

Air Quality Assessment
Lee Lane, Royston

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Executive Summary

Redmore Environmental Ltd was commissioned by Bellway Homes Limited (Yorkshire) to undertake an Air Quality Assessment in support of a planning application for a residential development on land off Lee Lane, Royston.

The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.

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

Potential impacts during the operational phase of the proposals may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the local 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 predicted air quality impacts as a result of traffic generated by the development were not significant at any sensitive location in the vicinity of the site.

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

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Bellway Homes Limited (Yorkshire) to undertake an Air Quality Assessment in support of a planning application for a residential development on land off Lee Lane, Royston.

1.1.2 The proposed development has the potential to cause air quality impacts at sensitive locations during the construction and operational phases. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects associated with the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land off Lee Lane, Royston, at approximate National Grid Reference (NGR): 434915, 410936. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise a residential development and associated infrastructure.

1.2.3 The development has the potential to cause air quality impacts at sensitive locations. These may include fugitive dust emissions associated with construction works and road traffic exhaust emissions from vehicles travelling to and from the site during the operational phase. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects as a result of the proposals. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 European Directives

2.1.1 European Union (EU) air quality legislation is provided within Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new Air Quality Limit Values (AQLVs) for particulate matter with an aerodynamic diameter of less than 2.5µm. The consolidated Directives include:

- Directive 1999/30/EC - the First Air Quality "Daughter" Directive - sets ambient AQLVs for nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM₁₀);
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

2.1.2 The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

2.2 UK Legislation

2.2.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and transpose EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Air Quality Target Values for an additional 5 pollutants.

2.2.2 Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for

Environment, Food and Rural Affairs (DEFRA) and published in July 2007¹. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

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

Table 1 Air Quality Objectives

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

2.2.4 Table 2 summarises the advice provided in DEFRA guidance² 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

¹ The AQS for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

² Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

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

2.3 Local Air Quality Management

- 2.3.1 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (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 (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Dust

- 2.4.1 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."

2.4.2 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). Enforcement can insist that there be no dust beyond the boundary of the works. 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.

2.5 National Planning Policy

2.5.1 The revised National Planning Policy Framework³ (NPPF) was published in July 2018 and sets out the Government's planning policies for England and how these are expected to be applied.

2.5.2 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 contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adaption to climate change, including moving to a low carbon economy."

2.5.1 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:

[...]

³ NPPF, Ministry of House, Communities and Local Government, 2018.

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

2.5.2 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."

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

2.6 National Planning Practice Guidance

2.6.1 The National Planning Practice Guidance⁴ (NPPG) web-based resource was launched by the Department for Communities and Local Government on 6th March 2014 to support the NPPF and make it more accessible. The air quality pages are summarised under the following headings:

1. Why should planning be concerned about air quality?
2. What is the role of Local Plans with regard to air quality?
3. Are air quality concerns relevant to neighbourhood planning?
4. What information is available about air quality?

⁴ <http://planningguidance.planningportal.gov.uk>.

5. When could air quality be relevant to a planning decision?
6. Where to start if bringing forward a proposal where air quality could be a concern?
7. How detailed does an air quality assessment need to be?
8. How can an impact on air quality be mitigated?
9. How do considerations about air quality fit into the development management process?

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

2.7 Local Planning Policy

2.7.1 The Barnsley Metropolitan Borough Council (BMBC) Local Development Plan consists of the Core Strategy⁵, the Barnsley Education Sites Development Plan Document⁶, the Barnsley, Doncaster and Rotherham Joint Waste Plan⁷ and saved policies from the Unitary Development Plan (UDP)⁸. The Core Strategy was adopted in September 2011 and sets out the key elements of the planning framework for Barnsley. Review of the document identified the following policies of relevance to this report:

"CSP 40 Pollution Control and Protection

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

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

⁵ Core Strategy, Local Development Framework, BMBC, 2011.

⁶ Barnsley Education Sites Development Plan Document, BMBC, 2009.

⁷ Barnsley, Doncaster and Rotherham Joint Waste Plan, BMBC, 2012.

⁸ Volume 1: Strategy, Policy and Justification, Barnsley UDP, BMBC, 2000.

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

"CSP 41 Development in Air Quality Management Areas

Development in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in terms of air quality (including residents, employees, visitors and customers), or that any such harmful effects can be mitigated against.

We will only allow residential development in air quality management areas, where the development provides an assessment that shows living conditions will be acceptable for future users.

We will only allow development in air quality management areas which could cause more air pollution, where the development provides an assessment that shows there will not be a significantly harmful effect on air quality."

- 2.7.2 The Core Strategy supersedes the majority of the UDP⁹. However, some policies have been saved until the adoption of the new Local Plan. Review of the document identified the following policy of relevance to this report:

"Economic Development and Residential Amenity

Policy ED4

Proposals for economic development adjoin or close to housing will be assessed with particular regard to the likely impact on residential amenity in terms of:

- a) Air Pollution, including smell, fumes, smoke, soot, ash, dust or grit.

[...]"

⁹ Volume 1: Strategy, Policy and Justification, Barnsley UDP, BMBC, 2000.

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

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 have been assessed in accordance with the following methodology, which was discussed with Chris Shields, Technical Officer for Pollution Control at BMBC, on 16th November 2018.

3.1.2 BMBC have produced 'Air Quality and Emissions Good Practice Planning Guidance'¹⁰ which includes direction on when an air quality assessment will be required and the associated scope of works. The recommendations outlined in the document were applied as necessary throughout the assessment.

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 V1.1'¹¹.

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,

¹⁰ Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2014.

¹¹ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

- The risk of health effects due to a significant increase in exposure to PM₁₀.

3.2.4 The assessment steps are detailed below.

Step 1

3.2.5 Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 350m from the boundary or 50m from the construction vehicle route up to 500m 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 500m 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

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

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

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

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

Table 3 Construction Dust - Magnitude of Emission

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

Magnitude	Activity	Criteria
	Trackout	• Less than 10 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

3.2.13 Step 2B defines the sensitivity of the area around the development to potential dust impacts. The influencing factors are shown in Table 4.

Table 4 Construction Dust - Examples of Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	• Users expect high levels of amenity • High aesthetic or value property • People expected to be present continuously for extended periods of time • Locations where members of the public are exposed over a time period relevant to the AQO for PM₁₀. e.g. residential properties, hospitals, schools and residential care homes	• Internationally or nationally designated site e.g. Special Area of Conservation
Medium	• Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	• Nationally designated site e.g. Sites of Special Scientific Interest
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

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

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

3.2.15 These factors were considered in the undertaking of this assessment.

3.2.16 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 350
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

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

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
Low	-	1 or more	Low	Low	Low	Low	Low

3.2.18 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

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

3.2.20 Table 8 outlines the risk category from earthworks and construction activities.

Table 8 Construction Dust - Dust Risk Category from Earthworks and Construction Activities

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

3.2.21 Table 9 outlines the risk category from trackout activities.

Table 9 Construction Dust - Dust Risk Category from Trackout Activities

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

Step 3

3.2.22 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance¹² 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

3.2.23 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**.

3.2.24 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 existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from the site. Potential

¹² Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2017 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2023 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2023 should the proposals be completed).

3.3.2 Reference should be made to Appendix 1 for assessment input data and details of the 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 within the Design Manual for Roads and Bridges (DMRB)¹³ on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance¹⁴ 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'¹⁵. 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 10.

Table 10 Significance of Impact

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO	Negligible	Slight	Moderate	Moderate

¹³ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

¹⁴ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

¹⁵ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

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

3.3.5 The matrix shown in Table 10 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**.

3.3.6 Following the prediction of impacts at discrete receptor locations, the IAQM document¹⁶ 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 guidance¹⁷ suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

¹⁶ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

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

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), BMBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO₂ are above the AQO within the borough. As such, six AQMAs have been declared. The closest of these to the development site is described as follows:

"An area along the M1 between Junction 35a and Junction 38, including Haigh, Darton, Cawthorne Dike, Higham, Dodworth, Gilroyd, Rockley, Birdwell, and Tankersley. The area extends 100m either side of the central reservation."

- 4.2.2 The development is located approximately 3.9km east of the AQMA. 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 BMBC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQOs. As such, no further AQMAs have been designated.

4.3 Air Quality Monitoring

- 4.3.1 Monitoring of pollutant concentrations is undertaken by BMBC using continuous and periodic methods throughout their area of jurisdiction. Recent results recorded in the vicinity of the development are shown in Table 11. Exceedences of the relevant AQO are shown in **bold**.

Table 11 Monitoring Results

Monitoring Site		Monitored NO ₂ Concentration (µg/m ³)		
		2015	2016	2017
CM3	Barnsley Gawber	19	19	16
DT34	Wakefield Road/Carlton Road	34.4	34.9	35.2
DT35	Wakefield Road/Carlton Road	42.2	40.7	38.7
DT36	Wakefield Road/Smithies Lane (North)	42	42.9	43.4
DT37	Wakefield Road – Burton Road Junction	32.8	34.3	33.4

4.3.2 As shown in Table 11, annual mean NO₂ concentrations were above the AQO at the DT35 - Wakefield Road/Carlton Road and DT36 - Wakefield Road/Smithies Lane (North) monitors during recent years. As the diffusion tubes are located at roadside positions within the vicinity of junctions, exceedences would be anticipated. Reference should be made to Figure 2 for a map of the survey locations.

4.3.3 BMBC do not undertake monitoring of PM₁₀ concentrations in the vicinity of the site.

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: 434500, 410500. Data for this location was downloaded from the DEFRA website¹⁸ for the purpose of the assessment and is summarised in Table 12.

Table 12 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m ³)		
	2017	2018	2023
NO ₂	10.79	10.34	8.43
PM ₁₀	12.95	12.86	12.58

¹⁸ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>.

4.4.2 As shown in Table 12, predicted background NO₂ and PM₁₀ concentrations are below the relevant AQOs 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 350m from the development boundary. These are summarised in Table 13.

Table 13 Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Up to 20	0	0
Up to 50	1 - 10	0
Up to 100	1 - 10	-
Up to 350	10 - 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 500m of the site access. These are summarised in Table 14.

Table 14 Trackout Dust Sensitive Receptors

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

4.5.4 There are no ecological receptors within 50m of the site or trackout boundary. As such, ecological impacts have not been assessed further within this report.

