Air Quality Assessment

Dearne Valley Parkway, Barnsley

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Executive Summary

Redmore Environmental Ltd was commissioned by Carnell Management Services Ltd to undertake an Air Quality Assessment in support of an industrial development on land adjacent to Dearne Valley Parkway, Birdwell, Barnsley.

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 undertaken 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 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.

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

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

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1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Carnell Management Services Ltd to undertake an Air Quality Assessment in support of an industrial development on land adjacent to Dearne Valley Parkway, Birdwell, Barnsley.

1.1.2 The 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 undertaken 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 adjacent to Dearne Valley Parkway, Birdwell, Barnsley, at approximate National Grid Reference (NGR): 434940, 400523. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise construction of seven industrial units comprising the following land uses:

- E(g)(ii): Research and development of products or processes
- E(g)(iii): Industrial Processes.
- B2: General Industrial.
- B8: Storage & distribution.
- Sui Generis:10% Trade counter.

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 assess potential effects as a result of the proposals. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 Legislation

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

- Nitrogen dioxide (NO_2);
- Sulphur dioxide;
- Lead;
- Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$);
- Benzene; and,
- Carbon monoxide.

2.1.2 Air Quality Target Values were also provided for several additional pollutants. It should be noted that the AQLV for $PM_{2.5}$ stated in the Air Quality Standards Regulations (2010) was amended in the Environment (Miscellaneous Amendments) (EU Exit) Regulations (2020).

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

2.1.4 The Environmental Improvement Plan 2023[2] was published in January 2023, providing long term and Interim Targets in order to reduce population exposure to $PM_{2.5}$. The concentration target for 2040 was subsequently adopted in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

[1] AQS: Framework for Local Authority Delivery, DEFRA, 2023.

[2] Environmental Improvement Plan 2023, DEFRA, 2023.

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

Table 1 Air Quality Objectives/Interim Target

Pollutant	Air Quality Objective/Interim Target	
	Concentration (µg/m³)	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
$PM_{2.5}$	12(a)	Annual mean

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

2.1.6 Table 2 summarises the advice provided in DEFRA guidance[3] on where the AQOs for pollutants considered within this report apply.

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access Hotels, unless people live there as their permanent residence Gardens of residential properties Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean	All locations where the annual mean objective would apply, together with hotels Gardens of residential properties	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term

[3] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer	Kerbside sites where the public would not be expected to have regular access

2.2 Local Air Quality Management

2.2.1 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.

2.3 Dust

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

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

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

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

2.4 National Planning Policy

2.4.1 The revised National Planning Policy Framework[4] (NPPF) was published in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

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

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

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

> "Planning policies and decisions should contribute to and enhance the natural and local environment by:
>
> […]
>
> e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of 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 […]."

[4] NPPF, Ministry of Housing, Communities and Local Government, 2021.

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

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

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

2.5 National Planning Practice Guidance

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

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

[5] https://www.gov.uk/guidance/air-quality--3.

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

2.6 Local Planning Policy

2.6.1 The Barnsley Metropolitan Borough Council (BMBC) Local Plan[6] sets out the planning framework for the borough up to the year 2033. A review of the document indicated the following in relation to air quality of relevance to this assessment:

> "Policy GD1 General Development
>
> Proposals for development will be approved if:
>
> […]
>
> Any adverse impact on the environment, natural resources, waste and pollution is minimised and mitigated;
>
> […]."
>
> "Policy Poll 1 Pollution Control and Protection
>
> Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.
>
> We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.
>
> Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate."

[6] Barnsley Local Plan, BMBC, 2019.

2.6.2 Policy AQ1 discusses development which may affect AQMAs:

> "Development which impacts on areas sensitive to air pollution in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in terms of air quality (including residents, employees, visitors and customers), taking into account any suitable and proportionate mitigation required for the development.
>
> We will only allow residential development which impacts on areas sensitive to air pollution, where the developer provides an assessment that shows living conditions will be acceptable for future residents, subject to any required mitigation.
> We will only allow development which impacts on areas sensitive to air pollution which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality, subject to any required mitigation.
>
> Furthermore, development which impacts on areas sensitive to air pollution due to traffic emissions will be expected to demonstrate suitable and proportionate mitigation relative to the increased traffic emissions generated by the development."

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

2.6.4 BMBC have produced Air Quality and Emissions Good Practice Planning Guidance[7] which provides a template for integrating air quality considerations into land-use planning and development management policies. This was taken into consideration throughout the assessment.

[7] Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2021.

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases. These issues have been assessed in accordance with the following methodology.

3.2 Construction Phase Assessment

3.2.1 There is the potential for fugitive dust emissions to occur as a result of construction phase activities. These have been assessed in accordance with the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of Dust from Demolition and Construction V1.1'[8].

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

- Earthworks;
- Construction; and,
- Trackout.

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

- Annoyance due to dust soiling;
- Harm to ecological receptors; and,
- The risk of health effects due to a significant increase in exposure to PM_{10}.

3.2.4 The assessment steps are detailed below.

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

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 10,000m^2 • 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	• Total building volume greater than 100,000m^3 • 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 2,500m^2 to 10,000m^2 • 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 25,000m^3 to 100,000m^3 • 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 2,500m^2 • 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 25,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	• Less than 10 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

3.2.12 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 PM_{10}. 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, shopping streets, playing fields, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

3.2.13 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.

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

3.2.15 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

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

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

Receptor Sensitivity	Background Annual Mean PM_{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	Background 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	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32µg/m^3	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m^3	More than 10	Low	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
	Less than 24µg/m^3	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

3.2.17 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

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
Low	Low	Low

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

3.2.19 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

3.2.20 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

3.2.21 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[9] to reduce potential dust impacts based upon the relevant risk categories

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

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

3.2.22 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**.

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

- 2019 - Verification;
- Opening year Do-Minimum (DM) (predicted traffic flows in 2028 should the proposals not proceed); and,
- Opening year Do-Something (DS) (predicted traffic flows in 2028 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)[10] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[11] 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'[12]. 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 Operational Phase Road Vehicle Exhaust Emissions Impact

Concentration at Receptor in Assessment Year	Predicted Concentration Change as Proportion of AQO/ Interim Target (%)			
	1	2 - 5	6 - 10	> 10
75% or less of AQO/Interim Target	Negligible	Negligible	Slight	Moderate
76 - 94% of AQO/Interim Target	Negligible	Slight	Moderate	Moderate
95 - 102% of AQO/Interim Target	Slight	Moderate	Moderate	Substantial
103 - 109% of AQO/Interim Target	Moderate	Moderate	Substantial	Substantial
110% or more of AQO/Interim Target	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 document[13] provides guidance on determining the overall air quality impact significance of the

10 LA 105: Air Quality, Highways England, 2019.

11 Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

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

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

operation of a development. The following factors are identified for consideration by the assessor:

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

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

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

[14] 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 development site were identified in order to provide a baseline for assessment. These are detailed in the following Sections.

4.2 Local Air Quality Management

4.2.1 As required by the Environment Act (1995), as amended by the Environment Act (2021), BMBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO_2 are above the AQOs within the borough. Six AQMAs have therefore been declared. The closest to the development is AQMA No. 1, which is described as follows:

> "An area encompassing residential properties one hundred metres either side of the central reservation of the M1 motorway in Barnsley."

4.2.2 The development is located approximately 140m north-east of the AQMA. As such, there is the potential for vehicles travelling to and from the site to increase pollution levels in this sensitive area. This has been considered throughout the assessment.

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

4.3 Air Quality Monitoring

4.3.1 Monitoring of pollutant concentrations is undertaken by BMBC throughout their area of jurisdiction. Recent NO_2 results recorded in the vicinity of the development are shown in Table 11.

