

Air Quality Assessment
Barnsley Road, Goldthorpe

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Prepared by	Elen Owen	Elen Owen		
Position	Graduate Air Quality Consultant	Graduate Air Quality Consultant		
Reviewed by	Jethro Redmore	Jethro Redmore		
Position	Director	Director		
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10th floor Chancery Place, 50 Brown Street, Manchester, M2 2JG

info@red-env.co.uk | 0161 706 0075 | www.red-env.co.uk

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Executive Summary

Redmore Environmental Ltd was commissioned by Dearne Estates (Goldthorpe) Ltd to undertake an Air Quality Assessment in support of a retail development on land north of Barnsley Road, Goldthorpe.

The proposals include two retail units and associated car parking. It should be noted that each unit is covered by a separate planning application. However, potential air quality impacts have been considered cumulatively within this report to ensure a robust assessment.

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.

A number of mitigation options were identified to reduce potential emissions associated with the scheme. These were related to the predicted impacts, as determined in accordance with the relevant best practice guidance.

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

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Dearne Estates (Goldthorpe) Ltd to undertake an Air Quality Assessment in support of a proposed retail development on land north of Barnsley Road, Goldthorpe.

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 to the north of Barnsley Road, Goldthorpe, at approximate National Grid Reference (NGR): 445014, 404268. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise two retail units, parking and associated infrastructure. It should be noted that each unit is covered by a separate planning application. However, potential air quality impacts have been considered cumulatively within this report to ensure a robust assessment.

1.2.3 Planning applications have been submitted separately for each retail unit, reference 2016/0090 and 2016/0091, respectively. A consultation response from Barnsley Metropolitan Borough Council (BMBC) highlighted concerns regarding the potential air quality impacts associated with the proposals. These may include fugitive dust emissions associated with construction work and operational phase road traffic exhaust emissions from vehicles travelling to and from the site. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider the potential cumulative effects as a result of both units included in 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 99/30/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 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 guidance LAQM.TG(09)² 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 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 Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.

² Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

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 (2010), 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 practice measures.

2.5 National Planning Policy

2.5.1 The National Planning Policy Framework³ (NPPF) was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to the proposed development:

"The planning system should contribute to and enhance the natural and local environment by: [...]

Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"

"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

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

³ NPPF, Department for Communities and Local Government, 2012.

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?
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 BMBC Local Development Plan consists of the Core Strategy, the Barnsley Education Sites Development Plan Document, the Joint Waste Plan and saved policies from the Unitary Development Plan (UDP). The Core Strategy⁵ was adopted in September 2011 and sets out the key elements of the planning framework for Barnsley. Review of the Core Strategy revealed the following policy 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,

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

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

dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.

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

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

2.7.2 The Core Strategy supersedes the majority of the UDP⁶. However, some policies from the UDP have been saved until the adoption of the new Local Plan, which is currently in the consultation phase. Review of the UDP saved policies document revealed 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.

[...]"

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

⁶ Volume 1: Strategy, Policy and Justification, Barnsley UDP, BMBC, 2000.

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 agreed via email with Chris Shields, Technical Officer for Pollution Control at BMBC, on 7th April 2016.

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'⁷.

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 PM₁₀.

3.2.4 The assessment steps are detailed below.

⁷ Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.

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	<ul style="list-style-type: none">• 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

Magnitude	Activity	Criteria
	Construction	<ul style="list-style-type: none"> Total building volume greater than 100,000m³ On site concrete batching Sandblasting
	Trackout	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Total building volume 25,000m³ to 100,000m³ Potentially dusty construction material (e.g. concrete) On site concrete batching
	Trackout	<ul style="list-style-type: none"> 10 to 50 HDV trips per day Moderately dusty surface material (e.g. high clay content) Unpaved road length 50m to 100m
Small	Earthworks	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Total building volume less than 25,000m³ Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	<ul style="list-style-type: none"> Less than 10 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

3.2.10 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	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Internationally or nationally designated site e.g. Special Area of Conservation
Medium	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Nationally designated site e.g. Sites of Special Scientific Interest
Low	<ul style="list-style-type: none"> • Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads 	<ul style="list-style-type: none"> • Locally designated site e.g. Local Nature Reserve

3.2.11 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.

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

3.2.13 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

3.2.14 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

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
	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	-	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low	Low

3.2.15 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

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

3.2.17 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

3.2.18 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

3.2.19 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance⁸ 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

3.2.20 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

⁸ Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.

effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be **not significant**.

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

- Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2017 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2017 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 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)⁹ on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance LAQM.TG(09)¹⁰ on where the AQOs apply, as summarised in Table 2, was utilised to determine appropriate receptor positions.

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

⁹ DMRB Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.

¹⁰ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Control: Planning for Air Quality¹¹. 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
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 document¹² 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. It should be noted that this is a binary judgement of either **significant** or **not significant**. The determination of significance relies on professional

¹¹ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

¹² Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

judgement and reasoning has been provided as far as practicable. The IAQM guidance¹³ suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 2.

¹³ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

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. Eight AQMAs have therefore been declared, with the closest to the development described as:

“An area encompassing the junction of Rotherham Road and Burton Road”

4.2.2 The development is located approximately 9.4km south-east of the AQMA. It is considered unlikely the proposals would cause air quality impacts over a distance of this magnitude. As such, the AQMA has not been considered further in the context of this 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 from sites in the vicinity of the development are shown in Table 11.

Table 11 Monitoring Results

Monitoring Site		Monitored 2014 NO ₂ Concentration (µg/m ³)
DT106	Doncaster Road, Darfield	33.2

Monitoring Site		Monitored 2014 NO ₂ Concentration (µg/m ³)
DT107	Doncaster Road, Darfield	36.6

4.3.2 As shown in Table 11, annual mean NO₂ concentrations were below the AQO at both monitoring sites in recent years. Reference should be made to Figure 2 for a map of the diffusion tube locations.

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: 445500, 404500. Data for this location was downloaded from the DEFRA website¹⁴ 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)		
	2014	2016	2017
NO ₂	15.83	14.81	14.22
PM ₁₀	16.94	15.59	16.46

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.

¹⁴ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011>.

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	1 - 10	0
Up to 50	10 - 100	0
Up to 100	10 - 100	-
Up to 350	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 500m of the site access. These are summarised in Table 14. For the purpose of the assessment it was assumed construction phase traffic would access the site from Barnsley Road.

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	More than 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	The Aldi Foodstore located directly to the west of the site was approved for development in August 2014, planning reference 2014/1020. Thus, it is likely the construction phase spanned part of 2015 resulting in dust generation
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	There is no significant screening around the site boundary
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 south. As such, receptors to the north of the site 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

4.5.6 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 users would expect to enjoy a reasonable level of amenity, aesthetics or value of their property could be diminished by soiling and people would be expected to be present for extended periods of time e.g. residential properties.

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	Medium	Medium	High

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
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 Road Vehicle Exhaust Emission Sensitive Receptor Locations

Receptor		NGR (m)		Height (m)
		X	Y	
R1	Residential - Holly Grove	445112.5	404228.6	1.5
R2	Residential - Holly Grove	445132.9	404217.4	1.5
R3	Residential (First Floor) - Barnsley Road	445382.0	404190.9	4.5
R4	Residential - Barnsley Road	445195.3	404190.7	1.5
R5	Residential - Nicholas Road	445407.5	404239.6	1.5
R6	Residential - Nicholas Road	445439.2	404259.3	1.5
R7	Dearne Highgate Primary School	445413.7	404324.4	1.5
R8	Residential - A635	445182.8	404413.5	1.5
R9	Residential - Highgate House Farm	444713.7	404234.3	1.5
R10	Residential - Westmore Close	445434.0	404206.3	1.5
R11	Residential - Highgate Lane	445378.0	404074.6	1.5
R12	Residential - Highgate Lane	445393.4	403883.8	1.5
R13	Residential - Barnsley Road	445483.9	404256.3	1.5
R14	Residential - Barnsley Road	445377.5	404191.0	1.5

4.5.9 The sensitive receptors identified in Table 17 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposals that have not been

individually identified above. 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 is estimated to cover 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 **medium**. In accordance with the criteria outlined in Table 8, the development is considered to be a **medium** risk site for dust soiling as a result of earthworks activities.