4.5.5 A number of additional factors have been considered when determining the sensitivity of the surrounding area. These are summarised in Table 15.

Table 15 Additional Area Sensitivity Factors

Guidance	Comment
Whether there is any history of dust generating activities in the area	A review of the planning portal and Google Maps imagery identified a residential development (Planning reference: Ref: 2016/1490) approximately 115m north-east of the site is currently under construction. It is possible that this may have caused dust generation in the area over recent months
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal did not indicate any additional development proposals likely to result in concurrent dust generation in the vicinity of the site
Pre-existing screening between the source and the receptors	Trees and shrubs are located sporadically along the site boundary. These may act as a barrier between emission sources and receptors should they be retained during construction
Conclusions drawn from analysing local meteorological data which accurately represent the area: and if relevant the season during which works will take place	As shown in Figure 3, the predominant wind bearing at the site is from the north-west. As such, receptors to the south-east of the boundary are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is possible that it will extend over one year
Any known specific receptor sensitivities which go beyond the classifications given in the document	No specific receptor sensitivities identified during the baseline assessment

4.5.6 Bases 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. As such, users would expect to enjoy a reasonable level of amenity, aesthetics or the value of their property could be diminished by soiling and people would be expected to be present for extended periods of time.

4.5.7 The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.2, is shown in Table 16.

Table 16 Sensitivity of the Surrounding Area

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

Operational Phase Sensitive Receptors

4.5.8 Locations sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 17. Receptor heights were selected to take account for less sensitive land uses, such as ground floor retail units.

Table 17 Operational Phase Sensitive Receptor Locations

Receptor		Height (m)	NGR (m)	
			X	Y
R1	Residential - Lee Lane	1.5	434733.3	411299.0
R2	Residential - Lee Lane	1.5	435362.6	411491.1
R3	Residential - Lee Lane	4.0	436165.3	411409.0
R4	Residential - Midland Road	4.0	436199.8	411452.3
R5	Residential - Station Road	1.5	436155.7	411466.6
R6	Residential - Station Road	1.5	436046.1	411646.2
R7	Parkside Primary School	1.5	436310.9	411438.1
R8	Residential - Midland Road	1.5	436442.1	411605.8
R9	Residential - Church Street	1.5	436455.3	411180.9
R10	Outwood Academy Carlton	1.5	436623.1	410360.0
R11	Residential - Church Street	1.5	436334.3	409826.1
R12	Residential - Wakefield Road	1.5	433380.8	410910.7

Receptor		Height (m)	NGR (m)	
			X	Y
R13	Residential - Wakefield Road	1.5	433490.3	410535.4
R14	Residential - Shaw Lane	1.5	433234.5	410423.1
R15	Mapplewell Primary School	1.5	433246.2	410173.8
R16	Residential - Shaw Lane	1.5	433017.7	410092.1
R17	Residential - Shaw Lane	1.5	432987.0	410037.4
R18	Residential - Wakefield Road	1.5	433664.6	410302.1
R19	Residential - Wakefield Road	1.5	433883.2	410013.3
R20	Residential - Wakefield Road	1.5	433902.8	409916.6
R21	Residential - Wakefield Road	1.5	434104.7	409636.4
R22	Residential - Bar Lane	1.5	433381.5	409858.1

4.5.9 Reference should be made to Figure 4 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

5.0 **ASSESSMENT**

5.1 **Introduction**

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

5.2 **Construction Phase Assessment**

Step 1

- 5.2.1 The undertaking of activities such as excavation, ground works, cutting, construction, concrete batching 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 road 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 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

Step 2

Earthworks

- 5.2.4 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The proposed development site covers an area greater than 10,000m². In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **large**.

5.2.5 Table 16 indicates the sensitivity of the area to dust soiling effects on people and property is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for dust soiling as a result of earthworks.

5.2.6 Table 16 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8 the development is considered to be a **low** risk site for human health impacts as a result of earthworks.

Construction

5.2.7 Due to the size of the development the total building volume is likely to be greater than 100,000m³. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **large**.

5.2.8 Table 16 indicates the sensitivity of the area to dust soiling effects on people and property is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for dust soiling as a result of construction activities.

5.2.9 Table 16 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 8, the development is considered to be a **low** risk site for human health impacts as a result of construction activities.

Trackout

5.2.10 Based on the site area, it is anticipated that the unpaved road length may be between 50m and 100m. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from trackout is therefore **medium**.

5.2.11 Table 16 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **medium** risk site for dust soiling as a result of trackout activities.

5.2.12 Table 16 indicates the sensitivity of the area to human health impacts is **low**. In accordance with the criteria outlined in Table 9, the development is considered to be a **low** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

5.2.13 A summary of the risk from each dust generating activity is provided in Table 18.

Table 18 Summary of Potential Unmitigated Dust Risks

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

5.2.14 As indicated in Table 18, the potential risk of dust soiling is **medium** from trackout and **low** from earthworks and construction. The potential risk of human health impacts is **low** from earthworks, construction and trackout.

5.2.15 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.

Step 3

5.2.16 The IAQM guidance¹⁹ 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 19. These may be reviewed prior to the commencement of construction works and incorporated into a Construction Environmental Management Plan if required by the LA.

¹⁹ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

Table 19 Fugitive Dust Emission Mitigation Measures

Issue	Control Measure
Communications	• Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager • Display the head or regional office contact information • Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the LA
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the LA upon request • 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
Monitoring	• Carry out regular site inspections to monitor compliance with the DMP, record inspection results and make an inspection log available to the LA upon request • 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
Site preparation	• Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible • Fully enclose site or specific operations where there is a high potential for dust production and they are active for an extensive period • Avoid site runoff of water or mud • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used • Cover, seed or fence stockpiles to prevent wind whipping
Operating vehicle/machinery and sustainable travel	• Ensure all vehicles switch off engines when stationary - no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable
Operations	• Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques • Ensure an adequate water supply on the site for effective dust suppression, using non-potable water where possible and appropriate • Use enclosed chutes and conveyors and covered skips • Minimise drop heights and use fine water sprays wherever appropriate
Waste management	• Avoid bonfires or burning of waste materials

Issue	Control Measure
Construction	• Avoid scabbling (roughening of concrete surfaces) if possible • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out
Trackout	• Use water-assisted dust sweeper on access and local roads, if required • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system, if required

Step 4

5.2.17 Assuming the relevant mitigation measures outlined in Table 19 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance²⁰.

5.3 Operational Phase Assessment

5.3.1 Vehicle movements associated with the operation of the proposal will generate exhaust emissions on the local and regional road networks. 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.

5.3.2 The assessment considered the following scenarios:

- 2017 - Verification;
- 2023 - DM; and,
- 2023 - DS.

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

²⁰ Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2016.

5.3.4 For the purpose of the assessment traffic data for 2023 was utilised as the development opening year. Air quality is predicted to improve in the future. However, in order to provide a robust assessment, emission factors for 2017 were utilised within the dispersion model. The use of 2023 traffic data and 2017 emission factors is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the predicted pollution concentrations.

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

Predicted Concentrations

5.3.6 Annual mean NO₂ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 20.

Table 20 Predicted Annual Mean NO₂ Concentrations

Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Lee Lane	16.82	16.88	0.06
R2	Residential - Lee Lane	21.58	21.86	0.28
R3	Residential - Lee Lane	21.02	21.25	0.23
R4	Residential - Midland Road	24.03	24.26	0.23
R5	Residential - Station Road	20.62	20.74	0.12
R6	Residential - Station Road	17.89	17.92	0.03
R7	Parkside Primary School	18.51	18.58	0.07
R8	Residential - Midland Road	21.77	21.86	0.09
R9	Residential - Church Street	20.06	20.19	0.13
R10	Outwood Academy Carlton	17.41	17.45	0.04
R11	Residential - Church Street	18.74	18.82	0.08
R12	Residential - Wakefield Road	17.19	17.22	0.03
R13	Residential - Wakefield Road	22.47	22.81	0.34
R14	Residential - Shaw Lane	22.17	22.41	0.24

Receptor		Predicted Annual Mean NO ₂ Concentration (µg/m ³)		
		DM	DS	Change
R15	Mapplewell Primary School	17.07	17.10	0.03
R16	Residential - Shaw Lane	20.81	20.99	0.18
R17	Residential - Shaw Lane	21.76	21.94	0.18
R18	Residential - Wakefield Road	17.83	17.90	0.07
R19	Residential - Wakefield Road	22.76	23.02	0.26
R20	Residential - Wakefield Road	18.51	18.61	0.10
R21	Residential - Wakefield Road	23.51	23.77	0.26
R22	Residential - Bar Lane	17.99	18.01	0.02

5.3.7 As indicated in Table 20, predicted annual mean NO₂ concentrations were below the relevant AQO at all receptor locations in both scenarios.

5.3.8 Reference should be made to Figures 5 and 6 for graphical representations of annual mean NO₂ concentrations across the assessment area for the DM and DS scenarios, respectively.

5.3.9 Annual mean PM₁₀ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 21.

Table 21 Predicted Annual Mean PM₁₀ Concentrations

Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R1	Residential - Lee Lane	13.09	13.10	0.01
R2	Residential - Lee Lane	13.87	13.92	0.05
R3	Residential - Lee Lane	13.62	13.65	0.03
R4	Residential - Midland Road	13.97	14.00	0.03
R5	Residential - Station Road	13.56	13.58	0.02
R6	Residential - Station Road	13.26	13.26	0.01

Receptor		Predicted Annual Mean PM ₁₀ Concentration (µg/m ³)		
		DM	DS	Change
R7	Parkside Primary School	13.30	13.31	0.01
R8	Residential - Midland Road	13.84	13.86	0.02
R9	Residential - Church Street	13.64	13.66	0.02
R10	Outwood Academy Carlton	13.18	13.19	0.01
R11	Residential - Church Street	13.41	13.43	0.01
R12	Residential - Wakefield Road	13.16	13.16	0.00
R13	Residential - Wakefield Road	13.92	13.98	0.05
R14	Residential - Shaw Lane	14.00	14.05	0.04
R15	Mapplewell Primary School	13.12	13.13	0.01
R16	Residential - Shaw Lane	13.65	13.68	0.03
R17	Residential - Shaw Lane	13.80	13.83	0.02
R18	Residential - Wakefield Road	13.27	13.28	0.01
R19	Residential - Wakefield Road	14.20	14.25	0.05
R20	Residential - Wakefield Road	13.38	13.40	0.02
R21	Residential - Wakefield Road	14.22	14.26	0.05
R22	Residential - Bar Lane	13.28	13.28	0.00

5.3.10 As indicated in Table 21, predicted annual mean PM₁₀ concentrations were below the relevant AQO at all sensitive receptors in both the DM and DS scenarios.

