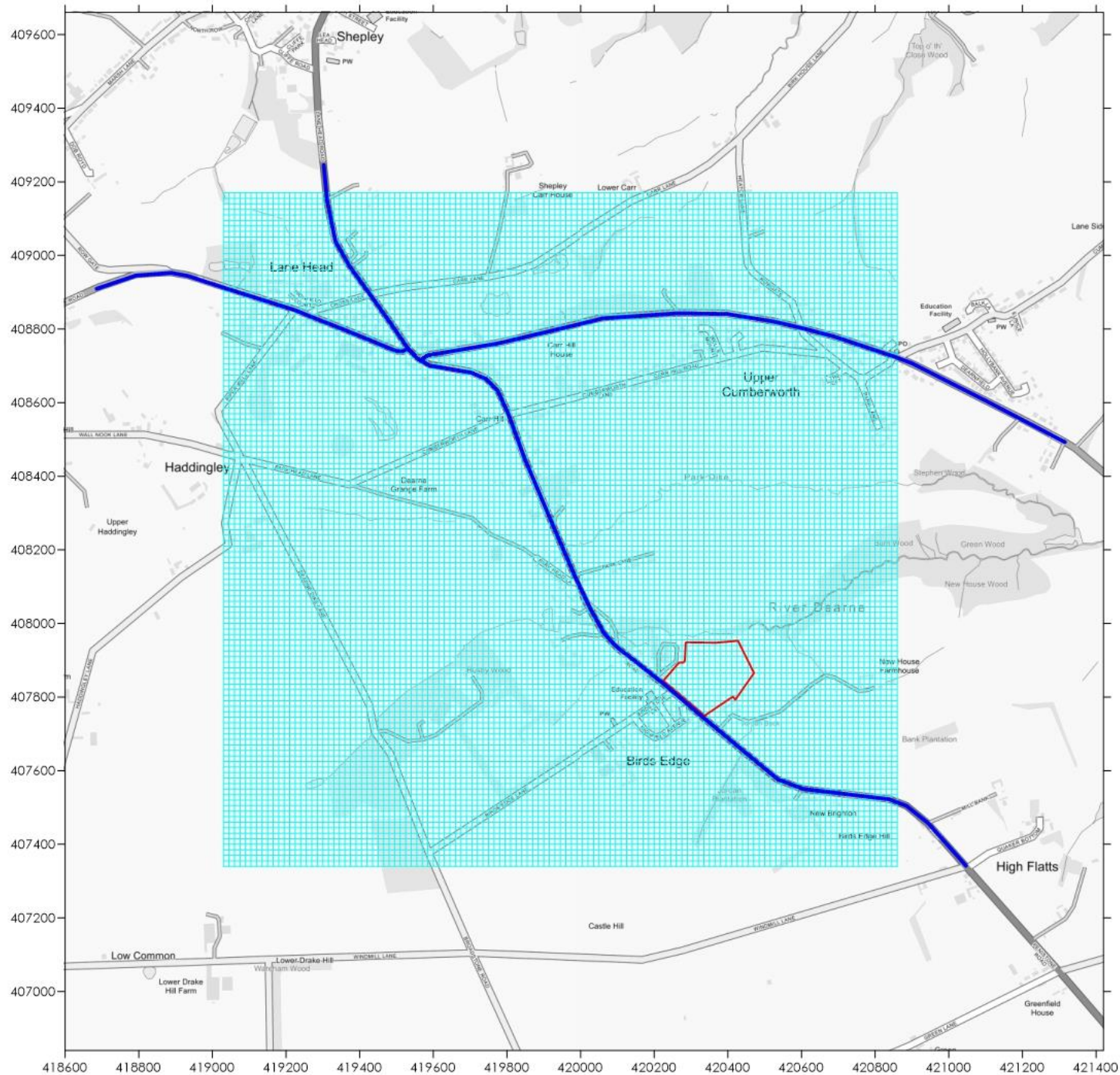
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**Legend**