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

Construction

5.2.7 Due to the size of the development site the total building volume is likely to be less than 25,000m³. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **small**.

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

Trackout

5.2.10 Information on the number of HDV trips to be generated during the construction phase of the development was not available at the time of assessment. Similarly, the surface material and unpaved road length was not known at this stage of the project.

5.2.11 Based on the site area, it is anticipated that the unpaved road length will 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**.

5.2.12 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.

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

Summary of the Risk of Dust Effects

5.2.14 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	Medium	Medium
Human Health	Negligible	Low	Low

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

5.2.16 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

The IAQM guidance¹⁵ 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.

¹⁵ Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.

Table 19 Fugitive Dust Emission Mitigation Measures

Issue	Control Measure
Communications	<ul style="list-style-type: none"> • Develop and implement a stakeholder communications plan that includes community engagement before work commences on site • Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager • Display the head or regional office contact information
Site management	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Undertake daily on-site and off-site inspection to monitor dust, record inspection results, and make the 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	<ul style="list-style-type: none"> • Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible • Fully enclose 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 • Keep site fencing, barriers and scaffolding clean using wet methods • Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used • Cover, seed or fence stockpiles to prevent wind whipping
Operating vehicle/machinery and sustainable travel	<ul style="list-style-type: none"> • Ensure all vehicles switch off engines when stationary - no idling vehicles • Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable • Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas
Operations	<ul style="list-style-type: none"> • 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 • Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods

Issue	Control Measure
Waste management	<ul style="list-style-type: none"> • Avoid bonfires and burning of waste materials
Earthworks	<ul style="list-style-type: none"> • Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable • Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil as soon as practicable
Construction	<ul style="list-style-type: none"> • 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 • Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos
Trackout	<ul style="list-style-type: none"> • Use water-assisted dust sweeper on access and local roads • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable • Implement a wheel washing system • Access gates to be located at least 10m from receptors where possible

5.2.17 The above measures can be secured through a planning condition requiring a Construction Method Statement, if deemed necessary by BMBC.

Step 4

5.2.18 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 IAQM guidance¹⁶.

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

¹⁶ Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.

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:

- 2014 - Verification;
- 2017 - DM; and,
- 2017 - DS.

5.3.3 The DM (i.e. without development) scenario 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 traffic associated with the operation of both retail units.

5.3.4 It has been assumed all traffic movements generated by the development are new. However, a proportion of the trips are likely to be the result of a redistribution of existing flows, as discussed in the Transport Statement¹⁷ produced in support of the development. Thus, the DS traffic included in the assessment is likely to be an overestimation and represents a worst case scenario.

5.3.5 For the purpose of this assessment traffic data for 2017 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 2014 were utilised within the dispersion model. The use of 2017 traffic data and 2014 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.

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

¹⁷ Proposed Retail Development Transport Statement, Barnsley Road, Highgate, Goldthorpe, Exigo Project Solutions, 2015.

Predicted Concentrations

5.3.7 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 - Holly Grove	27.36	27.60	0.24
R2	Residential - Holly Grove	30.16	30.49	0.33
R3	Residential (First Floor) - Barnsley Road	27.90	28.07	0.17
R4	Residential - Barnsley Road	28.68	29.01	0.33
R5	Residential - Nicholas Road	37.97	38.25	0.28
R6	Residential - Nicholas Road	40.02	40.25	0.23
R7	Dearne Highgate Primary School	33.99	34.14	0.15
R8	Residential - A635	31.57	31.69	0.12
R9	Residential - Highgate House Farm	26.17	26.27	0.10
R10	Residential - Westmore Close	34.63	34.83	0.20
R11	Residential - Highgate Lane	34.45	34.58	0.13
R12	Residential - Highgate Lane	37.10	37.20	0.10
R13	Residential - Barnsley Road	38.43	38.62	0.19
R14	Residential - Barnsley Road	36.84	37.18	0.34

5.3.8 As indicated in Table 20, predicted annual mean NO₂ concentrations were below the relevant AQO at all sensitive receptors in both scenarios with the exception of R6 - Nicholas Road. Reference should be made to Figure 5 and 6 for graphical representations of annual mean NO₂ concentrations across the assessment area for the DM and DS scenarios, respectively.

Predicted Impacts

5.3.9 Predicted impacts on annual mean NO₂ concentrations at the sensitive receptor locations are summarised in Table 21.

Table 21 Predicted Impacts - NO₂

Receptor		Predicted Annual Mean NO ₂ Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Holly Grove	Below 75% of AQO	1	Negligible
R2	Residential - Holly Grove	76 - 94% of AQO	1	Negligible
R3	Residential (First Floor) - Barnsley Road	Below 75% of AQO	0	Negligible
R4	Residential - Barnsley Road	Below 75% of AQO	1	Negligible
R5	Residential - Nicholas Road	95 - 102% of AQO	1	Slight
R6	Residential - Nicholas Road	95 - 102% of AQO	1	Slight
R7	Dearne Highgate Primary School	76 - 94% of AQO	0	Negligible
R8	Residential - A635	76 - 94% of AQO	0	Negligible
R9	Residential - Highgate House Farm	Below 75% of AQO	0	Negligible
R10	Residential - Westmore Close	76 - 94% of AQO	0	Negligible
R11	Residential - Highgate Lane	76 - 94% of AQO	0	Negligible
R12	Residential - Highgate Lane	76 - 94% of AQO	0	Negligible
R13	Residential - Barnsley Road	95 - 102% of AQO	0	Negligible
R14	Residential - Barnsley Road	76 - 94% of AQO	1	Negligible

5.3.10 As indicated in Table 21, impacts on annual mean NO₂ concentrations as a result of the proposed development were predicted to be **negligible** at 12 receptors and **slight** at two locations.

Barnsley Air Quality and Emissions Good Practice Guidance

5.3.11 BMBC have produced Air Quality and Emissions Good Practice Planning Guidance¹⁸ which includes guidance 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.

5.3.12 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 it meets the requirement shown in Table 22.

Table 22 Development Classification Requirement

Land Use	Description
Non-Food Retail (A1)	Retail sale of non-food goods to the public; but includes sandwich bars or other cold food purchased and consumed off site

5.3.13 The triggers for major development classification and associated response are summarised in Table 23.

Table 23 Major Development Classification

Guidance	Comment
Where the proposed development falls within the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2011 and includes air quality and/or transport as a specific likely impact	The proposals are not subject to an EIA
Proposals located within the area identified in Map 1	The site is not located in any of the highlighted areas in Map 1
Proposals that include additional Heavy Goods Vehicle (HGV) movements by more than 10% of total trips.	The proposals are not anticipated to result in HGV movements in excess of 10% of total trips
Where significant demolition and construction works are proposed	The area of development is relatively small and sufficient measures will be put in place to mitigate construction dust

¹⁸ Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2014.

5.3.14 As shown in Table 23, the proposals do not meet any of the triggers of **major** development classification. As such, the scheme was determined as **medium** in accordance with the Barnsley guidance¹⁹.

5.3.15 The document provides a number of mitigation options that should be included on all medium scale developments. These include the following:

- Provision of a Travel Plan;
- Provision of secure cycle storage; and,
- The use of such mitigation measures as designed the layout of the site taking into account air quality; and the use of green infrastructure or contributing to the funding of green infrastructure at schools etc.