5.3.11 Reference should be made to Figures 7 and 8 for graphical representations of annual mean PM₁₀ concentrations across the assessment area for the DM and DS scenarios, respectively.

Predicted Impacts

5.3.12 Predicted impacts on annual mean NO₂ concentrations at the sensitive receptor locations are summarised in Table 22.

Table 22 Predicted Impacts - NO₂

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Lee Lane	Below 75% of AQO	0	Negligible
R2	Residential - Lee Lane	Below 75% of AQO	1	Negligible
R3	Residential - Lee Lane	Below 75% of AQO	1	Negligible
R4	Residential - Midland Road	Below 75% of AQO	1	Negligible
R5	Residential - Station Road	Below 75% of AQO	0	Negligible
R6	Residential - Station Road	Below 75% of AQO	0	Negligible
R7	Parkside Primary School	Below 75% of AQO	0	Negligible
R8	Residential - Midland Road	Below 75% of AQO	0	Negligible
R9	Residential - Church Street	Below 75% of AQO	0	Negligible
R10	Outwood Academy Carlton	Below 75% of AQO	0	Negligible
R11	Residential - Church Street	Below 75% of AQO	0	Negligible
R12	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R13	Residential - Wakefield Road	Below 75% of AQO	1	Negligible
R14	Residential - Shaw Lane	Below 75% of AQO	1	Negligible
R15	Mapplewell Primary School	Below 75% of AQO	0	Negligible
R16	Residential - Shaw Lane	Below 75% of AQO	0	Negligible
R17	Residential - Shaw Lane	Below 75% of AQO	0	Negligible
R18	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R19	Residential - Wakefield Road	Below 75% of AQO	1	Negligible
R20	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R21	Residential - Wakefield Road	Below 75% of AQO	1	Negligible
R22	Residential - Bar Lane	Below 75% of AQO	0	Negligible

5.3.13 As indicated in Table 22, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

5.3.14 Predicted impacts on annual mean PM₁₀ concentrations at the sensitive receptor locations are summarised in Table 23.

Table 23 Predicted Impacts - PM₁₀

Receptor		Predicted Annual Mean PM ₁₀ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Lee Lane	Below 75% of AQO	0	Negligible
R2	Residential - Lee Lane	Below 75% of AQO	0	Negligible
R3	Residential - Lee Lane	Below 75% of AQO	0	Negligible
R4	Residential - Midland Road	Below 75% of AQO	0	Negligible
R5	Residential - Station Road	Below 75% of AQO	0	Negligible
R6	Residential - Station Road	Below 75% of AQO	0	Negligible
R7	Parkside Primary School	Below 75% of AQO	0	Negligible
R8	Residential - Midland Road	Below 75% of AQO	0	Negligible
R9	Residential - Church Street	Below 75% of AQO	0	Negligible
R10	Outwood Academy Carlton	Below 75% of AQO	0	Negligible
R11	Residential - Church Street	Below 75% of AQO	0	Negligible
R12	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R13	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R14	Residential - Shaw Lane	Below 75% of AQO	0	Negligible
R15	Mapplewell Primary School	Below 75% of AQO	0	Negligible
R16	Residential - Shaw Lane	Below 75% of AQO	0	Negligible
R17	Residential - Shaw Lane	Below 75% of AQO	0	Negligible
R18	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R19	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R20	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R21	Residential - Wakefield Road	Below 75% of AQO	0	Negligible
R22	Residential - Bar Lane	Below 75% of AQO	0	Negligible

5.3.15 As indicated in Table 23, impacts on annual mean PM₁₀ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

Barnsley Air Quality and Emissions Good Practice Guidance

5.3.16 BMBC have produced Air Quality and Emissions Good Practice Planning Guidance²¹ which includes direction on when an air quality assessment will be required and the associated scope of works. The recommendations outlined in the document were applied as necessary throughout the assessment.

5.3.17 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. Review of the relevant criteria indicated the proposals were classified as **medium** as they include over 50 dwellings but are not predicted to result in an increase in the existing traffic flow on roads of more than 10,000 AADT by 5% or more.

5.3.18 The guidance²² provides a number of mitigation options that should be considered for inclusion within developments. Those relevant to the proposals include the following:

- Provision of 1 electric vehicle (EV) charging point per residential unit; and,
- Production of a full Travel Plan to encourage the use of non-transport modes and assist with the reduction of development transport related emissions.

5.3.19 It is recommended that the above measures are incorporated into the scheme in response to the assessment. This will assist with minimising air quality effects as a result of vehicle exhaust emissions.

Overall Impact Significance

5.3.20 The overall significance of operational phase road traffic emission impacts was determined as **negligible**. This was based on the overall predicted impacts at discrete

²¹ Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2014.

²² Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2014.

receptor locations and the considerations outlined previously. Further justification is provided in Table 24.

Table 24 Overall Impact Significance

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO ₂ and PM ₁₀ concentrations were below the relevant AQOs at all sensitive receptors in the DM scenario. 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
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
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	The assessment assumed that vehicle exhaust emission rates and background pollutant levels will not reduce in future years. This provides worst-case results when compared with DEFRA and Highways Agency methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

5.3.21 The IAQM guidance²³ 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.

²³ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

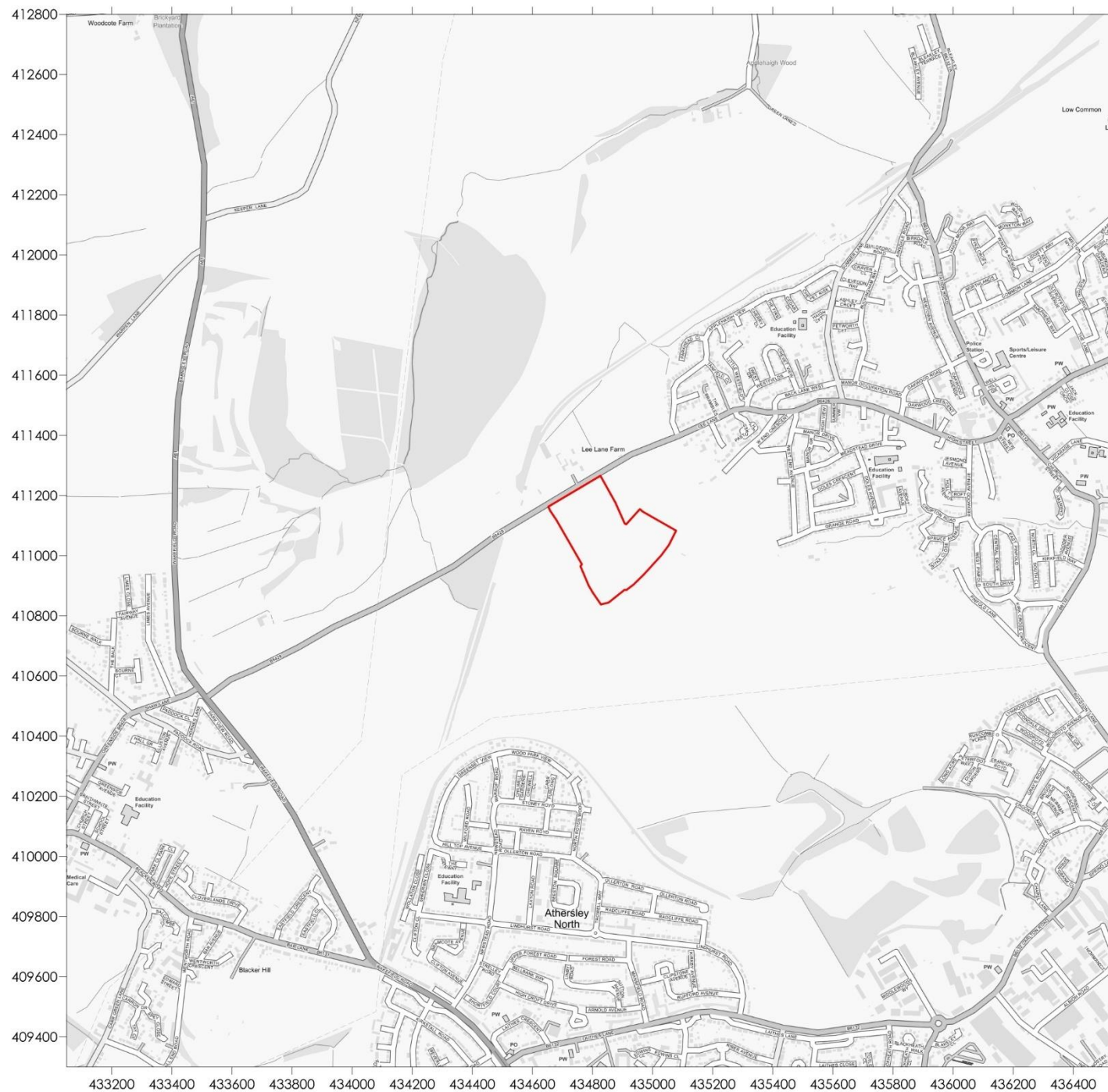
6.0 CONCLUSION

- 6.1.1 Redmore Environmental Ltd was commissioned by Bellway Homes Limited (Yorkshire) to undertake an Air Quality Assessment in support of a planning application for a residential development on land off Lee Lane, Royston.
- 6.1.2 The proposals have the potential to cause air quality impacts as a result of fugitive dust emissions during construction and road traffic exhaust emissions associated with vehicles travelling to and from the site during operation. As such, an Air Quality Assessment was required in order to determine baseline conditions and assess potential effects as a result of the scheme.
- 6.1.3 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. Assuming good practice dust control measures are implemented, the residual significance of potential air quality impacts from dust generated by earthworks, construction and trackout activities was predicted to be **not significant**.
- 6.1.4 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 site. Dispersion modelling was therefore undertaken in order to predict pollutant concentrations at sensitive locations as a result of emissions from the local highway network both with and without the development in place. Results were subsequently verified using local monitoring data.
- 6.1.5 Review of the dispersion modelling results indicated that impacts on annual mean NO₂ and PM₁₀ 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, air quality impacts as a result of the operation of the development were considered to be **not significant**, in accordance with the IAQM guidance.
- 6.1.6 Based on the assessment results, air quality factors are not considered a constraint to the development.