-  Site Boundary
-  Road Link
-  Output Grid

**Title**  
Figure 9 - ADMS-Roads Inputs  
Assessment Area 1

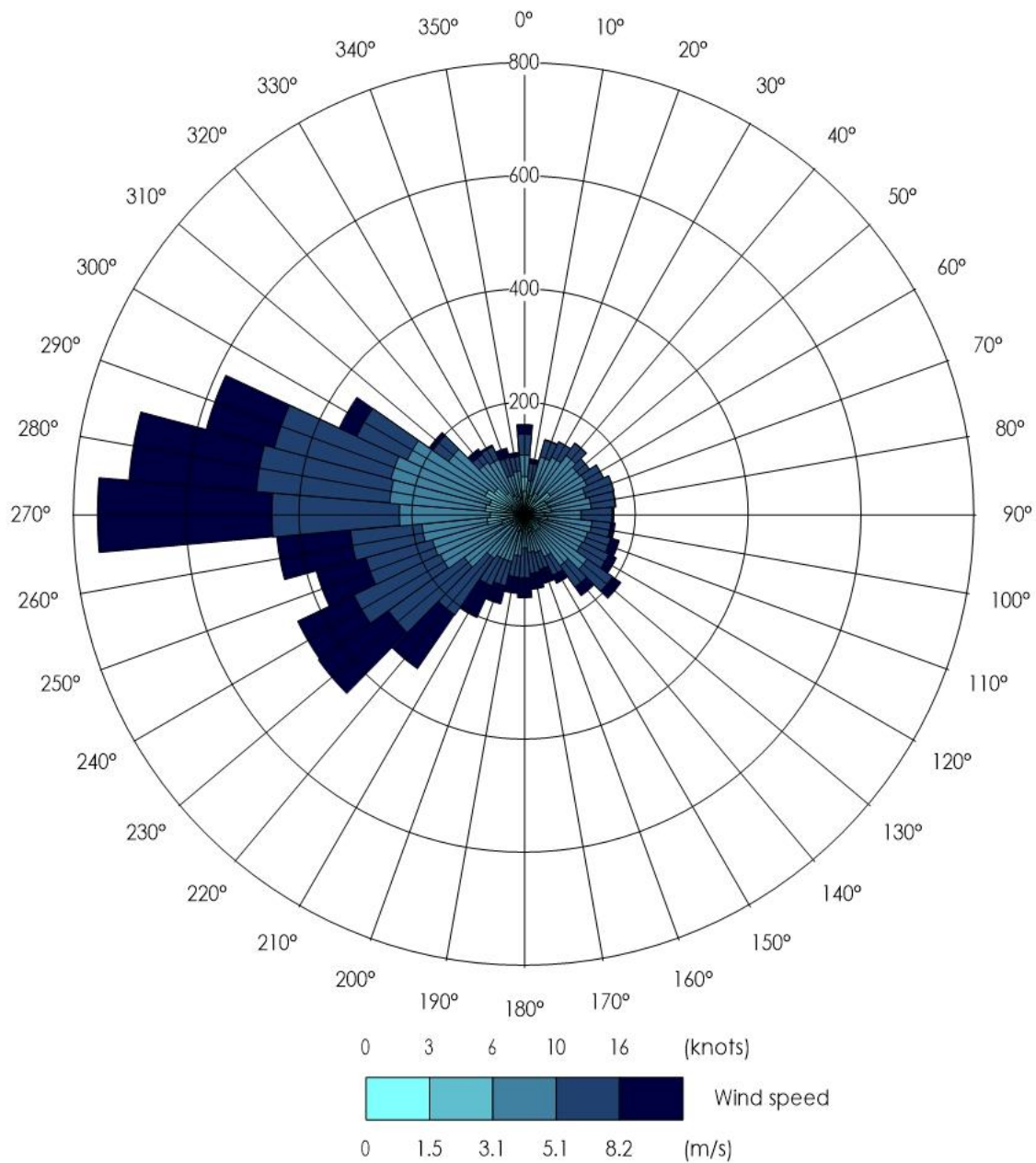
**Project**  
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Land off A629, Birdsedge