5.3.16 It is confirmed that ten cycle spaces will be included on the site. The indicative site layout also includes greenery along parts of the site boundary which will encourage pollutant deposition and absorption. A full Travel Plan will also be produced for the development.

Overall Impact Significance

5.3.17 The overall significance of operational phase road traffic emission impacts was determined as **slight**. This was based on the overall predicted impacts at discrete receptor locations, the proposed mitigation measures and the considerations outlined in Section 3.3. 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 concentrations were below the relevant AQO at all but one sensitive receptor. This is unlikely to change in the future 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

¹⁹ Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2014.

Guidance	Comment
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	<p>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</p> <p>The assessment assumed that all trips generated by the development were new. However, it is likely that a proportion of the trips will be a redistribution of existing traffic, as noted in the Transport Statement produced in support of the development</p> <p>Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature</p>

5.3.18 The IAQM guidance²⁰ states that only if the impact is greater than **slight**, the effect is considered significant. Residual impacts are likely to be controlled by the stated mitigation options and are therefore considered to be considered **not significant**.

²⁰ Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2015.

6.0 CONCLUSION

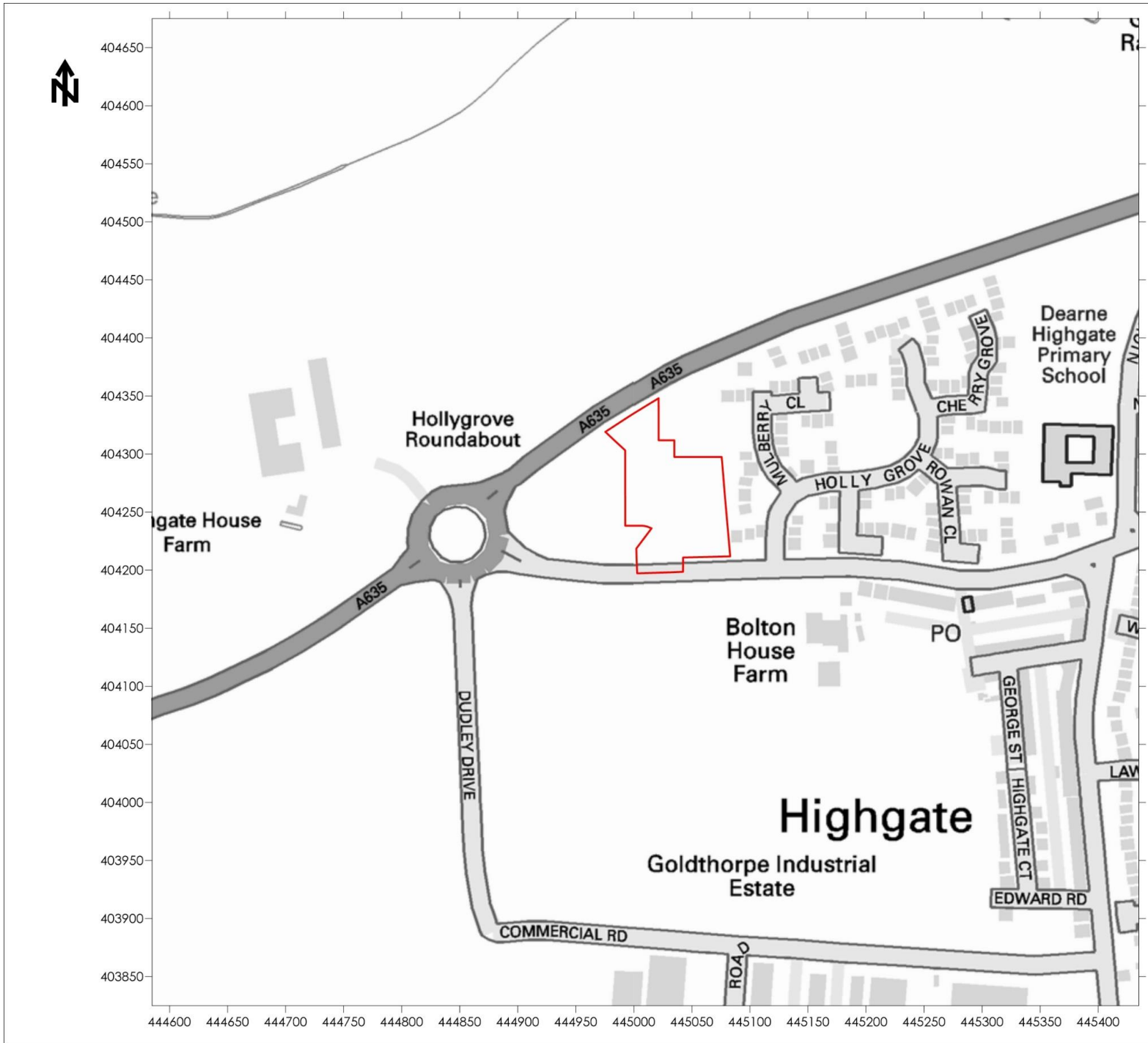
- 6.1.1 Redmore Environmental Ltd was commissioned by Dearne Estates (Goldthorpe) Ltd to undertake an Air Quality Assessment in support of a retail development on land north of Barnsley Road, Goldthorpe.
- 6.1.2 The proposals have the potential to cause air quality impacts as a result of construction and operational phase activities. An Air Quality Assessment was therefore undertaken to assess potential effects at sensitive locations in the vicinity of the site.
- 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 proposed development may occur due to road traffic exhaust emissions associated with vehicles travelling to and from the site. An assessment was therefore undertaken using detailed dispersion modelling to quantify NO₂ concentrations both with and without the proposals.
- 6.1.5 Impacts on NO₂ concentrations as a result of operational phase road vehicle exhaust emissions were predicted to be **negligible** at twelve receptors and **slight** at 2 locations. As worst-case assumptions were made throughout the assessment, it is anticipated that the magnitude of future impacts is likely to be smaller than those predicted.
- 6.1.6 A number of mitigation options were identified in order to reduce vehicle exhaust emissions associated with the development. Based on the range of predicted impacts, as well as the proposed control techniques, the overall significance of potential air quality impacts was determined as **slight**.
- 6.1.7 Following consideration of the relevant issues, residual impacts as a result of the operation of the development were considered to be **not significant**, in accordance to the IAQM guidance, subject to the inclusion of the identified mitigation measures.
-

6.1.8 Based on the assessment results, air quality issues are not considered a constraint to planning consent for 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
DfT	Department for Transport
DM	Do-Minimum
DMRB	Design Manual for Roads and Bridges
DPD	Development Plan Document
DS	Do-Something
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
LAQS	Local Air Quality Strategy
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
UDP	Unitary Development Plan
Z ₀	Roughness length