7.0 **ABBREVIATIONS**

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BMBC	Barnsley Metropolitan Borough Council
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DM	Do-Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EU	European Union
EV	Electric Vehicle
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	National Grid Reference
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
PM ₁₀	Particulate Matter with an aerodynamic diameter of less than 10µm
SP	Slow Phase
UDP	Unitary Development Plan
Z ₀	Roughness length

Figures



Legend



Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Lee Lane, Royston

Project Reference

2412

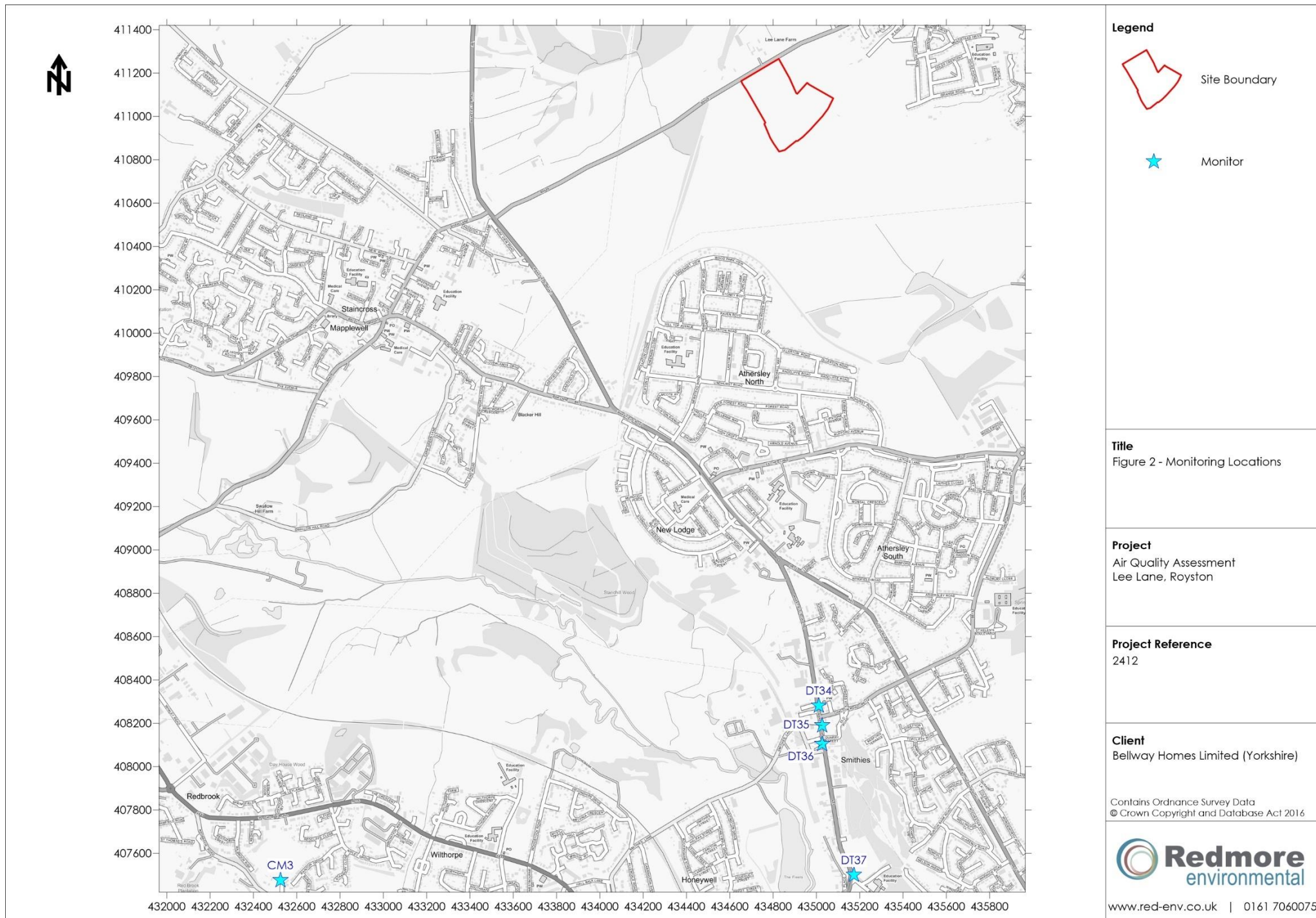
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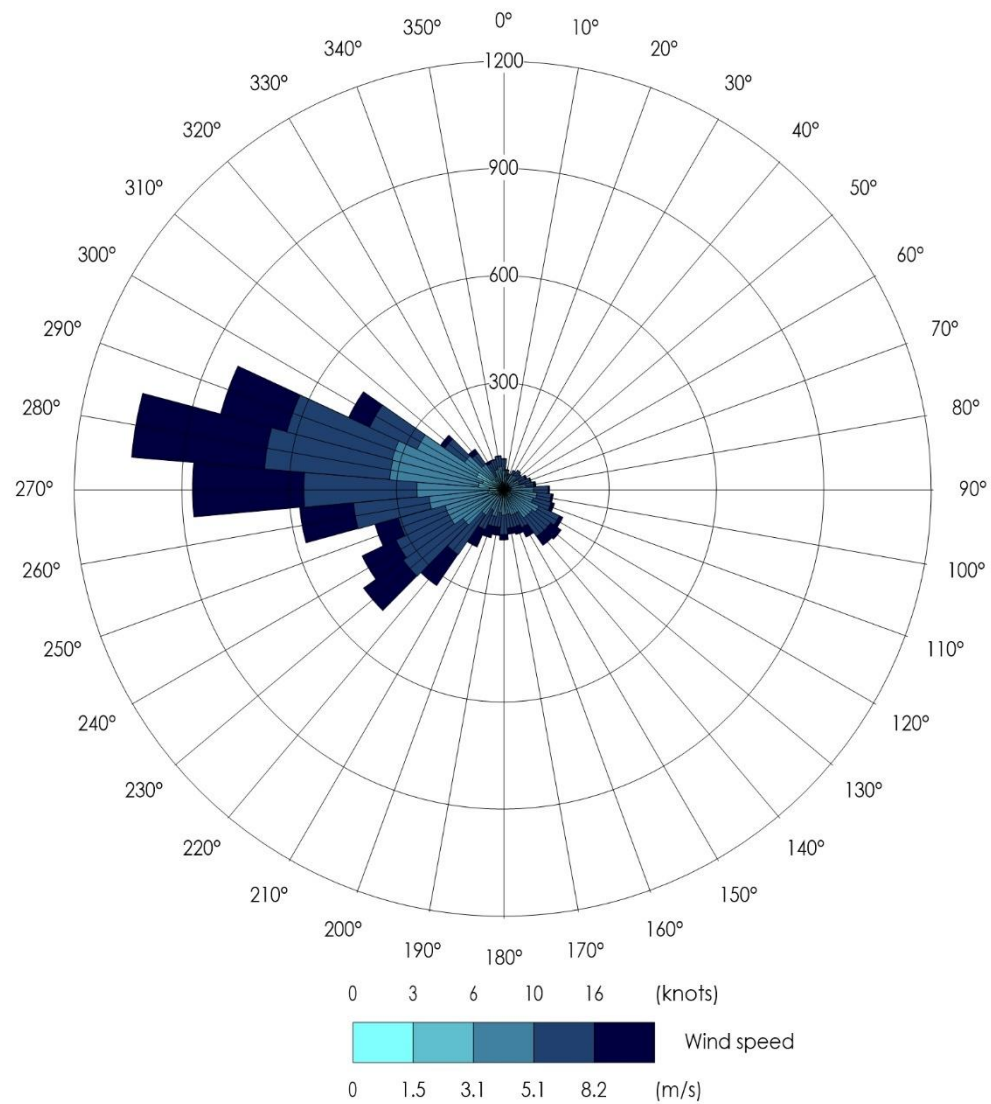
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Legend

Title
Figure 3 - Wind Rose of 2017 Emley Moor Meteorological Data

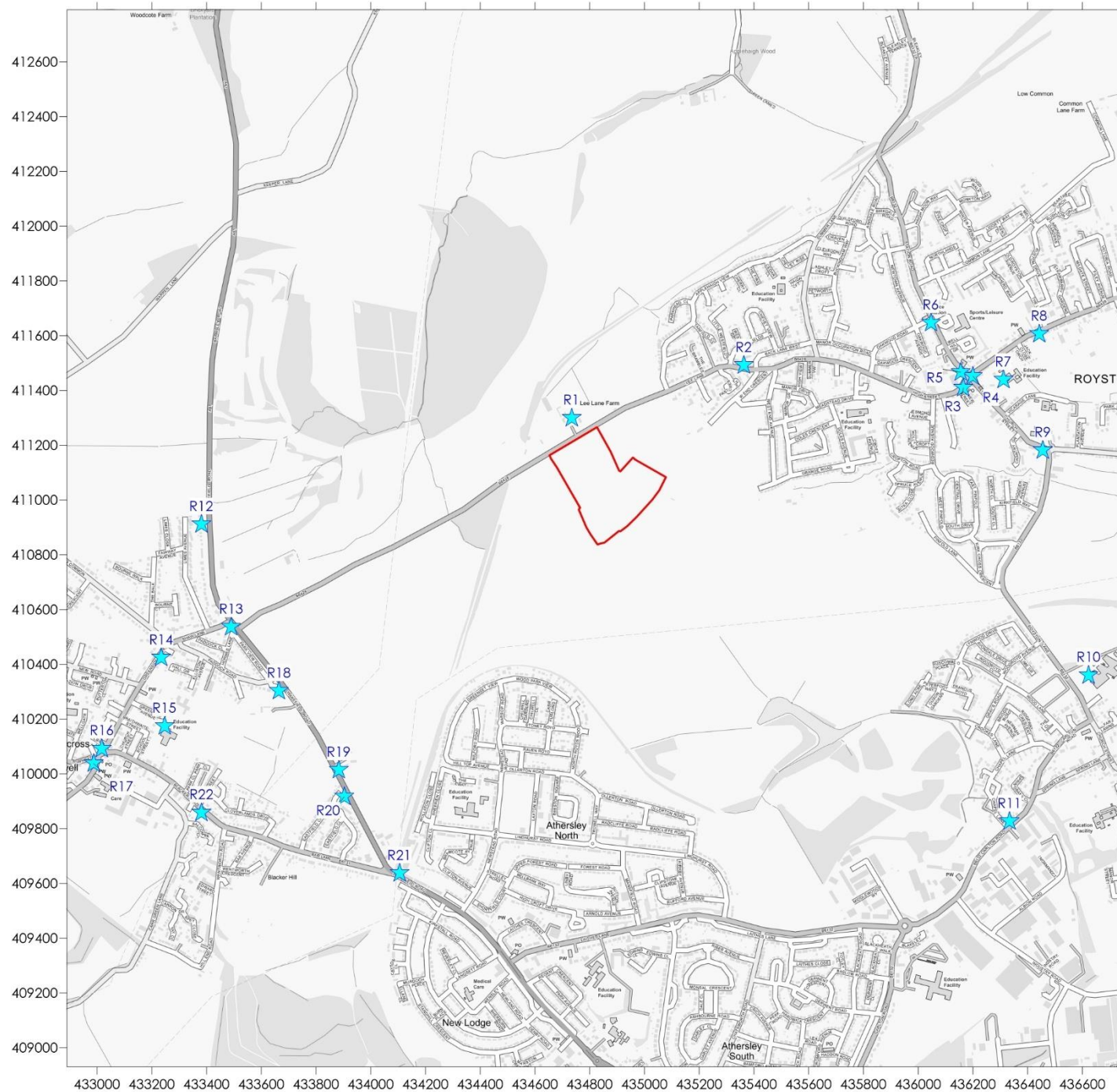
Project
Air Quality Assessment
Lee Lane, Royston