Table 11 Monitoring Results

Monitoring Site		Monitored NO_2 Concentration (µg/m³)		
		2018	2019	2020
DT24	A6135 Hoyland	30.2	30.3	20.6
DT25	A61 Sheffield Road, Birdwell	34.3	38.6	26.0
DT26	A61 Sheffield Road, Birdwell	**40.1**	**40.3**	25.7
DT27	A61 Sheffield Road, Birdwell	39.1	39.8	23.9
DT28	Tankersley School	23.9	23.6	15.1
DT29	Moor Lane, Birdwell	27.6	28.3	17.8
DT30	The Walk, Birdwell	29.5	33.4	20.1
DT31	Sheffield Road, Birdwell	29.7	29.7	19.1
DT32	Sheffield Road, Chapel Street, Birdwell	32.8	35.5	23.0

4.3.2 As shown in Table 11, annual mean NO_2 concentrations exceeded the AQO at DT26 - A61 Sheffield Road, Birdwell in 2018 and 2019. As this site is located adjacent to an A-road, elevated results would be expected. Concentrations were below the AQO at all other monitors. Reference should be made to Figure 2 for a map of the survey positions.

4.3.3 Pollutant concentrations during 2020 were lower than previous years due to a reduction in traffic and associated emissions caused by the COVID-19 pandemic. The results should therefore be viewed with caution.

4.3.4 BMBC does not undertake monitoring of PM_{10} or $PM_{2.5}$ within 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, 400500. Data for this location was downloaded from the DEFRA website[15] for the purpose of the assessment and is summarised in Table 12.

15 http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018.

Table 12 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m³)		
	2019	2023	2028
NO_2	17.36	14.05	11.10
PM_{10}	13.08	12.54	12.28
$PM_{2.5}$	8.23	7.79	7.58

4.4.2 As shown in Table 12, predicted background NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant AQOs and Interim Target at the development site.

4.5 Sensitive Receptors

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

Construction Phase Sensitive Receptors

4.5.2 Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 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	10 - 100	0
Up to 50	More than 100	0
Up to 100	More than 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.

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	More than 100	0
Up to 50	More than 100	0

4.5.4 There are no ecological receptors within 50m of the development boundary or the access route within 500m of the site entrance. 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 to Potential Dust Impacts

Guidance	Comment
Whether there is any history of dust generating activities in the area	A review of Google Maps imagery indicated a number of developments have recently been constructed in the local area, specifically north and east of the proposed site. As such, there may have been a history of dust generation in recent years
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal indicated that a number of applications have recently been granted consent in the vicinity of the site. It is therefore possible that there will be concurrent dust generation should the construction phases of these schemes overlap with the proposed development
Pre-existing screening between the source and the receptors	There is no significant screening in the vicinity of the site
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-west. As such, receptors to the north-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

Guidance	Comment
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 likely that it will extend over one year. The sensitivity of nearby receptors is unlikely to change during this time
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 Dust sensitive receptors within 350m of the development site include places of work and residential dwellings. These are of **medium** and **high** sensitivity, respectively. It should be noted that only receptors of **medium** sensitivity are present within 50m of the boundary.

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 to Potential Dust Impacts

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium
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.

Table 17 Operational Phase Road Vehicle Exhaust Emission Sensitive Receptor Locations

Receptor		NGR (m)	
		X	Y
R1	Residential - Rockingham Row	434938.8	400718.0
R2	Residential - A61, Sheffield Road	434853.0	400389.9
R3	Residential - A61, Sheffield Road	434655.8	400695.4

Receptor		NGR (m)	
		X	Y
R4	Residential - A61, Sheffield Road	434611.9	401013.5
R5	Residential - Cross Keys Lane	435221.4	400566.9
R6	Residential - Regent Court	435280.9	400430.9
R7	Residential - A6135, Sheffield Road	435397.6	400313.3
R8	Residential - Moor Lane	434708.1	400355.6
R9	Residential - The Walk	434492.3	400623.7
R10	Residential - Macnaghten Road	434669.8	400099.7
R11	Residential - Westwood New Road	434656.6	400182.8

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 The proposal has the potential for air quality impacts as a result of the construction and operation of the proposed development. These issues 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 and storage of materials has the potential to result in fugitive dust emissions throughout the construction phase. Vehicle movements on the local road network also have the potential to result in the re-suspension of dust from highway surfaces.

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

5.2.3 The desk-study undertaken to inform the baseline identified a number of sensitive receptors within 350m of the site boundary. As such, a detailed assessment of potential dust impacts was required.

Step 2

Earthworks

5.2.4 Earthworks may involve excavating material, haulage, tipping and stockpiling. The area of the proposed development site is greater than 10,000m^2. 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.

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 will be between 25,000m^3 and 100,000m^3. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from construction is therefore **medium**.

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

5.2.11 Table 16 indicates the sensitivity of the area to dust soiling effects to people and property is **medium**. 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	Medium	Medium	Medium
Human Health	Low	Low	Low

5.2.14 As indicated in Table 18, the potential risk of dust soiling is **medium** from earthworks, construction and trackout. The potential risk of human health effects 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 guidance[16] 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 or similar if required by the LA.

16 Guidance on the Assessment of Dust from Demolition and Construction V1.1, IAQM, 2017.

Table 19 Fugitive Dust Emission Mitigation Measures

Issue	Control Measure
Communications	• 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 • Develop and implement a Dust Management Plan (DMP) or similar, 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 off- site, 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 • Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site • 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	• 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

Issue	Control Measure
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 • Ensure equipment is available to clean any dry spillages, and clean up spillages as soon as reasonably practicable using wet cleaning methods
Waste management	• No bonfires and burning of waste materials
Earthworks	• 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	• 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 • Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably possible • 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 impact from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[17].

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

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

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 included the following scenarios:

- 2019 - Verification;
- 2028 - DM; and,
- 2028 - DS.

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

5.3.4 For the purpose of the assessment traffic data for 2028 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 2019 were utilised within the dispersion model. The use of 2028 traffic data and 2019 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 NO_2 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 NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Rockingham Row	23.71	23.75	0.04
R2	Residential - A61, Sheffield Road	**41.19**	**41.26**	0.07

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R3	Residential - A61, Sheffield Road	35.68	35.73	0.05
R4	Residential - A61, Sheffield Road	33.86	33.91	0.05
R5	Residential - Cross Keys Lane	22.91	22.95	0.04
R6	Residential - Regent Court	22.82	22.85	0.03
R7	Residential - A6135, Sheffield Road	26.23	26.30	0.07
R8	Residential - Moor Lane	**49.68**	**49.72**	0.04
R9	Residential - The Walk	**50.89**	**50.92**	0.03
R10	Residential - Macnaghten Road	24.10	24.11	0.01
R11	Residential - Westwood New Road	28.11	28.13	0.02

5.3.7 As indicated in Table 20, predicted annual mean NO_2 concentrations were below the relevant AQO at eight receptors and above at three positions in both the DM and DS scenarios. It should be noted that there are no new predicted exceedences in the DS scenario when compared with the DM.

5.3.8 Reference should be made to Figures 5 and 6 for graphical representations of annual mean NO_2 concentrations for the DM and DS scenarios, respectively.

5.3.9 Annual mean PM_{10} 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 PM_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Rockingham Row	14.07	14.07	0.01
R2	Residential - A61, Sheffield Road	17.02	17.04	0.01
R3	Residential - A61, Sheffield Road	16.14	16.15	0.01
R4	Residential - A61, Sheffield Road	16.03	16.04	0.01

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R5	Residential - Cross Keys Lane	14.01	14.02	0.01
R6	Residential - Regent Court	14.01	14.01	0.01
R7	Residential - A6135, Sheffield Road	14.75	14.76	0.01
R8	Residential - Moor Lane	17.65	17.65	0.01
R9	Residential - The Walk	17.62	17.63	0.00
R10	Residential - Macnaghten Road	13.95	13.96	0.00
R11	Residential - Westwood New Road	14.47	14.48	0.00

5.3.10 As indicated in Table 21, predicted annual mean PM_{10} 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 PM_{10} concentrations for the DM and DS scenarios, respectively.

5.3.12 Annual mean $PM_{2.5}$ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 22.

Table 22 Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Rockingham Row	8.83	8.83	0.00
R2	Residential - A61, Sheffield Road	10.62	10.63	0.01
R3	Residential - A61, Sheffield Road	10.08	10.09	0.00
R4	Residential - A61, Sheffield Road	9.99	9.99	0.00
R5	Residential - Cross Keys Lane	8.79	8.79	0.00
R6	Residential - Regent Court	8.78	8.79	0.00
R7	Residential - A6135, Sheffield Road	9.21	9.22	0.01

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)		
		DM	DS	Change
R8	Residential - Moor Lane	11.16	11.17	0.01
R9	Residential - The Walk	11.24	11.24	0.00
R10	Residential - Macnaghten Road	8.79	8.79	0.00
R11	Residential - Westwood New Road	9.12	9.13	0.00

5.3.13 As indicated in Table 22, predicted annual mean $PM_{2.5}$ concentrations were below the Interim Target at all sensitive receptors in both scenarios.