Figures



Legend

 Site Boundary

Title
Figure 1 - Site Location Plan

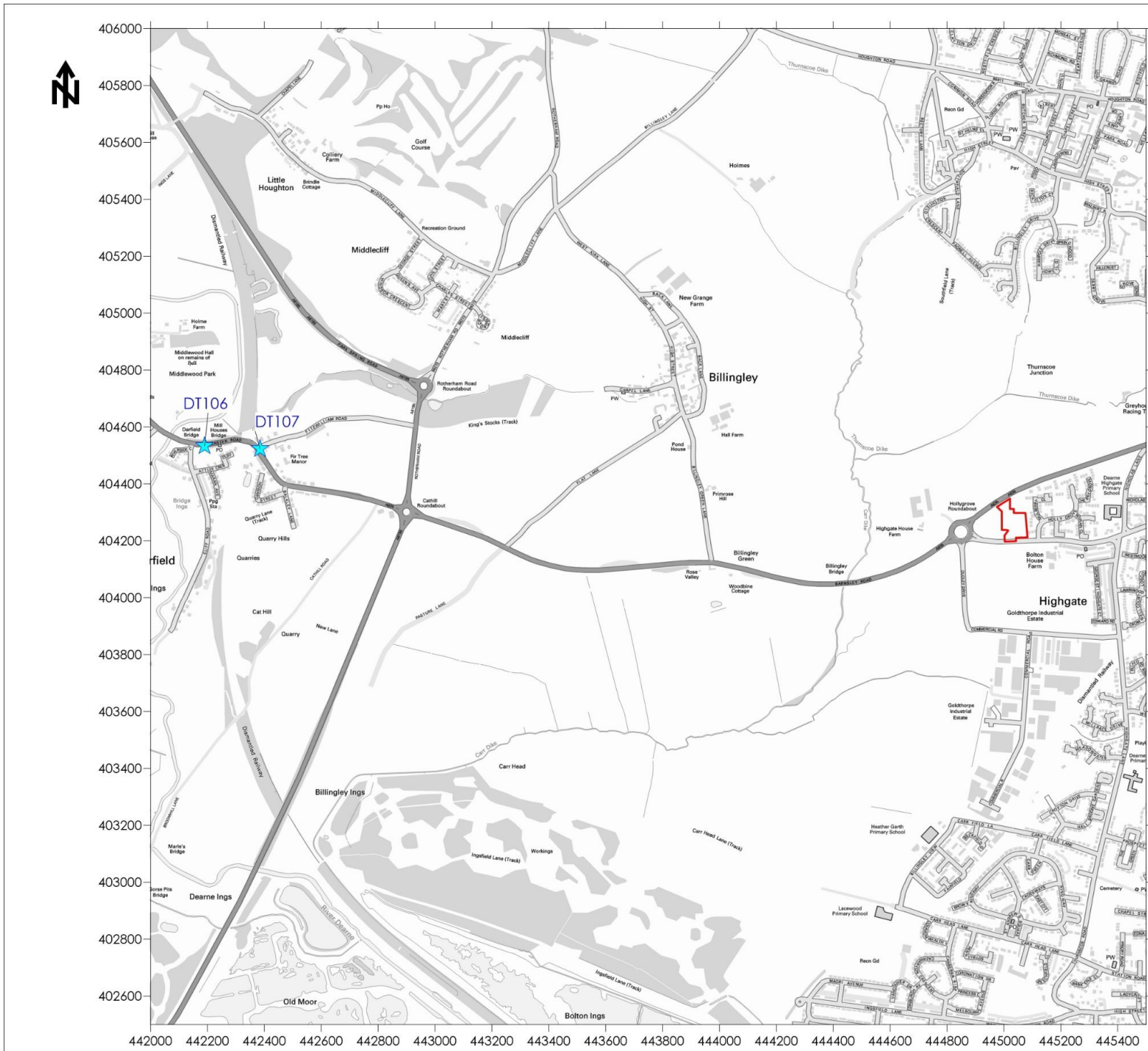
Project
Air Quality Assessment
Barnsley Road, Goldthorpe

Project Reference
1282

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Legend

-  Site Boundary
-  Monitoring Locations

Title
Figure 2 - Monitoring Locations

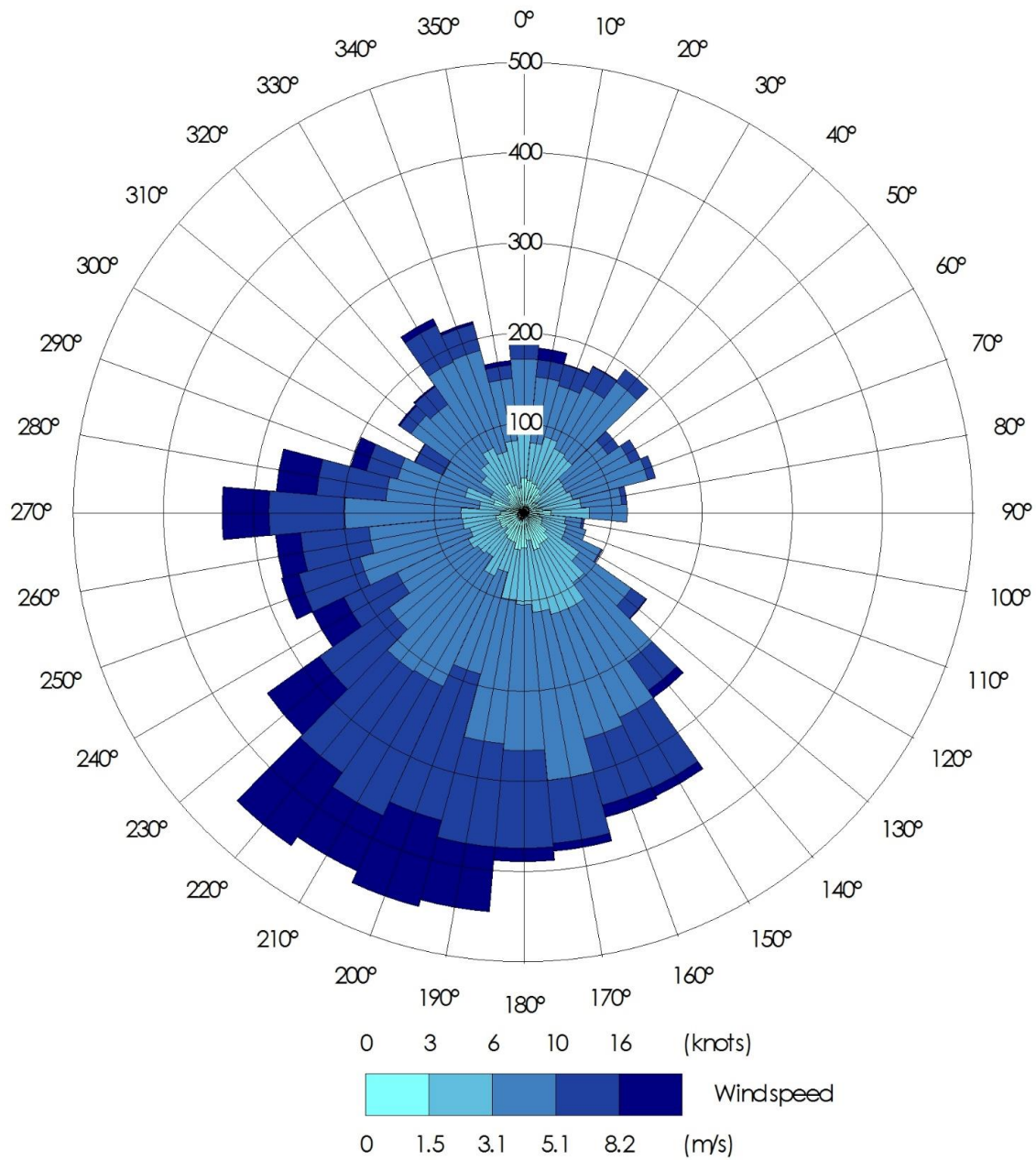
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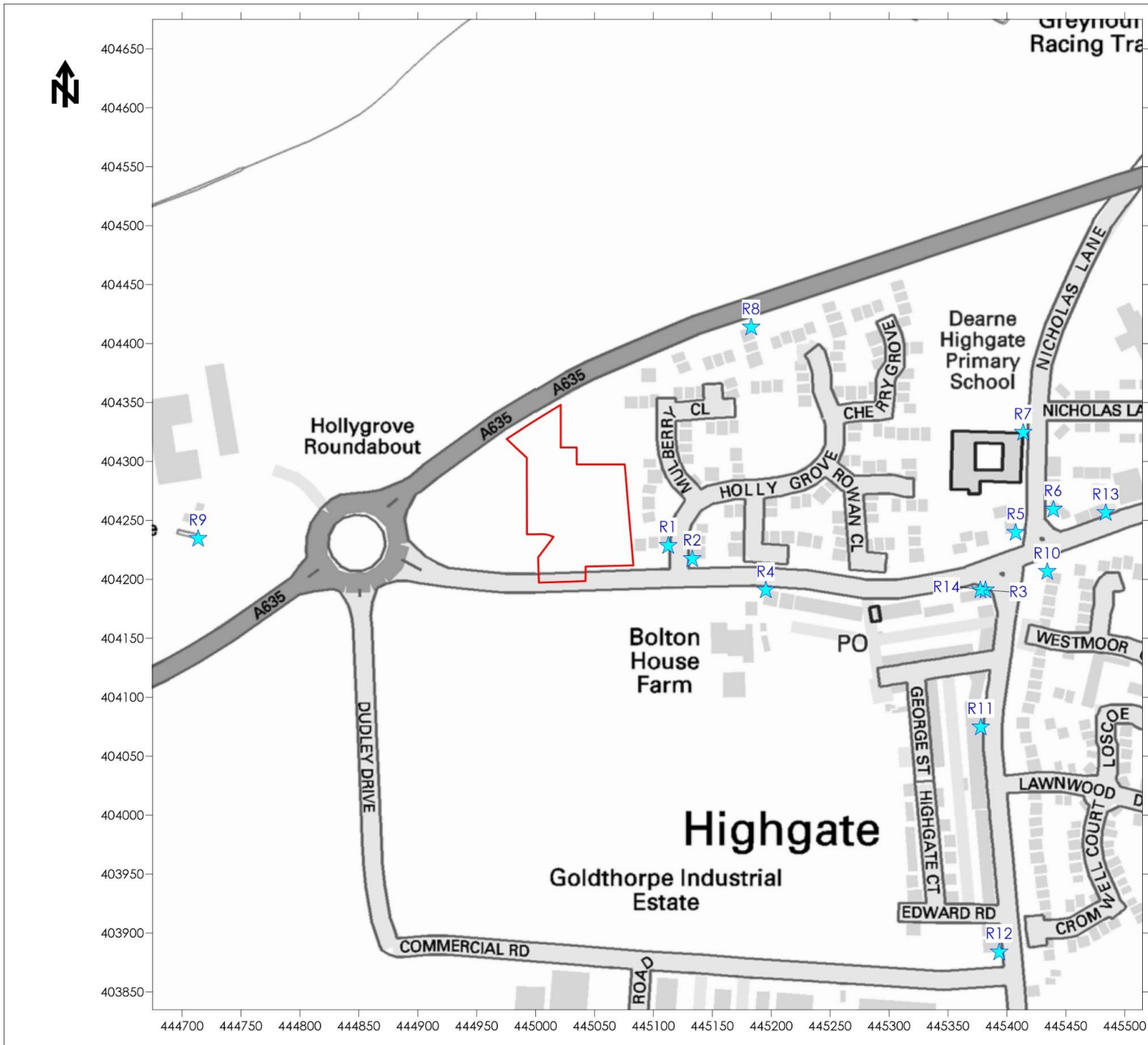
Title
 Figure 3 - Wind Rose of 2014
 Robin Hood Airport
 Meteorological Data