Project Reference
2412

Client
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Legend



Site Boundary



Sensitive Receptor

Title

Figure 4 - Sensitive Receptor Locations

Project

Air Quality Assessment
Lee Lane, Royston

Project Reference

2412

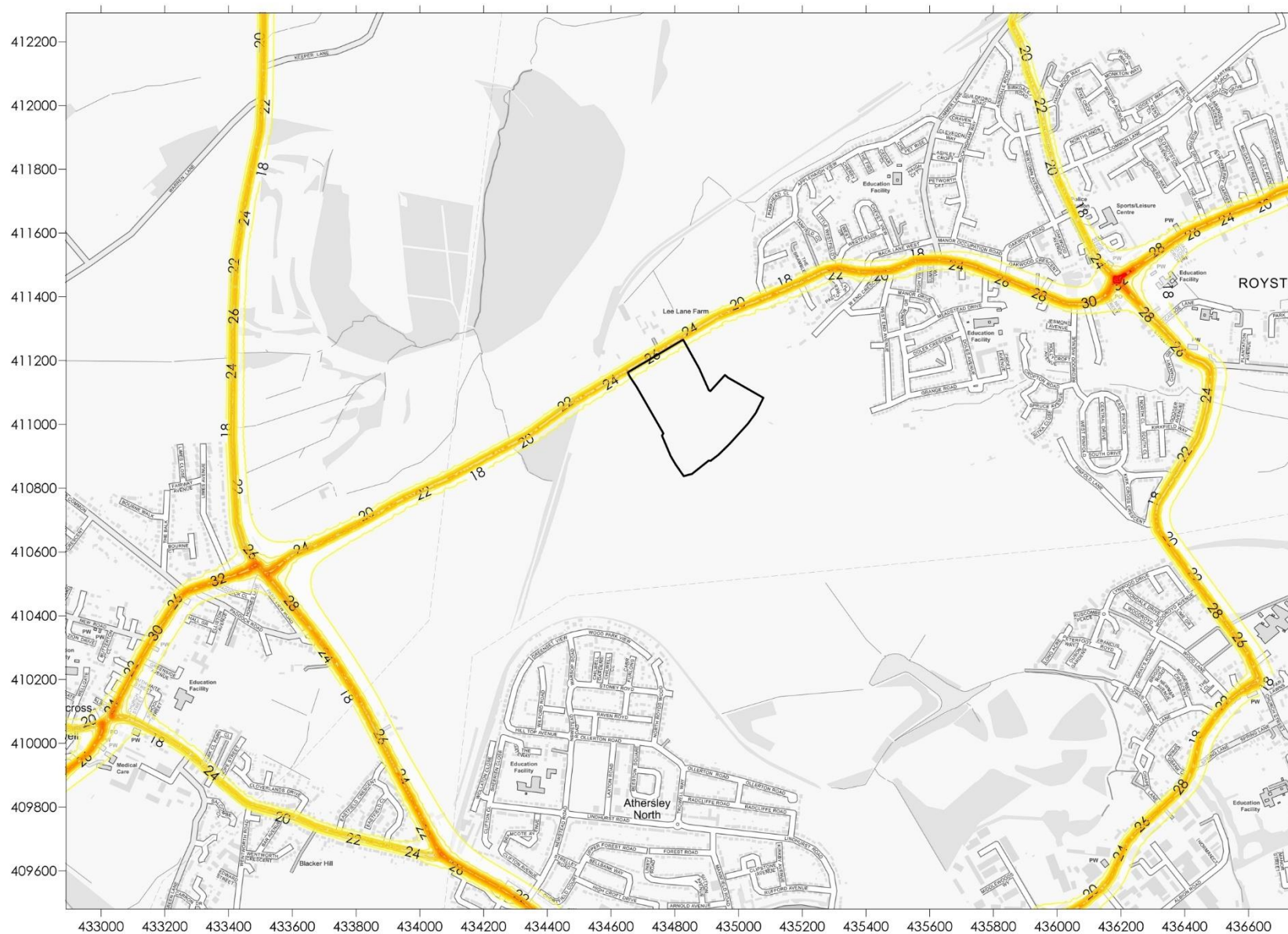
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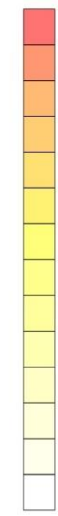
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Legend



Site Boundary



Annual Mean
NO₂ Concentration
(µg/m³)

Title

Figure 5 - Predicted Annual Mean
NO₂ Concentrations (µg/m³)
Do-Minimum

Project

Air Quality Assessment
Lee Lane, Royston

Project Reference

2412

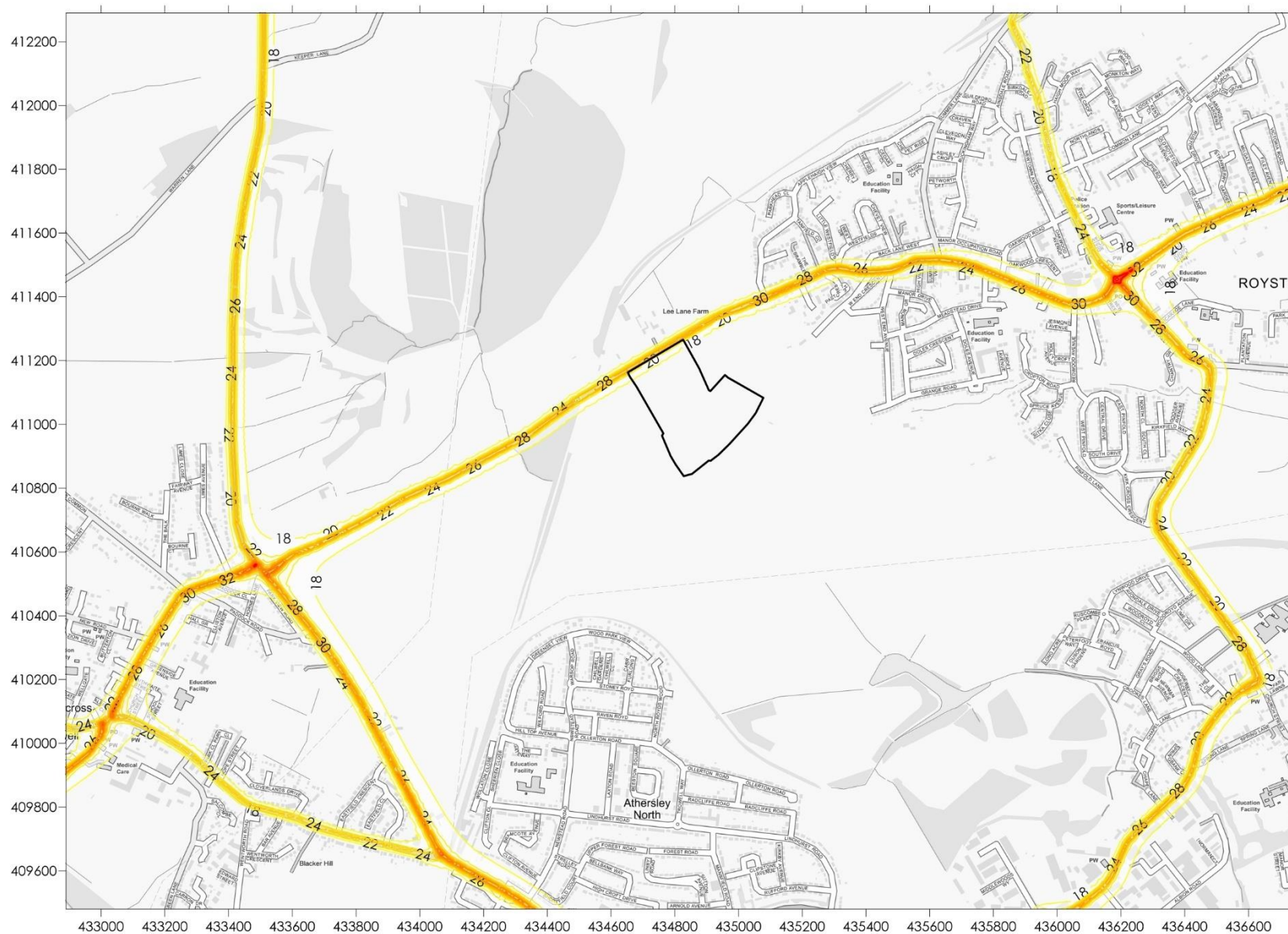
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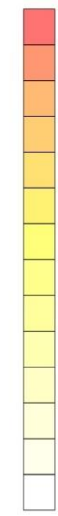
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Legend



Site Boundary



Annual Mean
NO₂ Concentration
(µg/m³)