5.3.14 Reference should be made to Figures 9 and 10 for graphical representations of annual mean $PM_{2.5}$ concentrations for the DM and DS scenarios, respectively.

Predicted Impacts

5.3.15 Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 23.

Table 23 Predicted Impacts - NO_2

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Rockingham Row	Below 75% of AQO	0	Negligible
R2	Residential - A61, Sheffield Road	103 - 109% of AQO	0	Negligible
R3	Residential - A61, Sheffield Road	76 - 94% of AQO	0	Negligible
R4	Residential - A61, Sheffield Road	76 - 94% of AQO	0	Negligible
R5	Residential - Cross Keys Lane	Below 75% of AQO	0	Negligible
R6	Residential - Regent Court	Below 75% of AQO	0	Negligible
R7	Residential - A6135, Sheffield Road	Below 75% of AQO	0	Negligible
R8	Residential - Moor Lane	110% or more of AQO	0	Negligible

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R9	Residential - The Walk	110% or more of AQO	0	Negligible
R10	Residential - Macnaghten Road	Below 75% of AQO	0	Negligible
R11	Residential - Westwood New Road	Below 75% of AQO	0	Negligible

5.3.16 As indicated in Table 23, impacts on annual mean NO_2 concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

5.3.17 Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 24.

Table 24 Predicted Impacts - PM_{10}

Receptor		Predicted Annual Mean PM_{10} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Rockingham Row	Below 75% of AQO	0	Negligible
R2	Residential - A61, Sheffield Road	Below 75% of AQO	0	Negligible
R3	Residential - A61, Sheffield Road	Below 75% of AQO	0	Negligible
R4	Residential - A61, Sheffield Road	Below 75% of AQO	0	Negligible
R5	Residential - Cross Keys Lane	Below 75% of AQO	0	Negligible
R6	Residential - Regent Court	Below 75% of AQO	0	Negligible
R7	Residential - A6135, Sheffield Road	Below 75% of AQO	0	Negligible
R8	Residential - Moor Lane	Below 75% of AQO	0	Negligible
R9	Residential - The Walk	Below 75% of AQO	0	Negligible
R10	Residential - Macnaghten Road	Below 75% of AQO	0	Negligible
R11	Residential - Westwood New Road	Below 75% of AQO	0	Negligible

5.3.18 As indicated in Table 24, impacts on annual mean PM_{10} concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

5.3.19 Predicted impacts on annual mean $PM_{2.5}$ concentrations at the sensitive receptor locations are summarised in Table 25.

Table 25 Predicted Impacts - $PM_{2.5}$

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration	Predicted Concentration Change as Proportion of Interim Target (%)	Impact Significance
R1	Residential - Rockingham Row	Below 75% of Interim Target	0	Negligible
R2	Residential - A61, Sheffield Road	76 - 94% of Interim Target	0	Negligible
R3	Residential - A61, Sheffield Road	76 - 94% of Interim Target	0	Negligible
R4	Residential - A61, Sheffield Road	76 - 94% of Interim Target	0	Negligible
R5	Residential - Cross Keys Lane	Below 75% of Interim Target	0	Negligible
R6	Residential - Regent Court	Below 75% of Interim Target	0	Negligible
R7	Residential - A6135, Sheffield Road	76 - 94% of Interim Target	0	Negligible
R8	Residential - Moor Lane	76 - 94% of Interim Target	0	Negligible
R9	Residential - The Walk	76 - 94% of Interim Target	0	Negligible
R10	Residential - Macnaghten Road	Below 75% of Interim Target	0	Negligible
R11	Residential - Westwood New Road	76 - 94% of Interim Target	0	Negligible

5.3.20 As indicated in Table 25, impacts on annual mean $PM_{2.5}$ concentrations as a result of the proposed development were predicted to be **negligible** at all receptor locations.

Overall Impact Significance

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

receptor locations and the considerations outlined previously. Further justification is provided in Table 26.

Table 26 Overall Road Vehicle Exhaust Emissions Impact Significance

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO_2 concentrations were above the relevant AQO at three receptors and below at eight locations in the DM scenario Predicted annual mean PM_{10} and $PM_{2.5}$ concentrations were below the relevant AQO and Interim Target at all locations in the DM scenario The predicted concentrations are considered unlikely to change significantly in the absence of the proposals given the 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 or Interim Target
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	It is assumed that vehicle exhaust emission rates and background pollution levels will not reduce in future years. This provides worst-case results when compared with the DEFRA and National Highways methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

5.3.22 The IAQM guidance[18] 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.

Barnsley Air Quality and Emissions Good Practice Guidance

5.3.23 BMBC has produced Air Quality and Emissions Good Practice Planning Guidance[19] which includes direction on when an air quality assessment will be required and the associated scope of works. This also provides a methodology for determining the scale of

[18] Land-Use Planning & Development Control: Planning for Air Quality, IAQM, 2017.

[19] Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2021.

a development as minor, medium or major and the required air quality mitigation for the relevant banding.

5.3.24 Review of the relevant criteria indicated the proposals were classified as **medium** as they exceed the Gross Floor Area (GFA) criteria for the relevant land uses but are not predicted to result in an increase in the existing traffic flow on roads of more than 10,000 Average Annual Daily Traffic (AADT) of 5% or more or trigger any other additional criteria.

5.3.25 The guidance[20] provides a number of mitigation options that should be considered for inclusion within developments. These were reviewed and the those to be incorporated within the proposals include the following:

- Implementation of the Fugitive Dust Emission Mitigation Measures outlined within the IAQM guidance[21], as summarised in Table 19, to control emissions during the construction phase of the development;
- Provision of electric vehicle (EV) charging points, to encourage the use of sustainable transport modes to and from the site; 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.

5.3.26 The mitigation measures outlined above can be secured by planning condition if required by BMBC.

[20] Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2021.

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

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Carnell Management Services Ltd to undertake an Air Quality Assessment in support of an industrial development on land adjacent to Dearne Valley Parkway, Birdwell, Barnsley.

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 therefore undertaken 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 The proposed development has the potential to impact existing air quality in the vicinity of the site during operation. Dispersion modelling was therefore undertaken using ADMS-Roads in order to predict pollutant concentrations as a result of emissions from the highway network. Results were subsequently verified using local monitoring data.

6.1.5 Review of the dispersion modelling results indicated that impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations as a result of traffic generated by the development were predicted to be **negligible** at all sensitive receptor locations. Air quality impacts as a result of the operation of the development were therefore considered to be **not significant**, in accordance with the IAQM guidance.

6.1.6 A number of mitigation measures were identified in line with the requirements of the Barnsley Air Quality and Emissions Good Practice Guidance[22] in order to reduce vehicle exhaust emissions associated with the proposals. It is considered these are appropriate for

[22] Air Quality and Emissions Good Practice Planning Guidance, BMBC, 2021.