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Legend



Site Boundary



Sensitive Receptor

Title

Figure 4 - Sensitive Receptors

Project

Air Quality Assessment
Barnsley Road, Goldthorpe

Project Reference

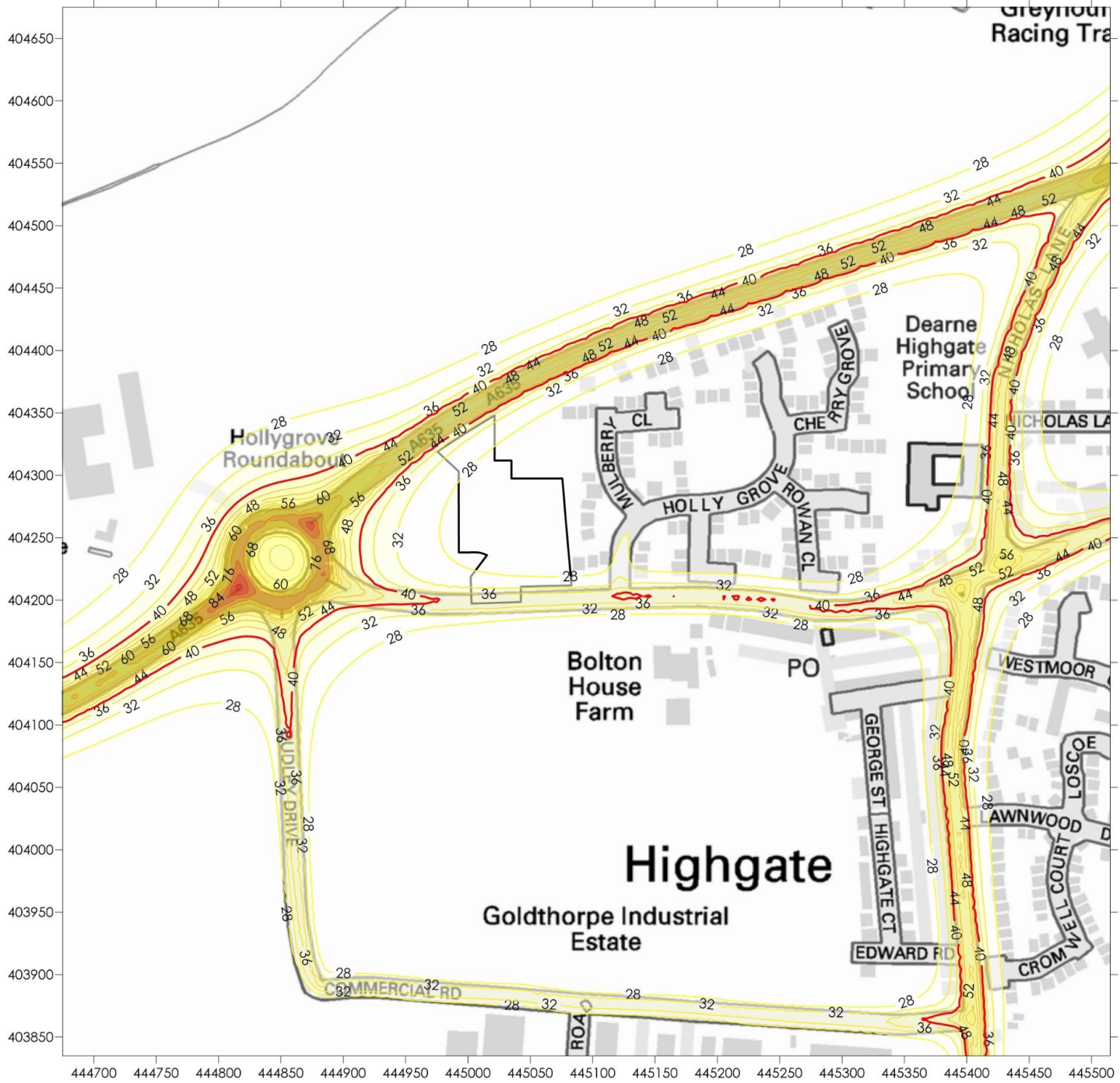
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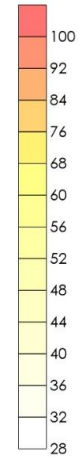




Legend



Site Boundary



Annual Mean
NO₂ Concentration
(µg/m³)