Title

Figure 6 - Predicted Annual Mean
NO₂ Concentrations (µg/m³)
Do-Something

Project

Air Quality Assessment
Lee Lane, Royston

Project Reference

2412

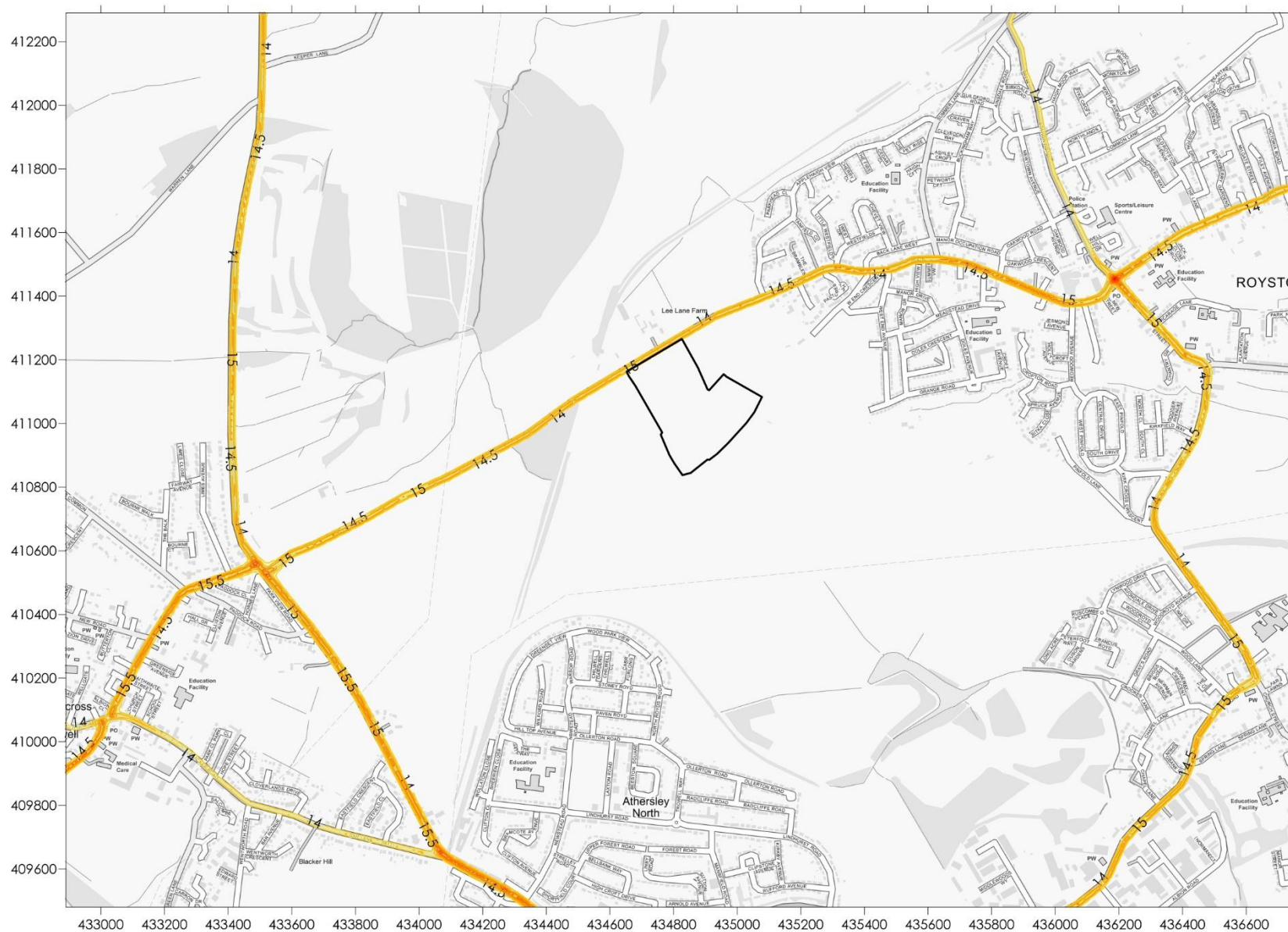
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Legend



Site Boundary



Annual Mean
PM₁₀ Concentration
(µg/m³)

Title

Figure 7 - Predicted Annual Mean
PM₁₀ Concentrations (µg/m³)
Do-Minimum

Project

Air Quality Assessment
Lee Lane, Royston

Project Reference

2412

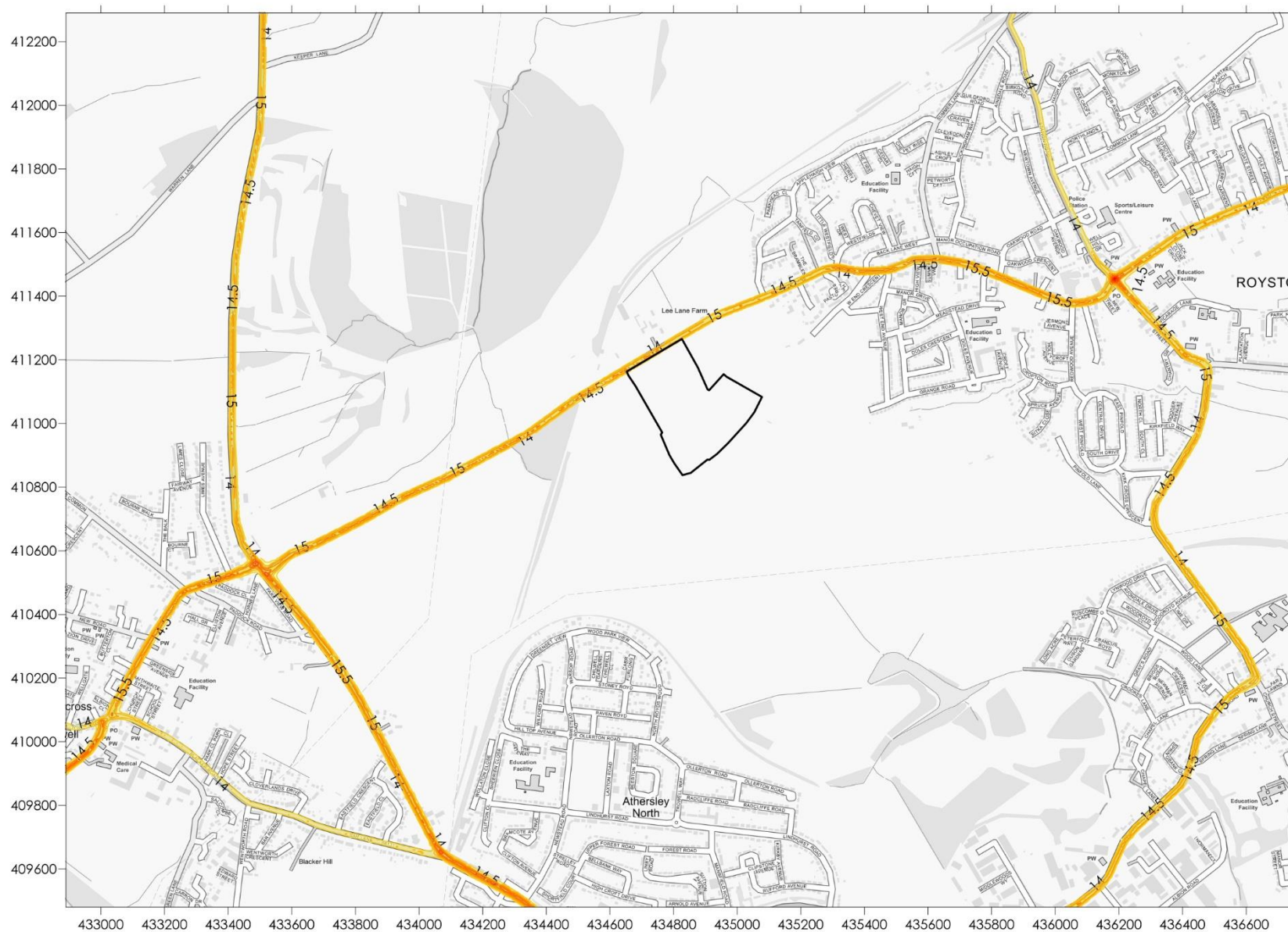
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Legend



Site Boundary



Annual Mean
PM₁₀ Concentration
(µg/m³)