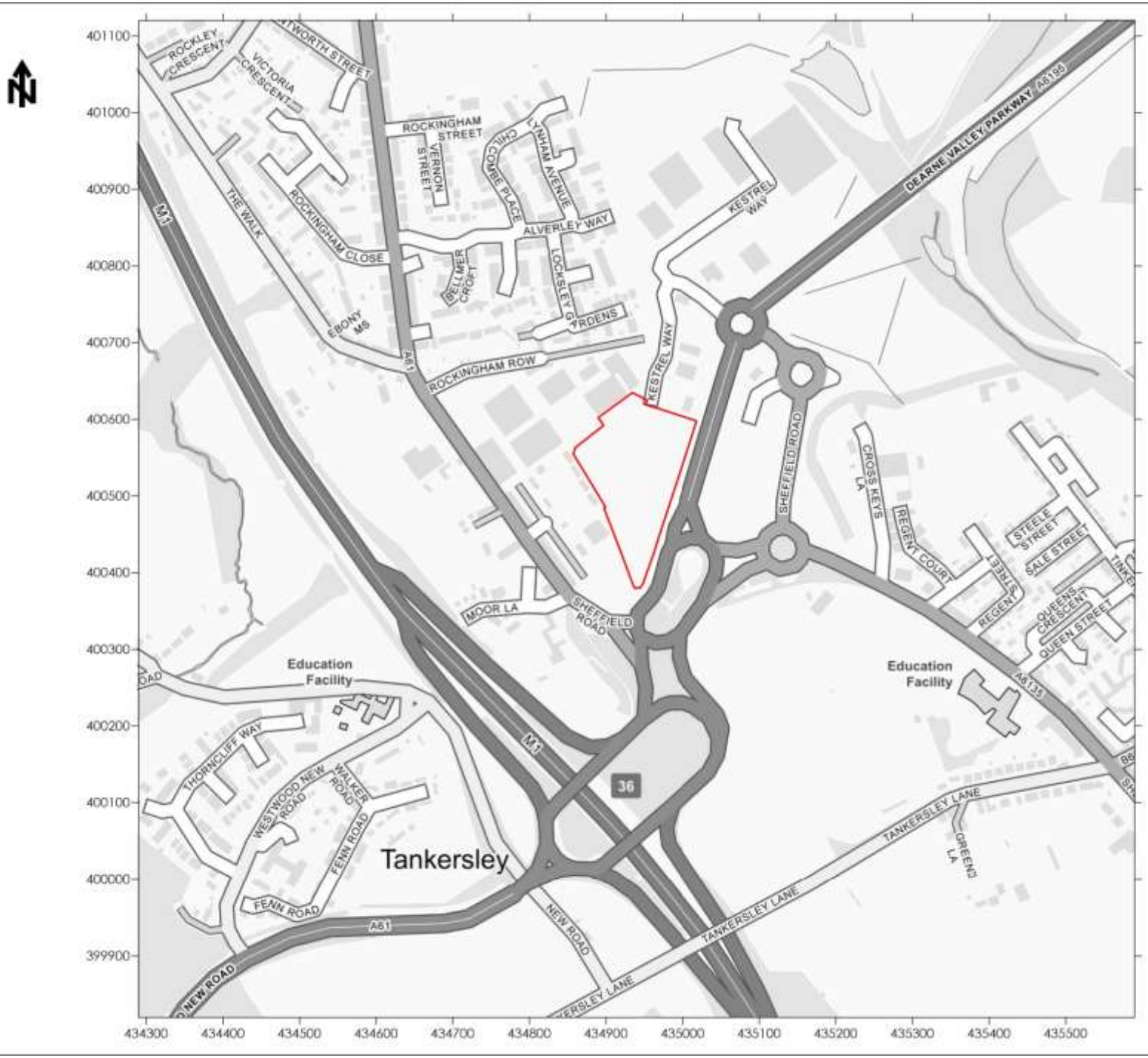
a development of this scale and nature and will further control impacts during the operational phase.

6.1.7 Based on the assessment results, air quality factors 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
DM	Do-Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
EB	Eastbound
EV	Electric Vehicle
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NB	Northbound
NGR	National Grid Reference
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
NPPG	National Planning Policy Guidance
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µm
SB	Southbound
WB	Westbound
z_0	Roughness length

Figures



Legend

Site Boundary

Title
Figure 1 - Site Location Plan

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
5887

Client
Carnell Management Services Ltd

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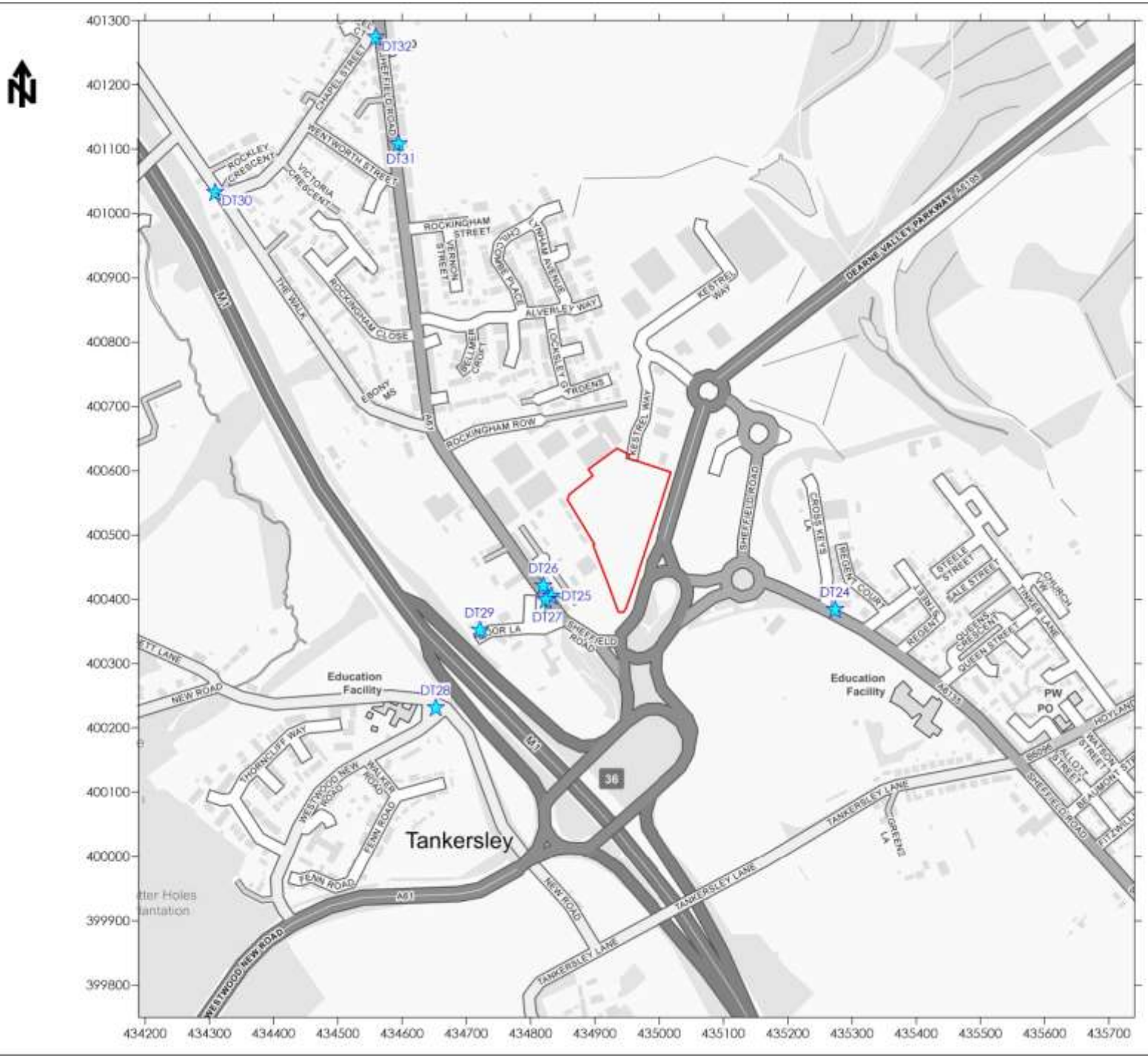