Title

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

Project

Air Quality Assessment
Barnsley Road, Goldthorpe

Project Reference

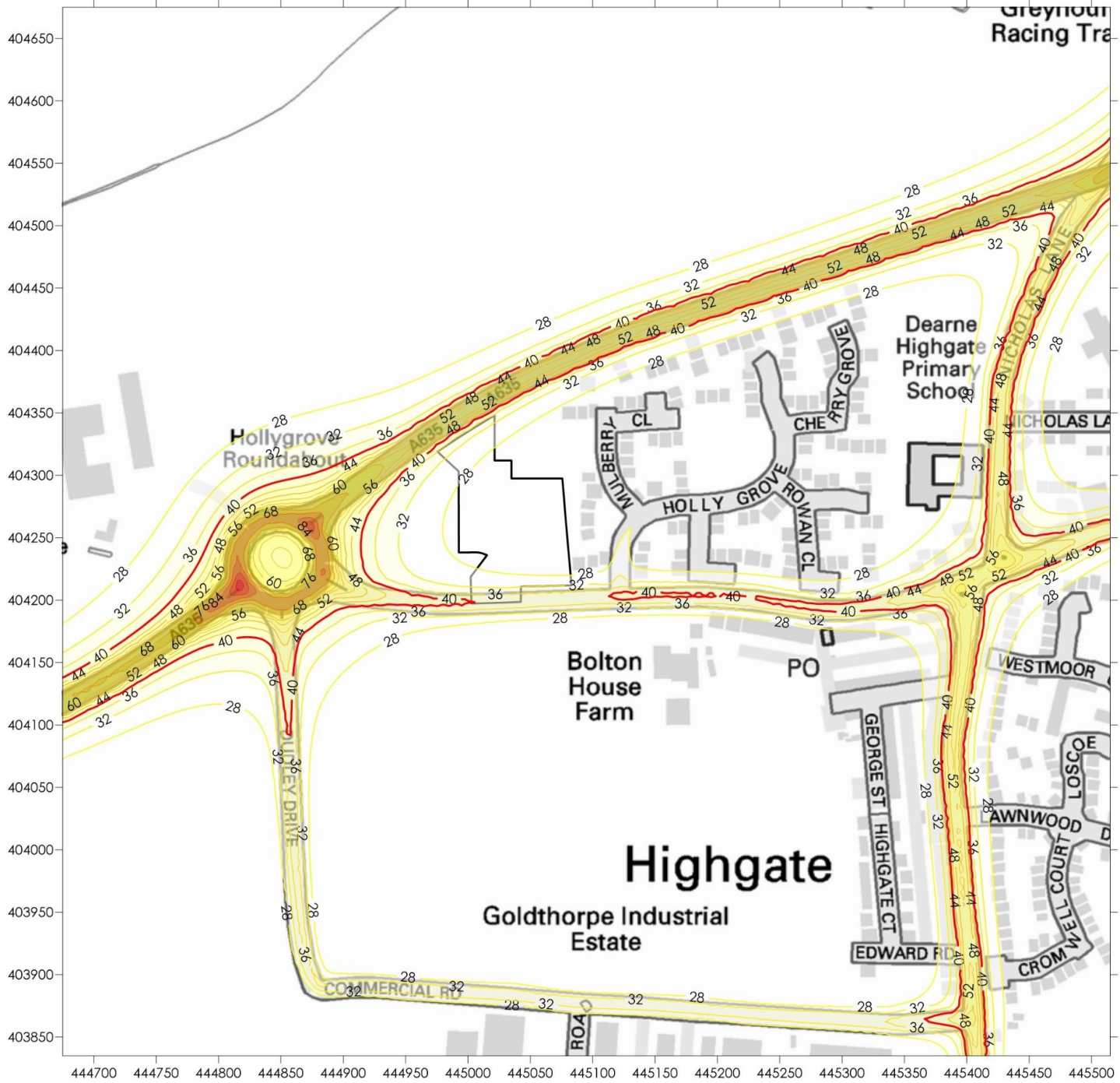
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Client

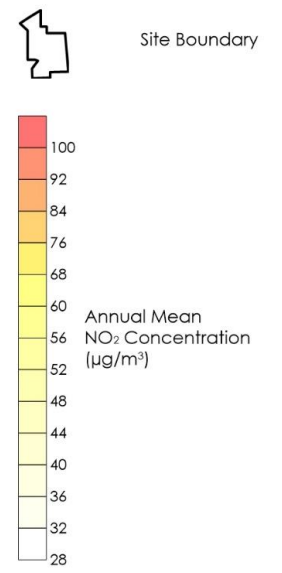
Deane Estates (Goldthorpe) Ltd

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Legend



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

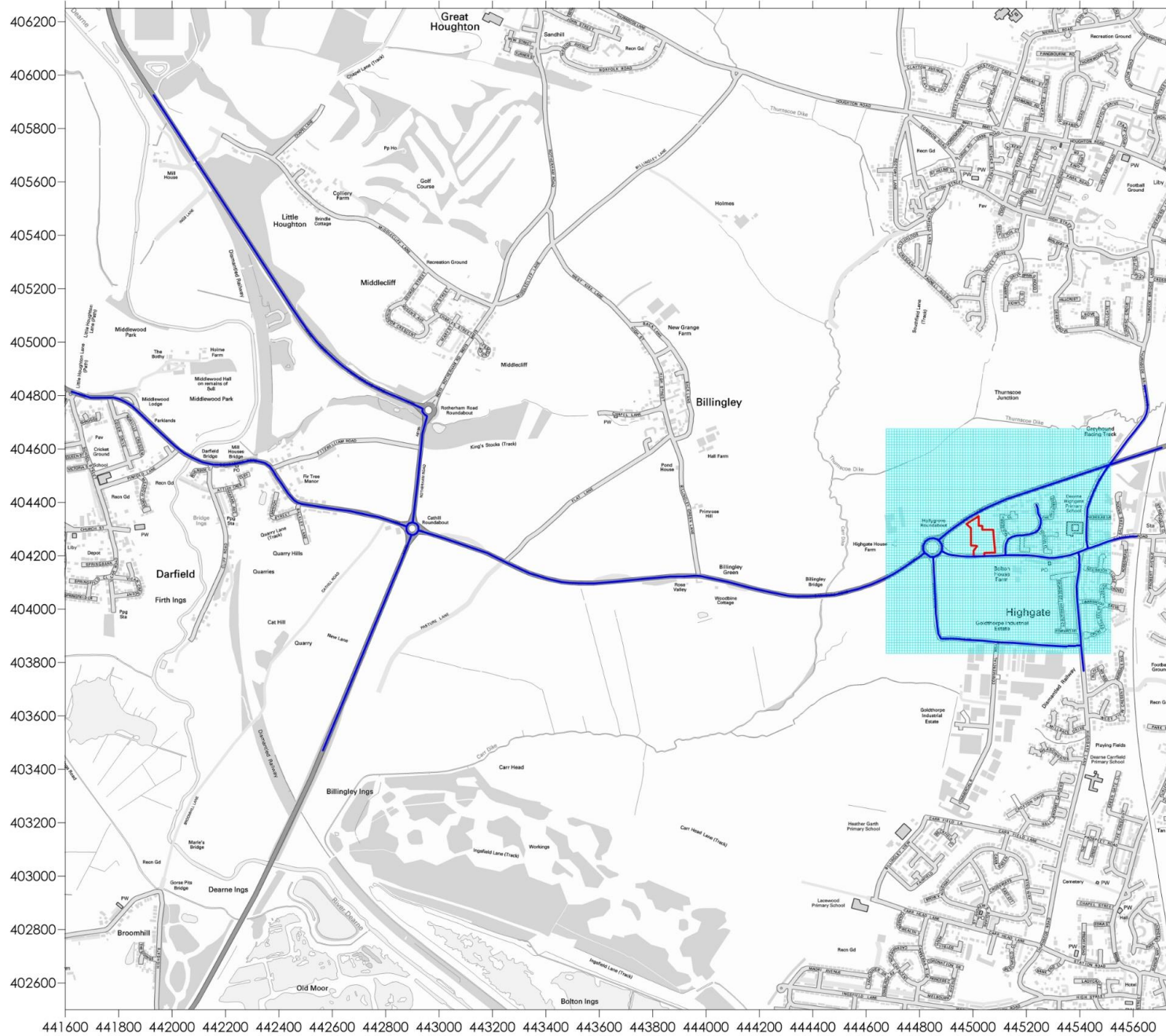
Project
Air Quality Assessment
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Legend

-  Site Boundary
-  Road Link
-  Output Grid

Title
Figure 7 - ADMS-Roads Inputs

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Project Reference
1282

Client
Dearne Estates (Goldthorpe) Ltd

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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 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 4.0.1.0). 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:

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

These are detailed in the following Sections.