Title

Figure 8 - Predicted Annual Mean
PM₁₀ Concentrations (µg/m³)
Do-Something

Project

Air Quality Assessment
Lee Lane, Royston

Project Reference

2412

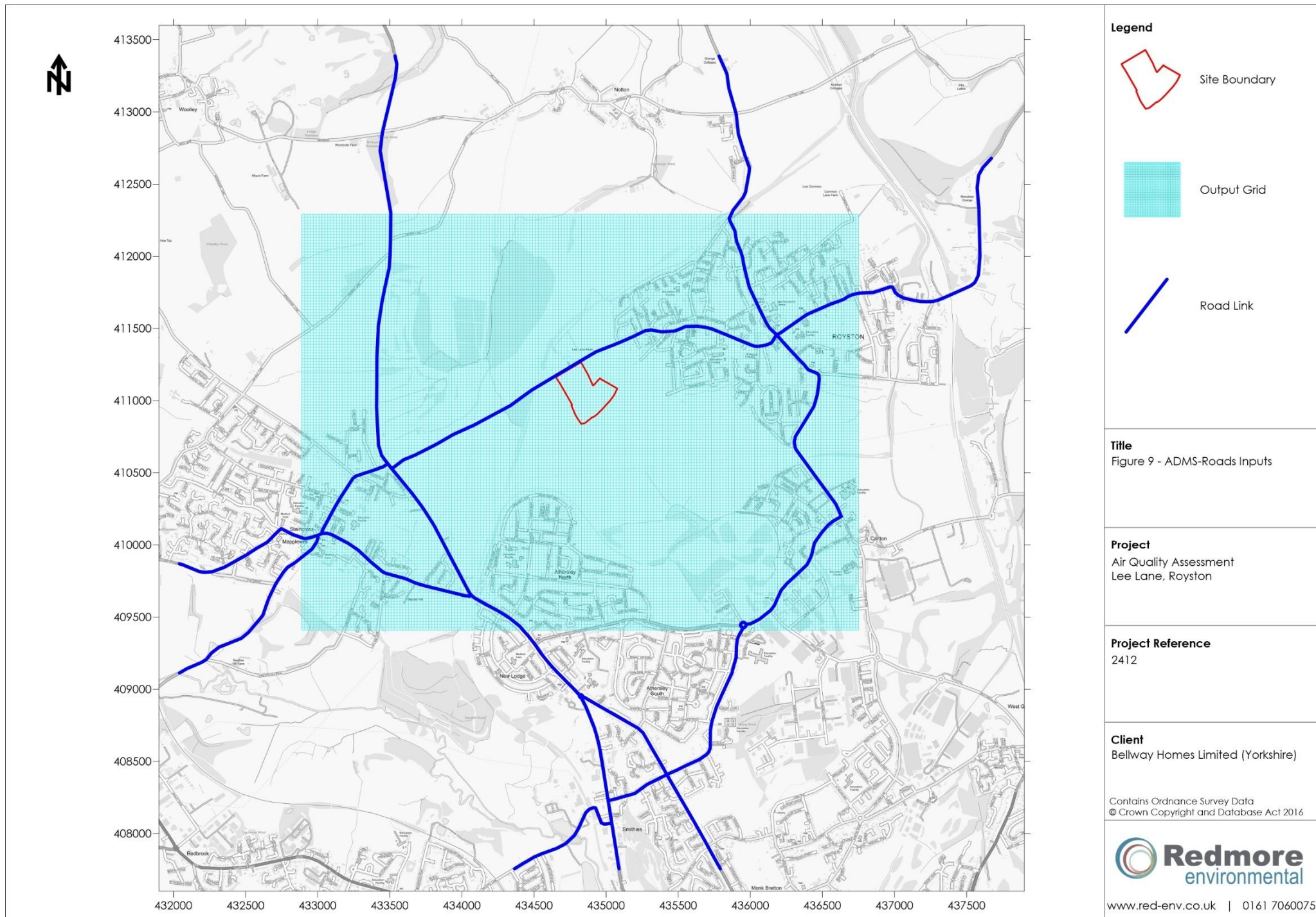
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Appendix 1 - Assessment Input Data

Introduction

The proposed development has the potential to cause air quality impacts as a result of vehicles travelling to and from the site. In order to assess NO₂ and PM₁₀ concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 4.1.1.0). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model requires input data that details the following parameters:

- Assessment area;
- Traffic flow data;
- Vehicle emission factors;
- Spatial co-ordinates of emissions;
- Street width;
- Meteorological data;
- Roughness length (z_0); and,
- Monin-Obukhov length.

These are detailed in the following Sections.

Assessment Area

The assessment area was defined based on the development location and anticipated access routes. Ambient concentrations were predicted over the area NGR: 432890, 409410 to 436750, 412290. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

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

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

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Average Annual Daily Traffic (AADT) flows and fleet composition as HDV proportion, was provided by Optima Highways, the Transport Consultants for the project.

Baseline traffic data was not available for the A633 Rotherham Road, A61 Wakefield Road - South of A633, B6131 Blacker Road and Smithies Lane as these were outside the extents of the Transport Assessment. As such, data for these links were obtained from the Department for Transport (DfT)²⁴. 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 2017. It should be noted that the DfT web tool is referenced in DEFRA guidance²⁵ 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 7.2). This software package has been developed by the DfT to calculate future traffic growth throughout the UK.

It should be noted that it was confirmed by Optima Highways that the use of a TEMPro factor would account for local traffic growth within the area generated from committed developments.

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

²⁴ <http://www.dft.gov.uk/traffic-counts/>.

²⁵ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Table A1.1 Traffic Data

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif	DM 2023	DS 2023			
L1	B6428 Midland Road	6,784	7,456	7,566	9.57	7.5	45
L2	B6428 Midland Road, Slow Phase (SP)	6,784	7,456	7,566	9.57	7.5	20
L3	B6132 Station Road, SP	4,456	4,898	4,935	2.19	6.5	20
L4	B6132 Station Road	4,456	4,898	4,935	2.19	6.5	45
L5	B6132 Church Street, SP	7,823	8,599	8,865	1.56	6.1	20
L6	B6132 Church Street	7,823	8,599	8,865	1.56	8.2	45
L7	B6132 Church Street, Junction	7,823	8,599	8,865	1.56	11.8	20
L8	B6132 Church Street, West of Carleton Road	7,823	8,599	8,865	1.56	6.1	45
L9	B6132 Church Street, West of Carleton Road, SP	7,823	8,599	8,865	1.56	12.3	20
L10	B6132 Carleton Road, SP	7,823	8,599	8,865	1.56	11.5	20
L11	B6132 Carleton Road,	7,823	8,599	8,865	1.56	7.6	45
L12	B6132 Carleton Road, East of A633, SP	7,823	8,599	8,865	1.56	7.3	20
L13	B6428 High Street, SP	7,262	7,982	8,396	4.66	8.9	20
L14	B6428 High Street	7,262	7,982	8,396	4.66	6.9	45
L15	B6428 High Street, East of Site Access	7,262	7,982	8,396	4.66	7.0	75
L16	B6428 Lee Lane, West of Site Access	7,262	7,982	8,962	4.66	7.1	75
L17	B6428 Lee Lane, West of Site Access, SP	7,262	7,982	8,962	4.66	10.5	20
L18	B6428 Shaw Lane, SP	9,648	10,605	11,029	2.43	10.7	20
L19	B6428 Shaw Lane	9,648	10,605	11,029	2.43	7.2	45
L20	B6428 Shaw Lane, North of B6131, SP	9,648	10,605	11,029	2.43	11.5	20
L21	B6428 Spark Lane, SP	9,648	10,605	11,029	2.43	9.5	20
L22	B6428 Spark Lane	9,648	10,605	11,029	2.43	5.9	45

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif	DM 2023	DS 2023			
L23	B6131, West of Shaw Lane	4,225	4,670	4,670	1.78	6.9	45
L24	B6131, between Shaw Lane and Spark Lane	4,225	4,670	5,094	1.78	7.3	45
L25	B6131, East of Shaw Lane	4,225	4,670	4,670	1.78	6.6	45
L26	B6131, East of Shaw Lane, SP	4,225	4,670	4,670	1.78	15.1	20
L27	A61 Wakefield, North of Limes Avenue	7,589	8,341	8,473	2.25	7.5	80
L28	A61 Wakefield, North of Shaw Lane	7,589	8,341	8,473	2.25	8.4	60
L29	A61 Wakefield, North of Lee Lane	7,589	8,341	9,190	2.25	9.3	60
L30	A61 Wakefield, South of Lee Lane	9,556	10,503	10,928	2.66	9.4	60
L31	A61 Wakefield, North of B6132	9,556	10,503	10,928	2.66	8.1	45
L32	A61 Wakefield, North of B6132, SP	9,556	10,503	10,928	2.66	12.2	20
L33	A61 Wakefield, South of B6132, SP	9,556	10,503	10,928	2.66	15.2	20
L34	A61 Wakefield, South of B6132	9,556	10,503	10,928	2.66	8.9	45
L35	A61 Wakefield, North of A633, SP	9,556	10,503	10,928	2.66	12.9	20
L36	A633 Rotherham Road, SP	8,534	9,433	9,645	3.76	9.3	20
L37	A633 Rotherham Road	8,534	9,433	9,645	3.76	10.5	45
L38	A633 Rotherham Road, North of B6132, SP	8,534	9,433	9,645	3.76	11.1	20
L39	A633 Rotherham Road, South of B6132, SP	8,534	9,433	9,778	3.76	7.3	20
L40	A633 Rotherham Road, South of B6132	8,534	9,433	9,778	3.76	8.6	45
L41	A61 Wakefield, South of A633, SP	11,814	13,058	13,270	5.22	9.4	20
L42	A61 Wakefield, South of A633	11,814	13,058	13,270	5.22	9.2	35
L43	A61 Wakefield, North of B6132, SP	11,814	13,058	13,270	5.22	8.2	10
L44	A61 Wakefield, South of B6132, SP	16,594	18,341	18,687	4.56	7.5	10
L45	A61 Wakefield, South of Smithies Lane	16,594	18,341	18,687	4.56	7.8	10

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)	Road Width (m)	Average Vehicle Speed (km/h)
		Verif	DM 2023	DS 2023			
L46	B6132, East of A61, SP	7,823	8,599	8,732	1.56	7.6	20
L47	B6132	7,823	8,599	8,732	1.56	7.2	35
L48	B6132, West of A633, SP	7,823	8,599	8,732	1.56	7.5	20
L49	Smithies Lane, SP	6,093	6,570	6,570	3.32	9.5	20
L50	Smithies Lane	6,093	6,570	6,570	3.32	6.7	40
R1	B6132 Roundabout	7,823	8,599	8,865	1.56	10.1	30
R2	A633/A61 Roundabout	9,968	10,998	11,422	5.22	8.7	30

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

Emission Factors

Emission factors were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 8.0.1). This has been produced by DEFRA and incorporates COPERT 5 vehicle emission factors and fleet information.

There is current uncertainty over NO₂ concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2017 emission factors were utilised in preference to the development opening year in order to provide robust model outputs. As predictions for 2017 were verified, it is considered the results are a robust indication of worst case concentrations for the future year.

Meteorological Data

Meteorological data used in the assessment was taken from Emley Moor meteorological station over the period 1st January 2017 to 31st December 2017 (inclusive). Emley Moor meteorological station is located at NGR: 422297, 412887 which is approximately 12.5km north-west of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 3 for a wind rose of 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 0.5m was used to describe the modelling extents. This value of z_0 is considered appropriate for the morphology of the area and is suggested within ADMS-Roads as being suitable for 'parkland, open suburbia'.

A z_0 of 0.2m was used to describe the meteorological site. This value of z_0 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 30m was used to describe the modelling extents. This value is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

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

Background Concentrations

A review of DEFRA data and local monitoring results was undertaken in order to identify an appropriate background value for use in the assessment. This indicated the annual mean NO₂ concentration recorded at the CM3 - Barnsley Gawber automatic station during 2017 was 16.00µg/m³, higher than the DEFRA background of 10.79µg/m³. As such, the monitoring result was used in order to provide worst-case predictions.

A PM₁₀ concentration of 12.95µg/m³ was obtained from the DEFRA mapping study for the grid square containing the development site, as shown in Table 12.