Legend

Site Boundary

Monitor

Title
Figure 2 - Monitoring Locations

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
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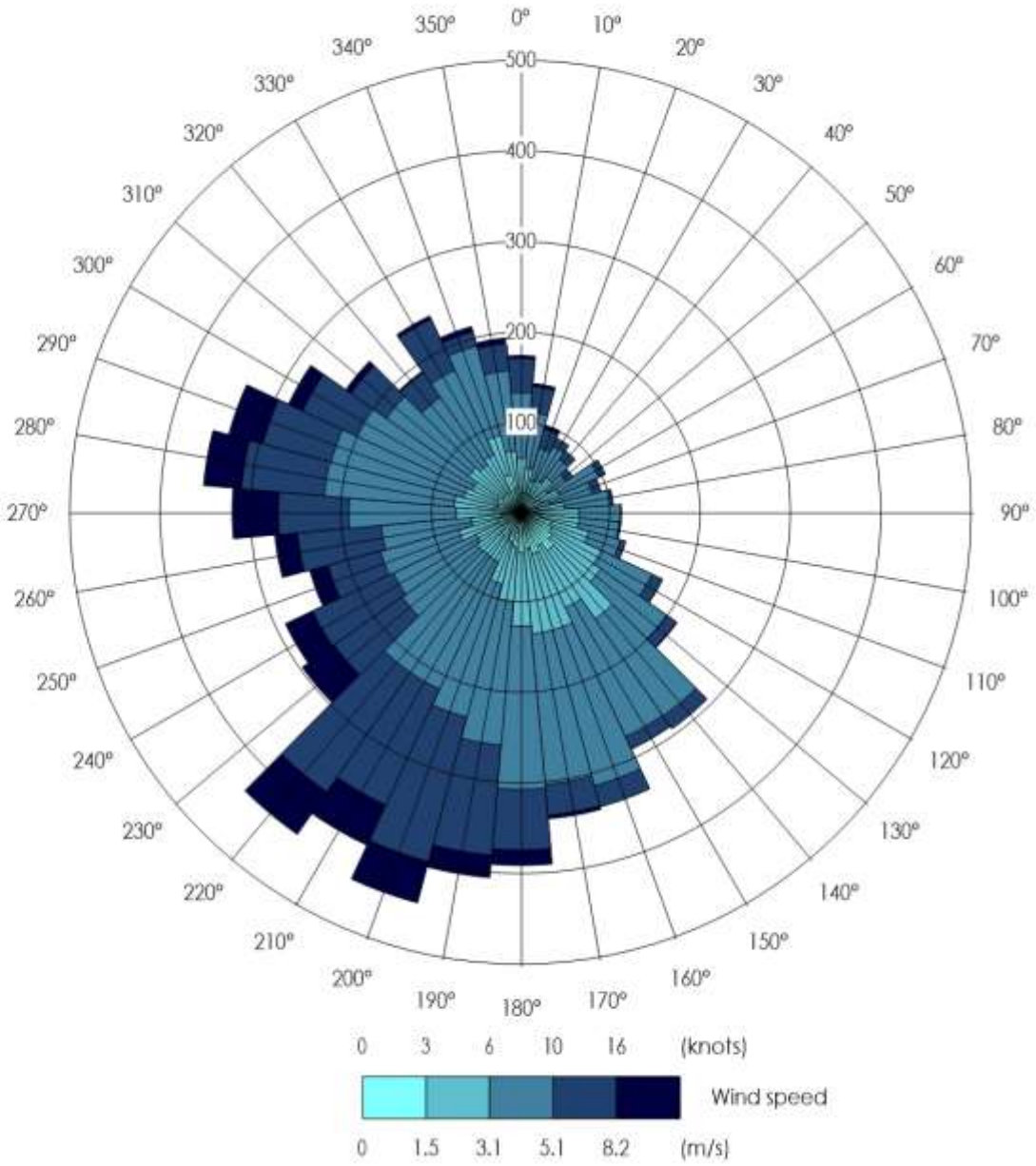

Legend

Title
Figure 3 - Wind Rose of 2019
Doncaster Sheffield Airport
Meteorological Data

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
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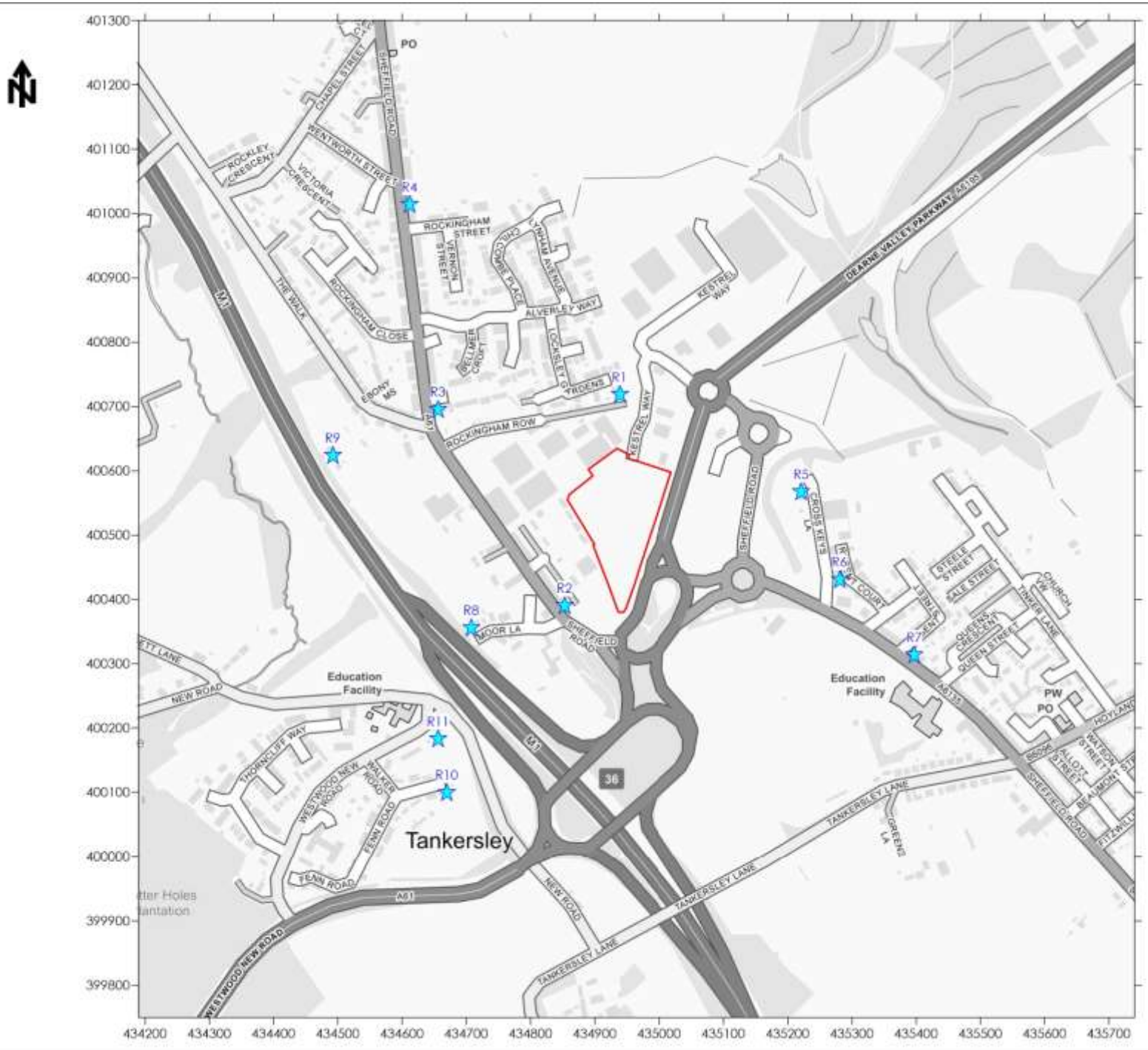