Traffic Flow Data

Baseline traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows and fleet composition as HDV proportion, was obtained from the Transport Assessment²¹ prepared in support of the Aldi store located adjacent to the site.

²¹ Transport Assessment, Proposed Aldi Foodstore, Barnsley Road, Highgate, Goldthorpe, Transport Potential, 2014.

Traffic data for Doncaster Road, Rotherham Road and Park Spring Road was supplemented with information from the Department for Transport (DfT)²². The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network in Great Britain for the years 1999 to 2014. It should be noted that the DfT is referenced in DEFRA guidance LAQM.TG(09)²³ 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.

Baseline traffic data was obtained for the year 2014 and converted to 2017 utilising factors obtained from TEMPro. This software package has been developed by the DfT to calculate traffic growth throughout the UK.

Traffic Generation associated with the development was obtained from the Transport Statement²⁴ produced by Exigo Project Solutions in support of the development, inclusive of both retail units. This was applied to the relevant road links based on traffic distribution patterns obtained from the Aldi store Transport Assessment.

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

Table A1.1 Traffic Data

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)
		Verification	2017 DM	2017 DS	
L1	A635 North of Roundabout	13,502	13,959	14,065	5.91
L2	A635 North Roundabout Junction	13,502	13,959	14,065	5.91
L3	Hollygrove Roundabout	16,288	16,839	17,156	5.91
L4	Barnsley Road West of Site Slow	7,159	7,401	7,718	1.73
L5	Barnsley Road to Site Access	7,159	7,401	7,718	1.73
L6	Site Access to Hollygrove	7,159	7,401	7,698	1.73
L7	Hollygrove to Nicholas Lane/Highgate Lane Junction	7,546	7,801	8,098	2.84

²² <http://www.dft.gov.uk/traffic-counts/>.

²³ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

²⁴ Proposed Retail Development, Transport Statement, Barnsley Road, Highgate, Goldthorpe, Exigo Project Solutions, 2015.

Link		24-hour AADT Flow			HDV Proportion of Fleet (%)
		Verification	2017 DM	2017 DS	
L8	Barnsley Road Highgate Lane Junction	7,546	7,801	8,098	2.84
L9	Barnsley Road Nicholas Lane Junction	10,473	10,827	10,926	3.26
L10	Barnsley Road East	10,473	10,827	10,926	3.26
L11	Nicholas Lane North of Barnsley Road	11,263	11,644	11,743	1.68
L12	Nicholas Lane Junction Slow Phase	11,263	11,644	11,743	1.68
L13	High Gate Lane Junction Barnsley Slow Phase	13,128	13,572	13,671	1.63
L14	Highgate Lane	13,128	13,572	13,671	1.63
L15	Dudley Drive Roundabout Slow Phase	5,586	5,775	5,775	2.73
L16	Dudley Drive	5,586	5,775	5,775	2.73
L17	Dudley Drive Junction Highgate Lane Slow	5,586	5,775	5,775	2.73
L18	Hollygrove	1,116	1,153	1,153	0.74
L19	Barnsley Road A635 South Roundabout Slow	22,617	23,381	23,593	4.59
L20	Barnsley Road A635 South	22,617	23,381	23,593	4.59
L21	Cathill Roundabout	39,086	40,407	23,593	4.59
L22	A635 Doncaster Road	16,469	17,026	17,079	3.84
L23	A6195 Rotherham Road North Roundabout	9,096	9,403	9,456	7.03
L24	A6195 Park Spring Road	9,096	9,403	9,456	7.03
L25	A6195 Rotherham Road South Roundabout	22,881	23,654	23,707	4.59

Reference should be made to Figure 7 for a graphical representation of the road link locations.

Road widths were estimated from aerial photography and UK highway design standards. Road widths and average vehicle speeds are shown in Table A1.2.

Table A1.2 Road Parameters

Link		Road Width (m)	Average Vehicle Speed (km/h)
L1	A635 North of Roundabout	8.6	90
L2	A635 North Roundabout Junction	12.9	30
L3	Hollygrove Roundabout	9.8	30
L4	Barnsley Road West of Site Slow	12.5	30
L5	Barnsley Road to Site Access	10.2	45
L6	Site Access to Hollygrove	9.4	45
L7	Hollygrove to Nicholas Lane/Highgate Lane Junction	9.6	45
L8	Barnsley Road Highgate Lane Junction	10.7	30
L9	Barnsley Road Nicholas Lane Junction	13.3	30
L10	Barnsley Road East	12.3	45
L11	Nicholas Lane North of Barnsley Road	9.4	45
L12	Nicholas Lane Junction Slow Phase	12.7	30
L13	High Gate Lane Junction Barnsley Slow Phase	18.3	30
L14	Highgate Lane	7.8	45
L15	Dudley Drive Roundabout Slow Phase	10.4	30
L16	Dudley Drive	7.0	45
L17	Dudley Drive Junction Highgate Lane Slow	7.6	30
L18	Hollygrove	5.3	30
L19	Barnsley Road A635 South Roundabout Slow	11.4	25
L20	Barnsley Road A635 South	8.7	90
L21	Cathill Roundabout	10.5	25
L22	A635 Doncaster Road	8.5	40
L23	A6195 Rotherham Road North Roundabout	8.5	90
L24	A6195 Park Spring Road	7.3	90
L25	A6195 Rotherham Road South Roundabout	7.5	90

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 6.0.2). This has been produced by DEFRA and incorporates updated COPERT4v10 vehicle emissions factors for NO_x and vehicle 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, 2014 emission factors were utilised in preference to the development opening year in order to provide robust model outputs. As predictions for 2014 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 Robin Hood Airport meteorological station over the period 1st January 2014 to 31st December 2014 (inclusive). Robin Hood Airport is located at NGR: 465930, 398920, which is approximately 21.8km south-east of the development.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 3 for a wind rose of utilised meteorological data.

Roughness Length

A roughness length (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 0.3m was used to describe the meteorological site. This value of z_0 is considered appropriate for the morphology of the area due to the large expanse of flat land use and is suggested within ADMS-Roads as being suitable for 'agricultural areas (max)'.

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 modelling extents. This value is

considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'small towns < 50,000'.

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 'rural areas'.

Background Concentrations

The background concentration obtained from the DEFRA mapping study was used throughout the assessment. This is shown in Table 12.

Similarly to emissions factors, the background concentration from 2014 was utilised in preference to the opening year of the development. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of proposal.

NO_x to NO₂ Conversion

Predicted annual mean NO_x concentrations were converted to NO₂ concentrations using the spreadsheet (version 4.1) provided by DEFRA, which is the method detailed within DEFRA guidance LAQM.TG(09)²⁵.