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**Legend**

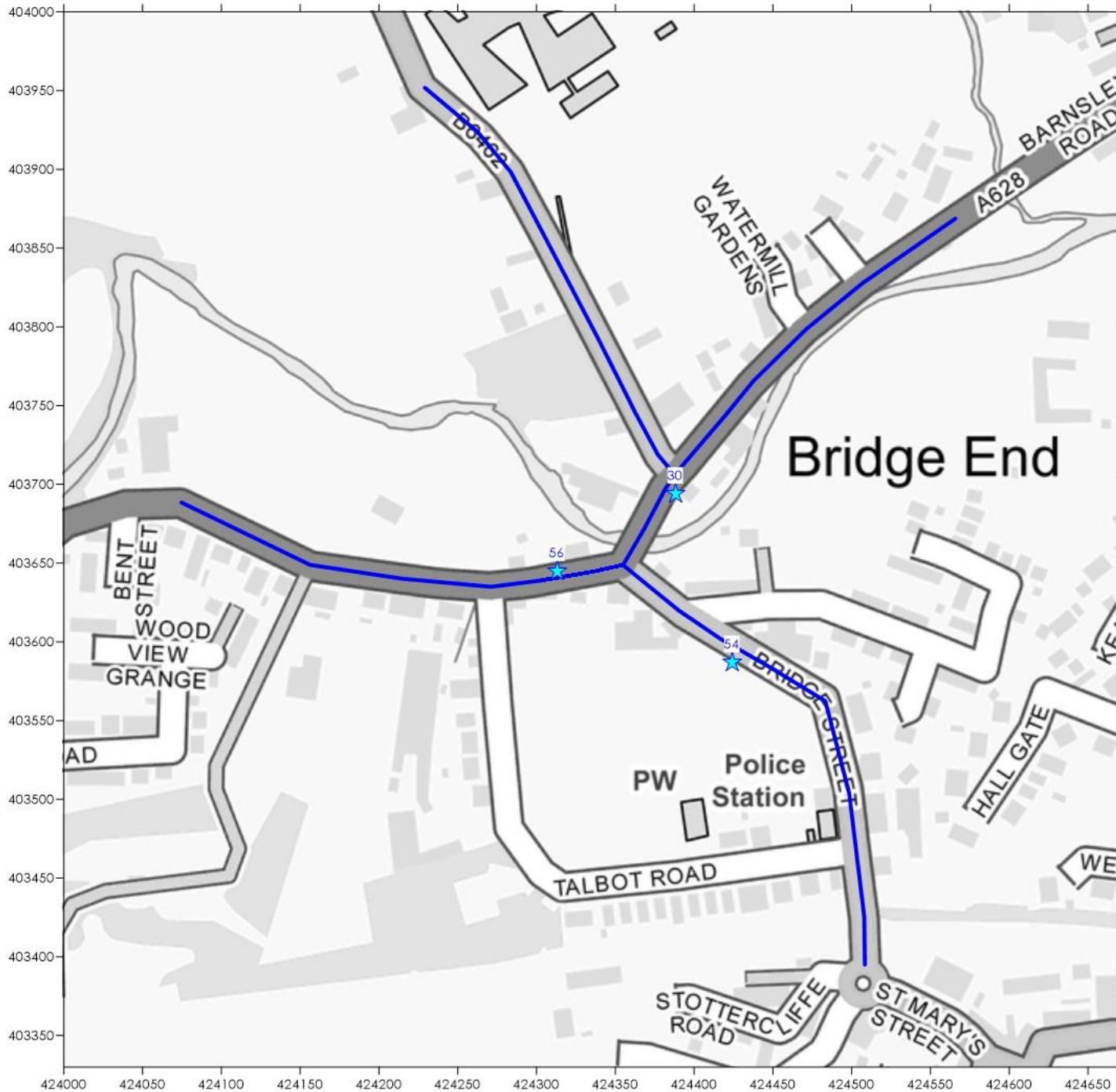
**Title**  
Figure 10 - Wind Rose of 2024 Emley Moor Meteorological Data

**Project**  
Air Quality Assessment  
Land off A629, Birdsedge

**Project Reference**  
10464

**Client**  
Yorkshire Land Limited





**Legend**

-  Road Link
-  Monitor

**Title**

Figure 11 - ADMS-Roads Inputs  
Assessment Area 2

**Project**

Air Quality Assessment  
Land off A629, Birdsedge

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**Appendix 1 - Assessment Input Data**

## **Introduction**

The proposals have the potential to cause air quality impacts as a result of exhaust emissions associated with vehicles travelling to and from the development. In order to assess NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Modelling was undertaken over two assessment areas:

- Assessment Area 1 - Proposed Development Site; and,
- Assessment Area 2 - Verification Site.

The use of two areas allowed for model verification of predicted concentrations whilst avoiding issues with model runtime and complications associated with assessment of large spatial extent. This is discussed further below.

Modelling was undertaken for 2024 to allow verification against recent monitoring results and 2031 to represent likely conditions in the opening year of the scheme.

## **Dispersion Model**

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.1.0.2). 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 1 - Proposed Development Site**

Ambient concentrations were predicted over the area NGR: 419030, 407340 to 420860, 409170. One Cartesian grid was included within the model to produce data suitable for contour plotting using the Surfer software package. The default intelligent grid spacing option was selected within ADMS-Roads in order to improve contour resolution within the vicinity of sources.