Legend

Site Boundary

Receptor

Title
Figure 4 - Road Vehicle Exhaust Emissions Sensitive Receptors

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

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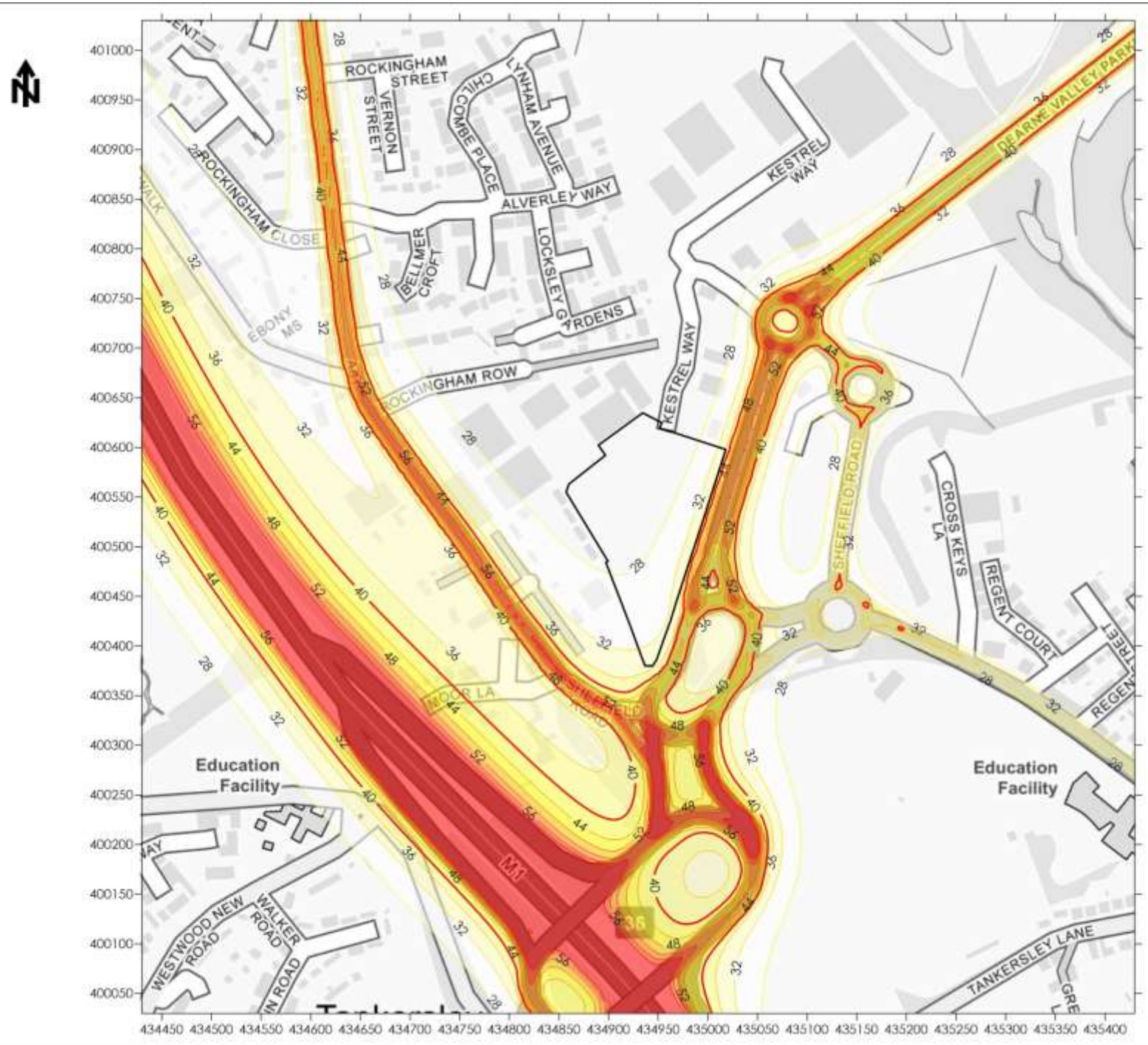

Legend

Site Boundary

Annual Mean NO_2 Concentrations ($\mu g/m^3$)

60
56
52
48
44
40
36
32
28

Title

Figure 5 - Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)
Do-Minimum

Project

Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference

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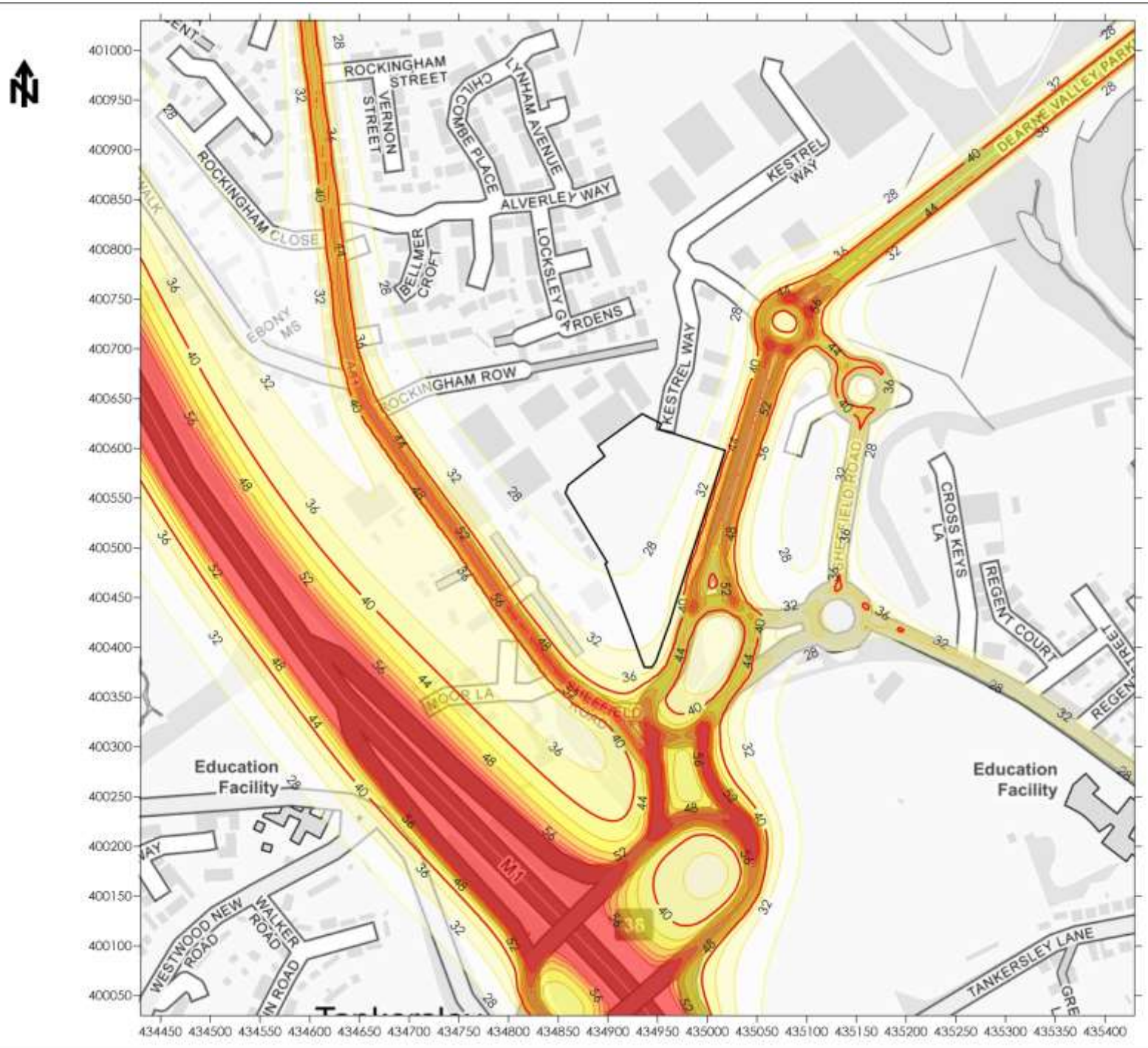

Legend

Site Boundary

Annual Mean NO_2 Concentrations ($\mu g/m^3$)

60
56
52
48
44
40
36
32
28

Title
Figure 6 - Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)
Do-Something