Similarly to emission factors, the background concentrations from 2017 were utilised in preference to the future year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposal.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 6.1) provided by DEFRA, which is the method detailed within DEFRA guidance²⁶.

Verification

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

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

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

For the purpose of the assessment, model verification was undertaken for 2017 using traffic data, meteorological data and monitoring results from this year.

Monitoring of NO₂ concentrations was undertaken at three locations within the modelling extents during 2017. Results were obtained and the road contributions to total NO_x concentrations calculated following the methodology contained within DEFRA guidance²⁷. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table A1.2.

²⁶ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

²⁷ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Table A1.2 Verification - Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
DT34	Wakefield Road/Carlton Road	35.2	39.36
DT35	Wakefield Road/Carlton Road	38.6	47.14
DT36	Wakefield Road/Smithies Lane (North)	43.5	58.86

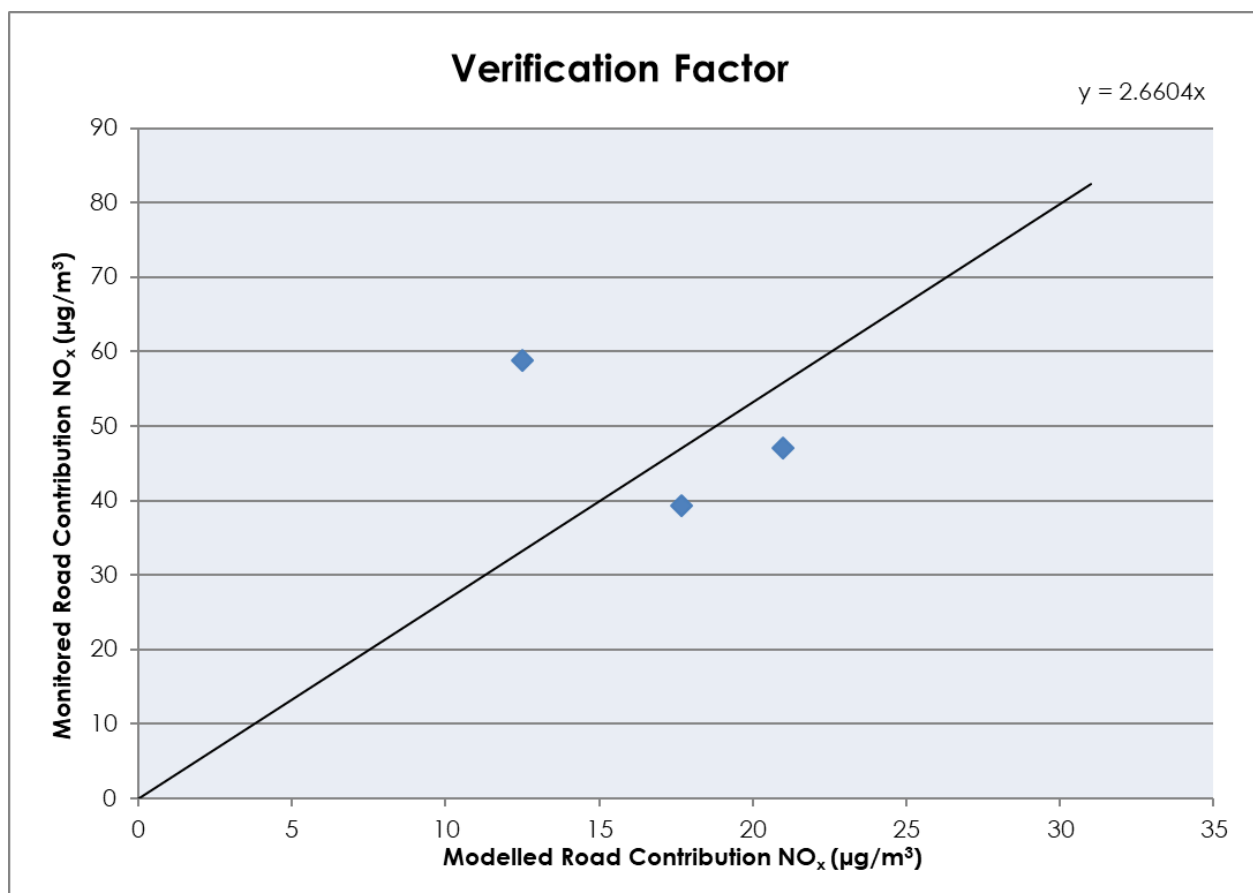
The annual mean road NO_x concentrations predicted from the dispersion model and the 2017 road NO_x concentrations calculated from the monitoring results are summarised in Table A1.3.

Table A1.3 Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
DT34	Wakefield Road/Carlton Road	39.36	17.70
DT35	Wakefield Road/Carlton Road	47.14	21.00
DT36	Wakefield Road/Smithies Lane (North)	58.86	12.50

The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 2.6604 was required to be applied to all NO_x modelling results, as shown in Graph 1.

Graph 1 - NO_x Verification Factor



Further analysis of model performance is recommended in DEFRA guidance²⁸ in order provide additional confidence in assessment predictions. As such, a comparison of the modelled and monitored NO₂ concentrations was undertaken. The NO_x verification factor was therefore applied to the modelled road NO_x concentrations at the monitoring locations and the total NO₂ concentrations calculated using the NO_x to NO₂ spreadsheet. This is summarised in Table A1.4.

Table A1.4 NO₂ Verification - Difference between Monitored and Modelled NO₂ Concentrations

Monitoring Location		Modelled Road NO _x Concentration - Verified (µg/m³)	Modelled NO ₂ Concentration (µg/m³)	Monitored NO ₂ Concentration (µg/m³)	Difference between Monitored and Modelled NO ₂ Concentration (%)
DT34	Wakefield Road/Carlton Road	47.09	38.58	35.2	+9.60

²⁸ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Monitoring Location		Modelled Road NO _x Concentration - Verified (µg/m ³)	Modelled NO ₂ Concentration (µg/m ³)	Monitored NO ₂ Concentration (µg/m ³)	Difference between Monitored and Modelled NO ₂ Concentration (%)
DT35	Wakefield Road/Carlton Road	55.87	42.27	38.6	+9.51
DT36	Wakefield Road/Smithies Lane (North)	33.25	32.45	43.5	-25.40

DEFRA guidance²⁹ states that the majority of modelled results should be within +/-25% of the monitored concentrations. As shown in Table A1.4, the difference between the modelled and monitored NO₂ concentrations at the DM34 - Wakefield Road/Carlton Road and DM35 - Wakefield Road/Carlton Road diffusion tubes were within the stated limits.

DT36 - Wakefield Road/Smithies Lane (North) was marginally outside of the stated limit. The underprediction is considered to be a result of the position of the diffusion tube close to a bus stop. As such, the monitored concentration is anticipated to be affected by vehicle emissions from idling buses which the model cannot accurately represent. However, removal of the monitor from the verification procedure resulted in a lower verification factor of 2.236. It was therefore decided to include the result and utilise a factor of 2.6604 in order to provide a worst case adjustment of pollutant levels.

Monitoring of PM₁₀ concentrations is not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust PM₁₀ model predictions in lieu of more accurate data in accordance with DEFRA guidance³⁰.

²⁹ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

³⁰ Local Air Quality Management Technical Guidance (TG16), DEFRA, 2018.

Date: 7th December 2018

Ref: 2412

Appendix 2 - Curricula Vitae

KEY EXPERIENCE:

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

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

SELECT PROJECTS SUMMARY:

Industrial

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

Tatweer Petroleum - dispersion modelling of Bahrain oil field.

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

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

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

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

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

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

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

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

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

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

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

Residential

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

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

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

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

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre.

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

York St, Bury - residential development adjacent to AQMA.

Temple Point Leeds - residential development adjacent to M1.

Commercial and Retail

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

Wakefield College - redevelopment of city centre campus in AQMA.

Manchester Airport Cargo Shed - commercial development.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

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

KEY EXPERIENCE:

Pearl 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 assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality.
- Assessment of construction dust impacts from a range of development sizes.
- Assessment of fugitive dust impacts from a range of mineral extraction developments.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.
- Odour monitoring at industrial sites to quantify odour emission rates.

SELECT PROJECTS SUMMARY:

Maid Marian House, Nottingham

Air Quality Assessment for a change of use from office units to residential use. Concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions from the A6008 Maid Marian Way. Dispersion modelling took place at several different heights reflective of residential units within the development. Predicted concentrations of NO₂ were found to exceed air quality criteria at numerous levels of the proposed building. Mechanical ventilation was specified in the appropriate units within the development as a form of mitigation.

Victoria Quarter, London

Air Quality Assessment in support of residential development in an AQMA. Dispersion modelling was undertaken to consider the potential impact of development generated vehicles and CHP/Boiler emissions on air quality at sensitive receptor locations within the vicinity of the site. Different heights within the development, reflective of the proposed residential units, were also considered. The assessment identified a range of impacts, as such, a range of mitigation was specified. Mechanical ventilation was also specified in the appropriate units predicted to be exposed to poor levels of air quality.

Monks Farm, Townsend Grove

Air Quality EIA in support of residential development comprising 456 dwellings and primary school. NO₂ and PM₁₀ concentrations were predicted to be below the air quality objectives at the sensitive receptors considered. Air quality effects as a result of the proposals was determined to be not significant.

Stanton Harcourt, West Oxford

Odour Assessment for the redevelopment of the former Stanton Harcourt Airfield to residential properties. Due to the location of the site, being adjacent to a recently capped landfill, odour surveys were required to assess the level of odour across the site. A risk assessment was also undertaken in accordance with appropriate odour guidance. Taking into account the results of the odour surveys, recent odour complaint history and odour risk assessment the potential for odour effects across the site was determined to be not significant.

Hunter Street, Chester

Air Quality Assessment in support of a development for student accommodation. Concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions from the A5268. Dispersion modelling took place at several different heights of the proposed building. Predicted concentrations of NO₂ were found to exceed air quality criteria at ground to first floor level for those apartments facing the A5268. Mechanical ventilation was specified in these units as a form of mitigation.

Botley Road, West End, Southampton

Co-ordination and management of a six month diffusion study in support of a proposed residential development. Concerns were raised regarding the exposure of future residents to poor air quality due to road traffic emissions from the M27. The results of the monitoring study identified NO₂ concentrations across the site to be below the air quality objective and therefore deemed suitable for residential use.