Receptors potentially sensitive to changes in pollutant concentrations were included in the assessment as outlined in the main report text.

Reference should be made to Figure 9 for a graphical representation of the assessment grid extents.

### **Traffic Flow Data**

Baseline traffic data, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition, 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 2024. 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 opening year of the development 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.

Vehicle movements associated with the development were provided by Andrew Moseley Associates Ltd, the Transport Consultants for the project. These were added to the relevant links

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<sup>23</sup> <https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints>.

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

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in order to determine future flows with the development in place.

Road parameters for input into the model were based on the following:

- Road widths were estimated from aerial photography and UK highway design standards;
- Vehicle speeds were estimated as an average for the relevant road link over the course of a 24-hour period;
- Vehicle speeds were determined following review of speed limits within the study extents, as well as congestion data available from GoogleMaps;
- Vehicle speeds specific to slow phases were determined using the methodology outlined in the DEFRA guidance<sup>25</sup>;
- Necessary adjustments to slow phase vehicle speeds were based upon congestion data available from GoogleMaps; and;
- The length for slow phases were derived using the approaching distance of 25m outlined in the DEFRA guidance<sup>26</sup>, and adjusted accordingly based on aerial photography and congestion data available from GoogleMaps.

A summary of the traffic data used in the assessment is provided in Table A1.1.

**Table A1.1 Traffic Data - Assessment Area 1**

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Avg. Vehicle Speed (km/h)	Road Width (m)
		2031 DM	2031 DS			
L1	Penistone Road, east of site access	7,430	7,466	5.15	40	7.2
L2	Penistone Road, east of site access, uphill	7,430	7,466	5.15	40	7.1
L3	Penistone Road, west of site access	7,430	7,949	5.15	40	7.1
L4	Penistone Road, north of site access, uphill	7,430	7,949	5.15	65	7.4
L5	Lane Head Road, south of Barnsley Road	7,430	7,949	5.15	40	8.4
L6	Lane Head Road, between Barnsley Road and Holmfirth Road	9,787	10,053	4.68	40	9.5
L7	Lane Head Road, north of Holmfirth Road	9,787	10,053	4.68	40	8.0

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

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

Link		24-hour AADT Flow		HDV Prop. of Fleet (%)	Avg. Vehicle Speed (km/h)	Road Width (m)
		2031 DM	2031 DS			
L8	Barnsley Road Slow Phase (SP)	7,495	7,748	4.37	20	10.3
L9	Barnsley Road	7,495	7,748	4.37	90	7.1
L10	Barnsley Road, east of Wells Mount	7,495	7,748	4.37	65	7.0
L11	Holmfirth Road SP	10,800	10,800	2.61	20	9.6
L12	Holmfirth Road	10,800	10,800	2.61	40	7.7

Reference should be made to Figure 9 for a graphical representation of the road link locations.

### Road Gradients

There are a number of roads within the modelling extents that have varying gradients. This causes additional vehicle emissions, particularly from HDVs, due to increased engine load associated with travelling up- and down-hill. Emission factors for several links were therefore adjusted using the relevant function in the Emissions Factor Toolkit (EFT).

### Emission Factors

The emission factors were calculated using the relevant traffic flows and the EFT (version 13.1). This has been produced by DEFRA and incorporates COPERT 5.8 vehicle emission factors.

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, 2024 emission factors were utilised in preference to the scheme opening year in order to provide robust model outputs. As predictions for 2024 were verified, it is considered the results are a robust indication of concentrations for the future year.

### Meteorological Data

Meteorological data used in the assessment was taken from Emley Moor meteorological station over the period 1<sup>st</sup> January 2024 to 31<sup>st</sup> December 2024 (inclusive). Emley Moor meteorological station is located at NGR: 422297, 412887, which is approximately 5.3km north-west of the

scheme. 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 10 for a wind rose of the utilised meteorological data.

### **Roughness Length**

The  $z_0$  is a modelling parameter applied to allow consideration of surface height roughness elements. A  $z_0$  of 0.3m was used to describe the modelling extents. This value is considered appropriate for the morphology of both areas and is suggested within ADMS-Roads as being suitable for 'agricultural areas (max)'.