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.

²⁵ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

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 2014 using traffic data, meteorological data and monitoring results from this year.

BMBC undertook diffusion tube monitoring of NO₂ concentrations at two locations within the modelling extents during 2014. Results were obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance LAQM.TG(09)²⁶. The monitored annual mean NO₂ concentrations and calculated road NO_x concentrations are summarised in Table A1.3.

Table A1.3 Verification - Monitoring Results

Monitoring Location		Monitored NO ₂ Concentration (µg/m ³)	Calculated Road NO _x Concentration (µg/m ³)
DT106	Doncaster Road, Darfield	33.2	35.88
DT107	Doncaster Road, Darfield	36.6	43.75

The annual mean road NO_x concentrations predicted from the dispersion model and the 2014 road NO_x concentration calculated from the monitoring results are summarised in Table A1.4.

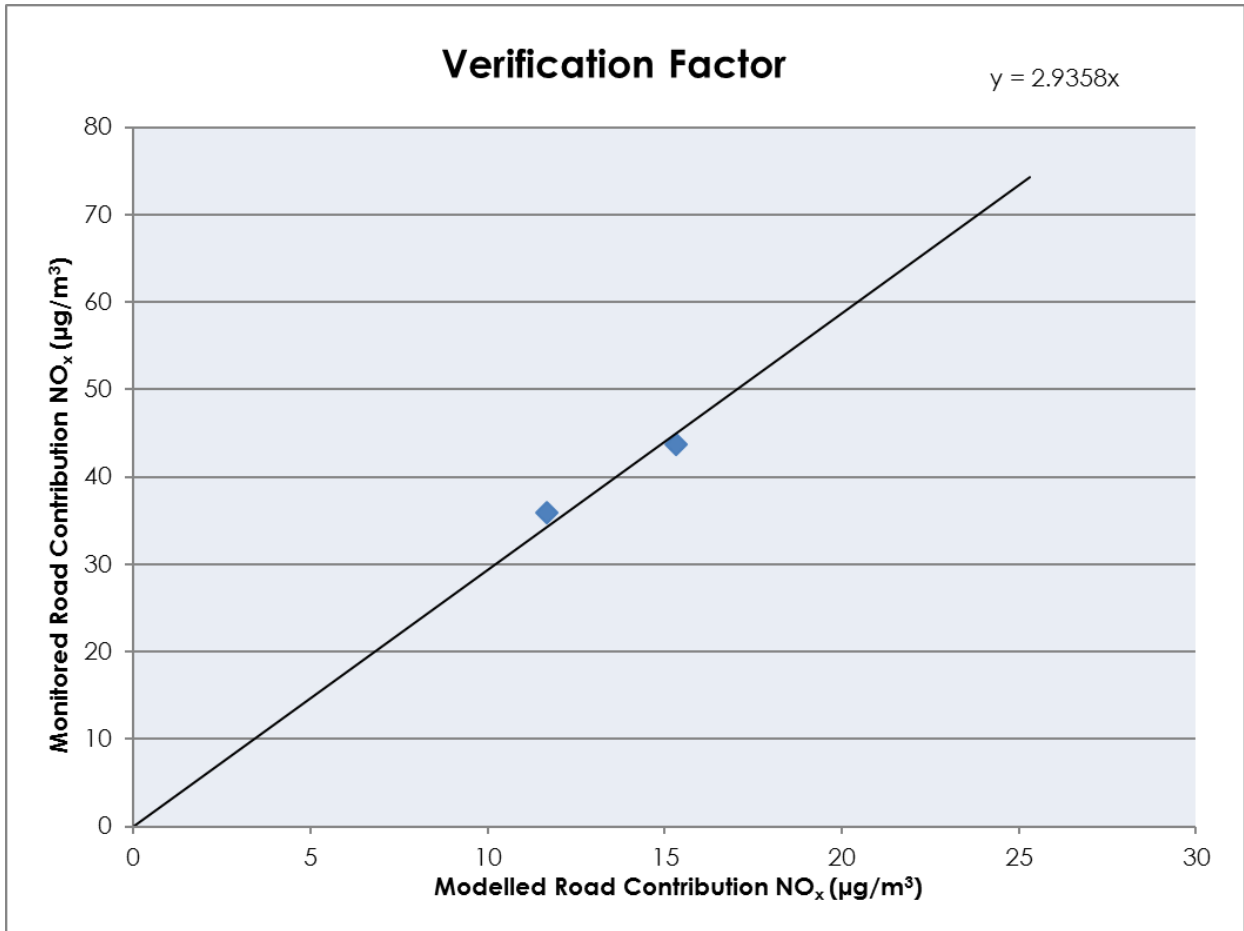
Table A1.4 Verification - Modelling Results

Monitoring Location		Calculated Road NO _x Concentration (µg/m ³)	Modelled Road NO _x Concentration (µg/m ³)
DT106	Doncaster Road, Darfield	35.88	11.68
DT107	Doncaster Road, Darfield	43.75	15.31

The monitored and modelled road NO_x contribution concentrations were graphed and the equation of the trendline based on linear progression through zero calculated. This indicated that a verification factor of 2.9358 was required to be applied to all modelling results, as shown in Graph 1.

²⁶ Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

Graph 1 Verification



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:

Elen is a Graduate 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.
- 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.
- 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.
- ADMS-5 modelling of industrial sources including Anaerobic Digestion (AD) plants to determine impacts of stack emissions on local air quality.
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.

SELECT PROJECTS SUMMARY:

Potion Redevelopment, Erith

Air Quality Assessment of a residential development in an Air Quality Management Area (AQMA). Concerns were raised regarding the exposure of future occupants to poor air quality. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM₁₀ and NO₂ concentrations across the site. Results revealed that pollution levels were below the air quality standards across the development.

Magdalen Street, Colchester

Air Quality Assessment in support of a planning application for a cluster of student accommodation buildings. The site was located in a built up area of Colchester and was already occupied by a bus depot. The assessment included a comparison of concentrations at sensitive receptors in areas where the urban topography would be altered as a result of the development. Review of the results revealed that canyon effects would be reduced in the presence of the student accommodation, when compared to the existing land use. A detailed report was produced and the local authority accepted the air quality findings.

Greenbridge Road, Swindon

Air Quality Assessment for a mixed-use development in Swindon. The proposals involved demolition of a large building prior to construction. An assessment of fugitive dust emissions was undertaken and revealed that the use of good practice control measures would provide suitable mitigation for the impacts of the scheme.

Gonerby Moor Anaerobic Digestion Plant

Air Quality and Odour Assessments in support of an AD plant in Grantham. Combustion products from the combined heat and power unit have the potential to result in air quality impacts. Further to this, storage and transfer of biomass materials can lead to odour emissions from the site. ADMS-5 was used to model both odour and air quality impacts. Results revealed that emissions would not lead to exceedences of the relevant air quality standards across the site, and odour emissions remained below benchmark levels at all identified sensitive locations.

Coral Mill, Rochdale

Air Quality Assessment for a residential scheme partially located in an AQMA. Due to the size of the development, it was possible that traffic generation by future occupants travelling to and from the site may cause negative impacts on sensitive receptors nearby. NO₂ and PM₁₀ concentrations were quantified at specific receptor points to ensure there would be no significant increases in pollutant levels. Results revealed negligible impacts at all locations.

Stone Street, Kent

Air Quality Assessment for redevelopment of existing buildings in Gravesend, Kent. Road layout changes had been proposed in the vicinity of the site, which would alter the routes used by road traffic and thereby influence the location of vehicle emissions. Modelling took account of the impact of the new road layout on concentrations at the development. Results revealed pollutant concentrations were below the relevant standards across the site.