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
5887

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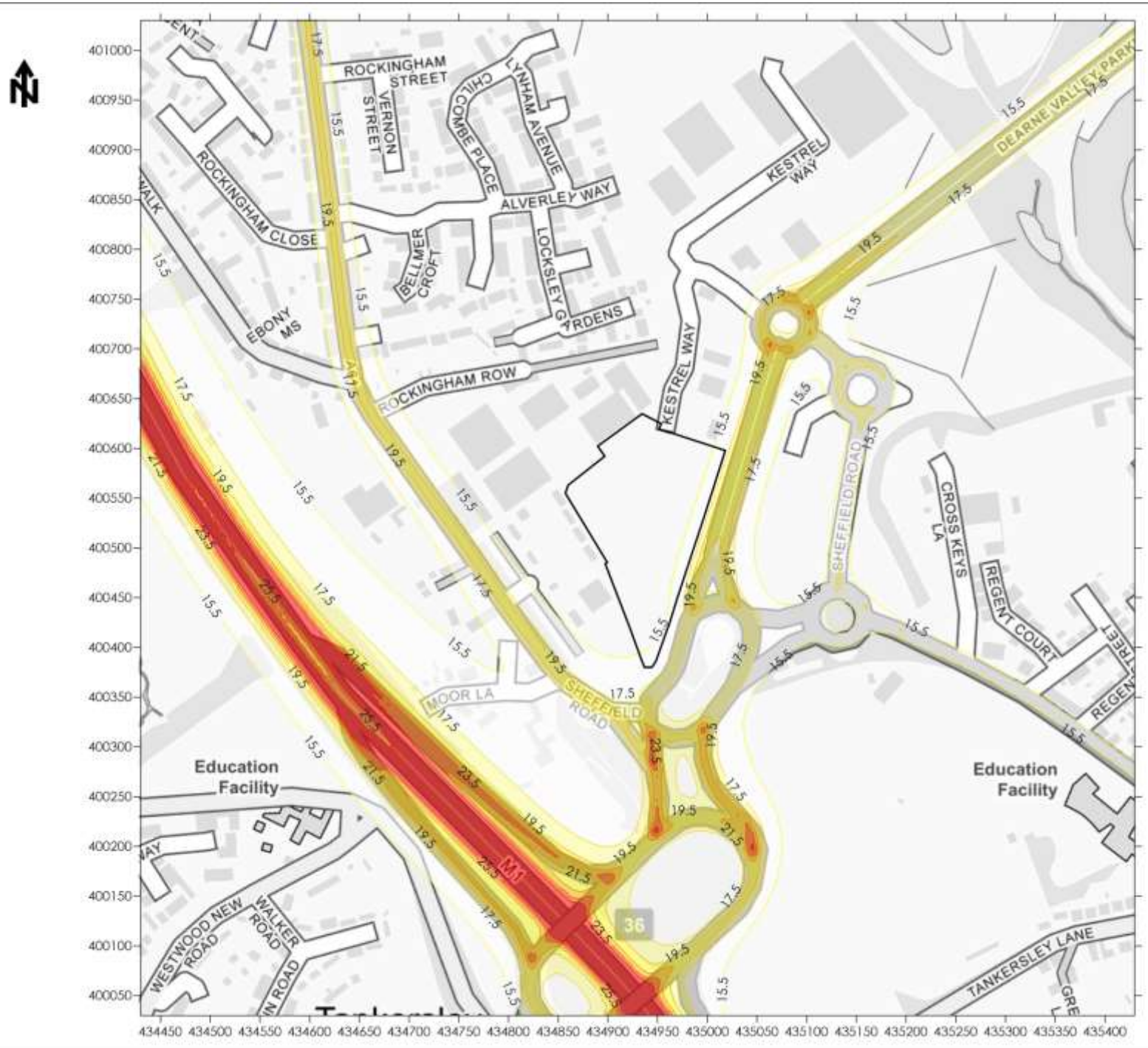

Legend

Site Boundary

Annual Mean PM_{10} Concentrations (µg/m³)

25.5
23.5
21.5
19.5
17.5
15.5

Title
Figure 7 - Predicted Annual Mean PM_{10} Concentration (µg/m³) Do-Minimum

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
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Legend

Site Boundary

Annual Mean PM_{10} Concentrations (µg/m³)

25.5
23.5
21.5
19.5
17.5
15.5

Title
Figure 8 - Predicted Annual Mean PM_{10} Concentration (µg/m³)
Do-Something

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
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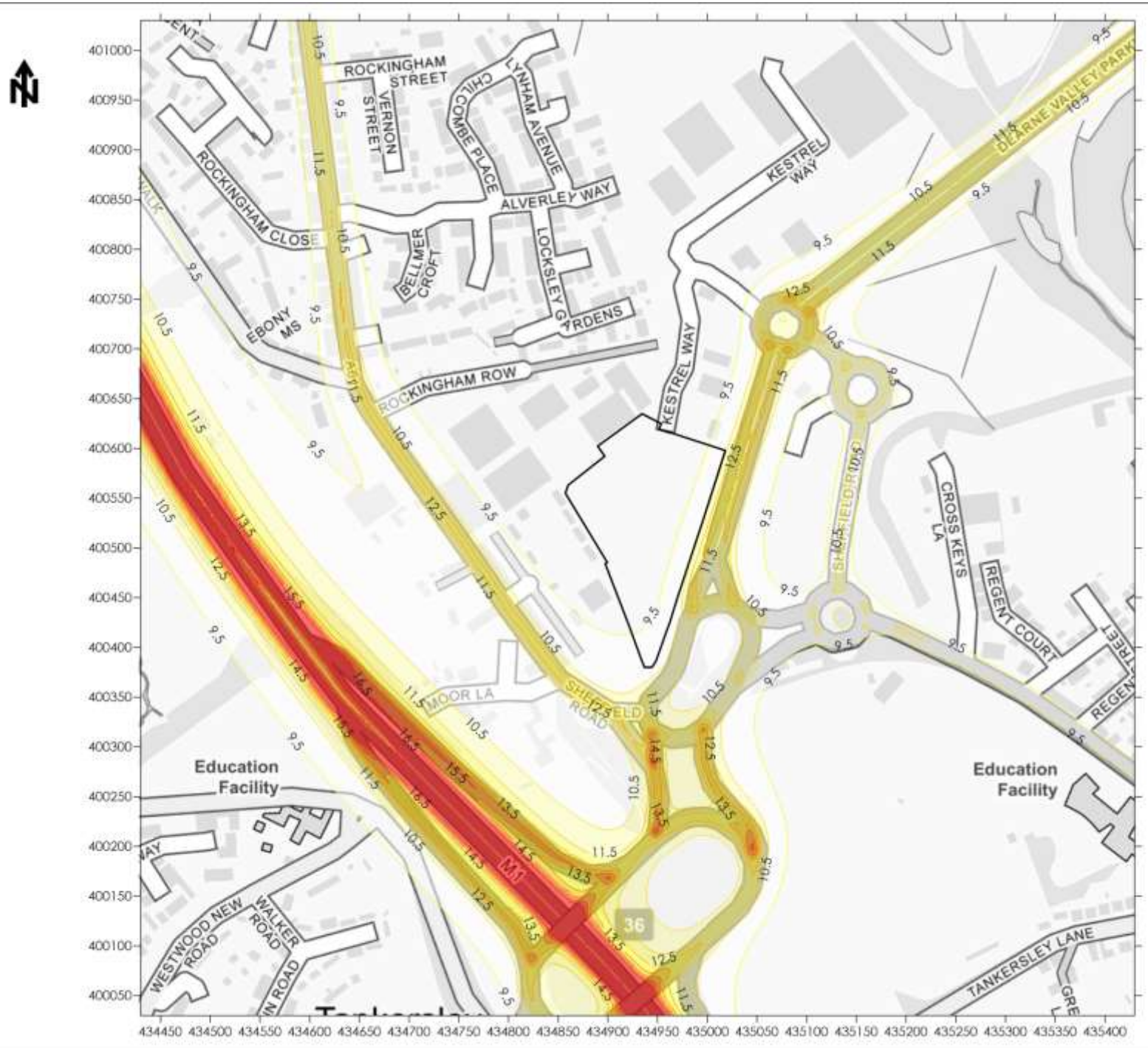

Legend

Site Boundary

Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

16.5
15.5
14.5
13.5
12.5
11.5
10.5
9.5

Title
Figure 9 - Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)
Do-Minimum