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

### **Monin-Obukhov Length**

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

A minimum Monin-Obukhov length of 1m was used to describe the meteorological site. This is considered appropriate or the nature of the area and is suggested and is suggested within ADMS-Roads as being suitable for 'rural areas'.

### **Background Concentrations**

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

Similarly to emission factors, background concentrations from 2024 were utilised in preference to the future year. This provided a robust assessment and is likely to overestimate pollutant

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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 9.1) provided by DEFRA, which is the method detailed within DEFRA guidance<sup>27</sup>.

### **Assessment Area 2 - Verification Site**

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.

In order to undertake model verification, monitoring results are required within the assessment extents. Review of LA air quality survey data indicated that the closest site to the development in 2024 was approximately 5.5km to the south-east. Due to the distance between the development and monitoring positions, a separate area was modelled in order to reduce the total output area and manage software run time.

For the purpose of the assessment, model verification was undertaken for 2024 using traffic data, meteorological data and monitoring results from this year.

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

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## Traffic Flow Data

Traffic data for use in the assessment was taken from the Air Quality Assessment<sup>28</sup> undertaken in support of a residential development 420m north-east of the 30 - Don Villas, Barnsley Road, Penistone (73) monitor.

A summary of the traffic data used in the assessment is provided in Table A1.1.

**Table A1.2 Traffic Data - Assessment Area 2**

Link	2024 24-hour AADT Flow	HDV Prop. of Fleet (%)	Avg. Vehicle Speed (km/h)	Road Width (m)	
L1	A628 Thurlstone Road	13,202	3.00	40	5.7
L2	A628 Thurlstone Road SP	13,202	3.00	20	7.6
L3	A628 Barnsley Road SP	17,600	2.00	20	8.8
L4	A628 Barnsley Road	17,600	2.00	40	9.7
L5	B6462 Bridge Street SP	16,268	3.00	20	7.5
L6	B6462 Bridge Street	16,268	3.00	40	7.0
L7	B6462 Huddersfield Road SP	16,268	3.00	20	10.6
L8	B6462 Huddersfield Road	16,268	3.00	40	5.2

Reference should be made to Figure 11 for a graphical representation of the road link locations.

## Roughness Length

The  $z_0$  is a modelling parameter applied to allow consideration of surface height roughness elements. A  $z_0$  of 0.5m was used to describe the modelling extents. This value is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parkland, open suburbia'.

<sup>28</sup> Land South of Halifax Road, Penistone - Air Quality Assessment, BWB, 2018.

## Background Concentrations

Annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations for use in the assessment were taken from the DEFRA mapping study for the grid square containing the monitors, NGR: 424500, 403500, as shown in Table A1.3.

**Table A1.3 Background Pollutant Concentrations - Area 2**

Pollutant	Predicted 2024 Background Pollutant Concentration (µg/m <sup>3</sup> )
NO <sub>2</sub>	6.47
PM <sub>10</sub>	9.58
PM <sub>2.5</sub>	5.81

## Other Inputs

All other model inputs, including road gradients, the NO<sub>x</sub> to NO<sub>2</sub> method, emission factor method, meteorological data and the Monin-Obukhov length utilised during the verification were identical to those described previously for Assessment Area 1 - Proposed Development Site in order to provide continuity between the two models.

## Verification

In order to undertake model verification, a review of monitoring results was undertaken. This indicated that the closest monitoring position to the site was located within Barnsley Metropolitan Borough Council's (BMBC's) administrative extents, approximately 5.5km south-east of the site. The monitoring results were obtained from BMBC's '2025 Air Quality Annual Status Report (ASR)'<sup>29</sup>.

Monitoring of NO<sub>2</sub> concentrations was undertaken at three locations within the vicinity of roads included in the model during 2024. The results were obtained and the road contributions to total NO<sub>x</sub> concentration calculated following the methodology contained within DEFRA guidance<sup>30</sup>. The monitored annual mean NO<sub>2</sub> concentrations and calculated road NO<sub>x</sub> concentrations are summarised in Table A1.4.

<sup>29</sup> 2025 Air Quality ASR, BMBC, 2025.

<sup>30</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

**Table A1.4 NO<sub>x</sub> 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> )
30	Don Villas, Barnsley Road, Penistone (73)	16.1	20.66
54	LC8 Bridge Street	9.8	6.82
56	10 Thurlstone Road	14	15.90

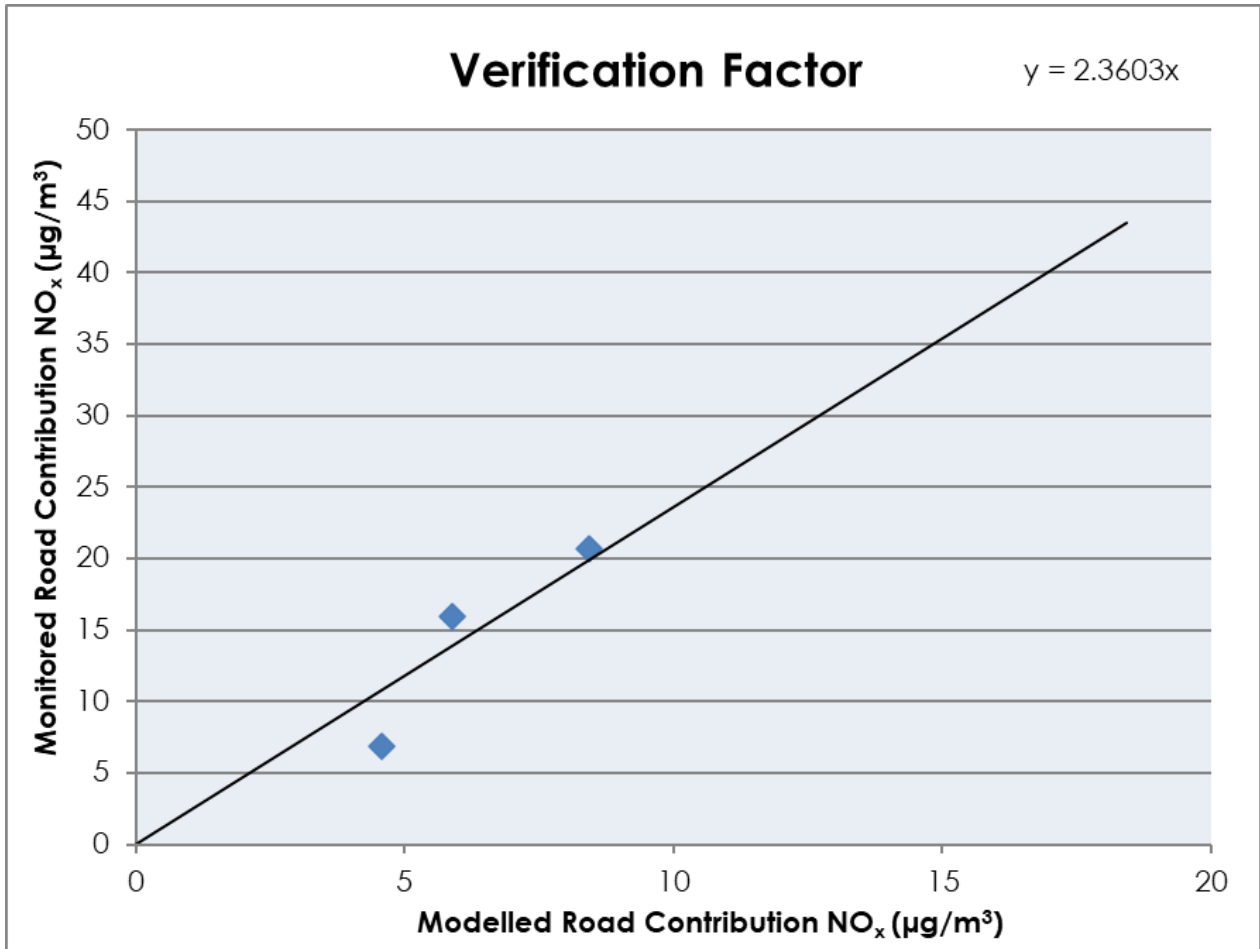
The annual mean road NO<sub>x</sub> concentrations predicted from the dispersion model and the road NO<sub>x</sub> concentrations calculated from the monitoring results are summarised in Table A1.5.

**Table A1.5 NO<sub>x</sub> 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> )
30	Don Villas, Barnsley Road, Penistone (73)	20.66	8.43
54	LC8 Bridge Street	6.82	4.58
56	10 Thurlstone Road	15.90	5.88

The monitored and modelled road NO<sub>x</sub> concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 2.3603 was required to be applied to all monitoring results, as shown in Graph 1.

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



Monitoring of PM<sub>10</sub> or PM<sub>2.5</sub> concentrations was 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>31</sup>.

<sup>31</sup> Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

**Appendix 2 - Curricula Vitae**

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### KEY EXPERIENCE:

Claire is a Director with specialist experience in the air quality sector

Her key capabilities include:

- Production and management of Air Quality, Dust and Odour Assessments for a wide range of clients from the residential, retail, commercial, leisure and industrial and infrastructure sectors.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-Roads, ADMS-6 and AERMOD. 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.
- Assessment of fugitive dust impacts from a range of waste and industrial developments.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Undertaken and overseeing pollutant monitoring campaigns.
- Provision of expert advice and attendance at DCO examination process.

### SELECT PROJECTS SUMMARY:

#### Residential and Educational

Air Quality Assessments for a large number of proposed residential and educational developments across the UK. The assessments included consideration of construction phase dust emissions and mitigation was recommended to minimise fugitive dust emissions accordingly. The suitability of the sites for the proposed residential and educational uses was also assessed. The assessment utilised a range of assessment tools including relevant screening criteria, air dispersion modelling using ADMS-Roads, local air quality monitoring and Defra published assessment tools. Where required for sites in London, Air Quality Neutral assessments were also undertaken utilised the Greater London Authority guidance.

#### Air Quality Monitoring

Air Quality Assessments and overseeing air quality monitoring campaigns for a number of sites within Birmingham. Air dispersion modelling was undertaken and air quality monitoring utilising NO<sub>2</sub> diffusion tubes was carried out for use in verification of the dispersion model. Mitigation was recommended where appropriate to reduced the exposure of future uses of the sites to elevated pollutant concentrations.

#### Odour Assessments

Undertaken to support developments in the UK, including consideration of the impact of existing odour sources on proposed developments or to assess proposed odour releases. A combination of field odour surveys, risk assessments and detailed dispersion modelling were undertaken, with mitigation measures recommended where required.

#### Commercial and Retail

**Foodstores across the UK** - Air quality assessments for a number of proposed foodstores across the UK. Consideration was given to construction phase dust emissions and vehicle emissions generated by the foodstore operations. Relevant screening criteria and detailed air dispersion modelling were utilised in the assessment. Mitigation was recommended as required to minimise construction phase dust emissions.

#### Commercial development,

**Workshop** - Air quality assessment and input into the EIA for a proposed large scale commercial development near Workshop. Assessments of construction phase dust and operational phase road traffic emissions were undertaken and consideration was given to both human and ecological receptors.

#### Industrial and Infrastructure

#### Greater Manchester Waste PFI

**Contract** - Air Quality and Odour Assessments were undertaken as part of the Planning Applications and Environmental Permit applications for a number of proposed waste facilities in Greater Manchester.

#### Energy from Waste Development,

**Scotland** - Air Quality Assessment and coordination of the EIA and Environmental Permit Application for a proposed Energy from Waste development in Scotland. Considered industrial emissions from flue stacks as well as additional road traffic movements generated by the development

#### Strategic Rail Freight Interchange,

**Hinckley** - oversaw the Air Quality Assessment for the proposed Rail Freight Interchange and acted as expert witness as part of the Development Consent Order (DCO) examination process.

### KEY EXPERIENCE:

Megan is an Environmental Consultant with specialist experience in the air quality sector. Her 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 impact assessments on sensitive receptors and exposure of new residents to poor air quality.
- Advanced Canyon Modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Assessment of construction dust impacts from a range of development sites.
- Production of Air Quality Neutral Assessments in accordance with The London Plan.
- Installation and management of diffusion tube monitoring campaigns in order to determine the potential for exposure of sensitive receptors to poor air quality.

### SELECT PROJECTS SUMMARY:

#### **Whitebirk, Blackburn**

Air Quality Assessment in support of a residential development comprising demolition of existing buildings and construction of 152 dwellings on land at the Whitebirk Estate, Blackburn. The development had the potential to expose future occupants to any existing air quality issues and cause impacts at sensitive locations. Dispersion modelling was undertaken using ADMS-Roads. A construction dust assessment was also performed to provide mitigation for proposed dust generating activities. Results of the study indicated that air quality impacts and fugitive dust emissions were not significant.

#### **Willow Lane, Mitcham**

Air Quality Assessment in support of an industrial development off Willow Lane, Mitcham. Due to the size of the development, it was possible that traffic generated from the scheme may cause negative impacts on sensitive receptors nearby. NO<sub>2</sub> and PM<sub>10</sub> concentrations were quantified at specific receptor points to ensure there would be no significant increases in pollution levels. Results revealed negligible impacts at all locations. An Air Quality Neutral Assessment was also undertaken in accordance with the London Plan. Following implementation of relevant mitigation measures, the development was considered Air Quality Neutral.

#### **Harrow Road, London**

Air Quality Assessment in support of a nursery. Detailed dispersion modelling, including advanced canyon inputs, was undertaken to evaluate the potential for exposure of future occupants to any existing issues at the site. The results indicated air quality conditions did not present an issue to planning consent.

#### **The Green, Cheadle**

Air Quality Assessment in support of a new Aldi store off the Green, Cheadle. Following concerns from the Local Authority regarding the potential for traffic generated by the proposals to cause air quality impacts, dispersion modelling was undertaken in order to quantify changes in pollutant concentrations at sensitive locations in the vicinity of the site. Results revealed negligible impacts at all locations.

#### **Holloway Road, London**

Kitchen Odour Assessment undertaken in line with the EMAQ+ and DEFRA guidance in support of a new restaurant on Holloway Road, London. Site-specific odour abatement options were identified in order to conform with best practice guidance. Based on the inclusion of the specified mitigation, odour effects associated with the development were not considered a constraint to planning consent.

#### **Wyebridge Motors, Hereford**

Ambient Air Quality Monitoring in support of a residential development. The Local Authority raised concerns regarding the exposure of future residents to poor air quality as a result of pollution from the adjacent A49. Due to the irregular topography of the area, a scheme of diffusion tube monitoring was undertaken to determine baseline NO<sub>2</sub> concentrations at the site. Results indicated that concentrations were below the Air Quality Objective at the building façade and as such, the risk for exposure of future residents to poor air quality was not considered significant.

#### KEY EXPERIENCE:

Charlotte is a Graduate Consultant with specialist experience in the air quality sector. Her 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.
- Advanced canyon modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Assessment of construction dust impacts from a range of development sizes.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Production of Air Quality Neutral Assessments in accordance with The London Plan.
- Odour surveys and risk assessments to assess amenity and suitability of sites for potential future development for residential use.

#### SELECT PROJECTS SUMMARY:

##### **Strefford Memorial Hospital, Strefford**

Air Quality Assessment in support of the demolition of the former Strefford Memorial Hospital and construction of 29 residential dwellings alongside car parking and associated infrastructure. The site was located adjacent to an Air Quality Management Area (AQMA) therefore there was concern that there could be potential impacts due to vehicle movements as a result of the site within this sensitive area as well as exposure of future occupants to poor air quality due to traffic emissions. Results indicated that potential impacts were predicted to be not significant and the site was considered suitable for the proposed end use.

##### **River Road, Barking**

Air Quality Assessment and Air Quality Neutral Assessment in support of an industrial development to provide a temporary contractors yard. A Fugitive Dust Emissions Assessment was required to determine potential impacts of operational phase fugitive dust emissions. Dispersion modelling of road vehicle exhaust emissions was also undertaken in support of the scheme. The site was concluded to be Air Quality Neutral in accordance with the relevant guidance and the overall impacts of fugitive dust emissions and road vehicle exhaust emissions associated with the site were concluded to be not significant.

##### **Crewe Road, Shavington**

An Odour Assessment in support of a residential development with associated access, infrastructure and landscaping works. The development was located in the vicinity of a meat processing

facility which may form a source of odour emissions and cause loss of amenity to future residents. A two stage Odour Assessment was undertaken to assess baseline conditions across the site and consider the risk of reduced amenity. Results of the assessment indicated odour effects at the site did not represent a constraint to planning consent.

##### **Land North of Parklands, Waltham Abbey**

Air Quality Assessment in support of a residential development comprising 400 dwellings, a local centre and public open space. Detailed dispersion modelling was undertaken to predict pollutant concentrations at sensitive locations as a result of emissions from the highway network both with and without the development in place. Review of the dispersion modelling results indicated that residual impacts due to the operation of the development were considered to be not significant.

##### **Masshouse Lane, Birmingham**

Air Quality Assessment in support of a mixed-use development to provide a new part-three, part-six storey building including ground and first floor retail space with a mix of residential dwellings from first to sixth floor, to provide 10 residential units. The site was located within an AQMA therefore there was concern that future occupants could be exposed to existing air quality conditions due to traffic emissions as well as potential impacts to sensitive receptors due to vehicle movements as a result of the proposals. Results revealed negligible impacts at all locations and that pollution levels were below the air quality objectives across the development.