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
5887

Client
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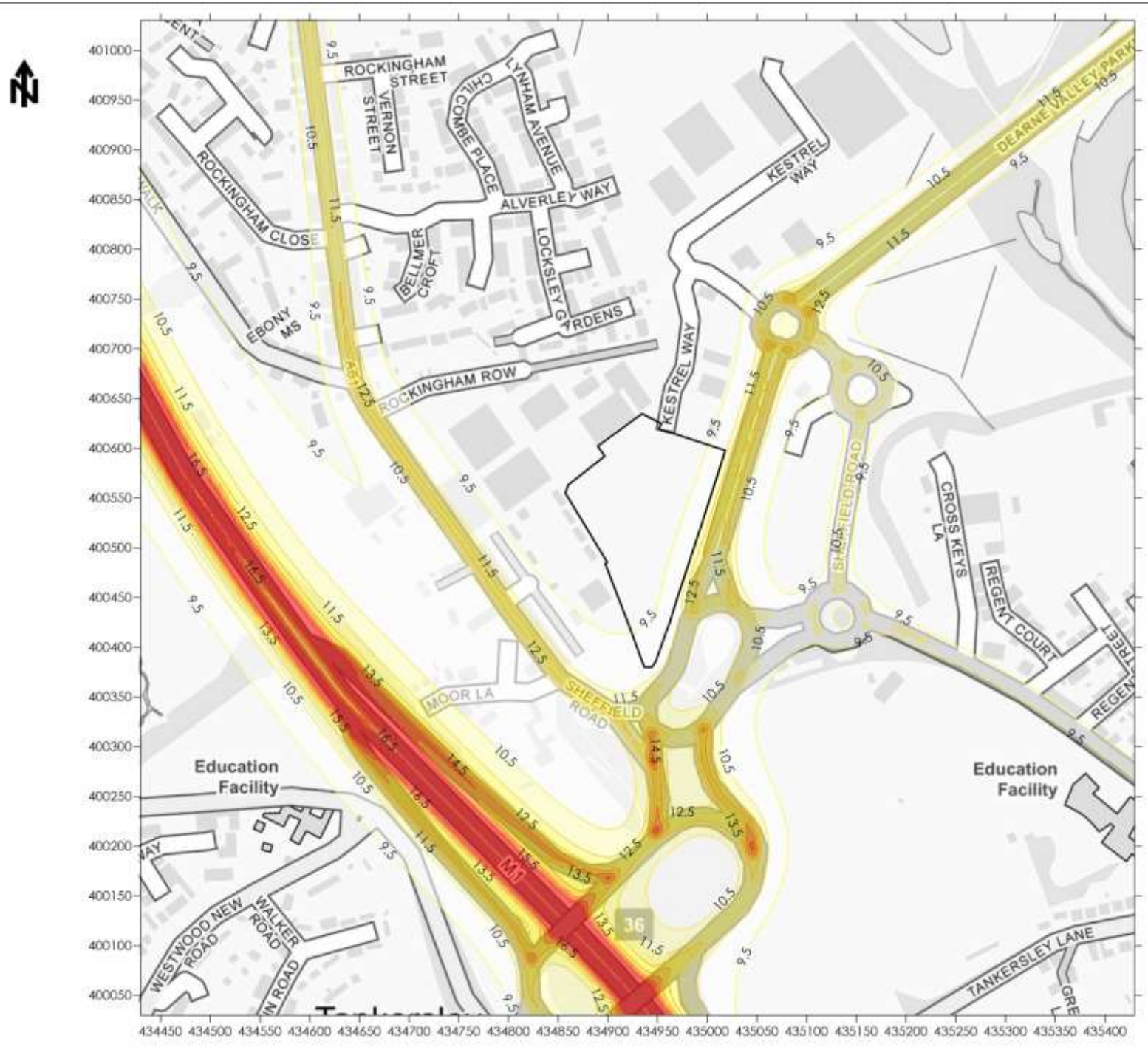

Legend

Site Boundary

Annual Mean $PM_{2.5}$ Concentrations (µg/m³)

16.5
15.5
14.5
13.5
12.5
11.5
10.5
9.5

Title
Figure 10 - Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)
Do-Something

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
5887

Client
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Legend

Site Boundary

Road Link

Output Grid

Title
Figure 11 - ADMS-Roads Inputs

Project
Air Quality Assessment
Dearne Valley Parkway, Barnsley

Project Reference
5887

Client
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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 exhaust emissions associated with vehicles travelling to and from the site. In order to assess NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive locations, detailed dispersion modelling was undertaken in accordance with the following methodology.

Modelling was undertaken for 2019 to allow verification against recent monitoring results and 2028 to represent likely conditions in the opening year of the scheme.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 5.0.1.3). ADMS-Roads is developed by Cambridge Environmental Research Consultants (CERC) and is routinely used throughout the world for the prediction of pollutant dispersion from road sources. Modelling predictions from this software package are accepted within the UK by the Environment Agency and DEFRA.

The model requires input data that details the following parameters:

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

The following Sections detail the relevant inputs utilised in the assessment.

Assessment Area

The assessment area was defined based on the location of the development and roads likely to impact pollutant levels across the site. Ambient concentrations were predicted over NGR: 434430, 400030 to 435430, 401030. One Cartesian grid was used within the model to produce

data suitable for contour plotting using the Surfer software package. It should be noted that although the grid only covered the proposed site, source geometries were extended in order to ensure the impact of all relevant emissions in the vicinity of the scheme were considered.

Reference should be made to Figure 11 for a graphical representation of the assessment grid extents.

Traffic Flow Data

Traffic data for use in the assessment was provided by the Transport Consultants for the project. This is summarised in Table A1.1.

Table A1.1 Traffic Data

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)		
		Verif.	2028 DM	2028 DS	Verif.	2028 DM	2028 DS
L1	Dearne Valley Parkway, east of Shortwood Way, Eastbound (EB)	11,978	13,014	13,068	4.99	4.99	4.99
L2	Dearne Valley Parkway, east of Shortwood Way, Westbound (WB)	13,039	14,167	14,220	5.32	5.32	5.32
L3	Dearne Valley Parkway, west of Shortwood Way, WB	13,039	14,167	14,220	5.32	5.32	5.32
L4	Dearne Valley Parkway, east of Rockingham Roundabout, WB	13,039	14,167	14,220	5.32	5.32	5.32
L5	Dearne Valley Parkway, east of Rockingham Roundabout, EB	11,978	13,014	13,068	4.99	4.99	4.99
L6	Dearne Valley Parkway, west of Shortwood Way, EB	11,978	13,014	13,068	4.99	4.99	4.99
L7	Dearne Valley Parkway, south of Rockingham Roundabout, Southbound (SB)	12,234	13,292	13,479	5.17	5.17	5.18
L8	Dearne Valley Parkway, north of Rockingham Roundabout, Northbound (NB)	14,298	15,535	15,724	6.06	6.06	6.06
L9	A61 Sheffield Road to Birdwell Roundabout	4,252	4,620	4,635	3.63	3.63	3.64
L10	Birdwell Roundabout to A61 Sheffield Road	4,252	4,620	4,635	3.63	3.63	3.64

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)		
		Verif.	2028 DM	2028 DS	Verif.	2028 DM	2028 DS
L11	A61 to A61 Sheffield Road	8,505	9,240	9,270	3.63	3.63	3.64
L12	A61 Sheffield Road, south of The Walk	17,009	18,480	18,539	3.63	3.63	3.64
L13	A61 Sheffield Road, north of The Walk	17,009	18,480	18,539	3.63	3.63	3.64
L14	East of Rockingham Roundabout	9,092	9,878	9,930	1.68	1.68	1.71
L15	North of A6135	9,092	9,878	9,930	1.68	1.68	1.71
L16	A6135 Sheffield Road, EB	4,546	4,939	4,976	1.68	1.68	1.71
L17	A6135 Sheffield Road, WB	4,546	4,939	4,976	1.68	1.68	1.71
L18	A6135 Sheffield Road	9,092	9,878	9,952	1.68	1.68	1.71
L19	A61 south of Birdwell Roundabout, SB	18,217	19,793	19,951	5.17	5.17	5.18
L20	A61 south of Birdwell Roundabout, NB	19,982	21,710	21,870	4.76	4.76	4.78
L21	A6135, east of Birdwell Roundabout, EB	4,546	4,939	4,965	1.68	1.68	1.71
L22	A6135, east of Birdwell Roundabout, WB	4,546	4,939	4,965	1.68	1.68	1.71
L23	M1, NB	48,277	52,453	52,538	9.48	9.48	9.47
L24	M1, SB	51,737	56,212	56,262	10.04	10.04	10.03
L25	Shortwood Roundabout	12,509	13,590	13,644	5.16	5.16	5.16
L26	Rockingham Roundabout	12,887	14,002	14,123	5.38	5.38	5.39
L27	Roundabout	9,092	9,878	9,930	1.68	1.68	1.71
L28	Roundabout	5,455	5,927	5,963	1.68	1.68	1.71
L29	Birdwell Roundabout	10,291	11,181	11,278	3.97	3.97	3.99
L30	M1 Roundabout	15,612	16,963	17,053	7.22	7.22	7.23
L31	M1 slip road, SB	12,181	13,235	13,256	9.48	9.48	9.48
L32	M1 slip road, NB	12,069	13,113	13,134	9.48	9.48	9.47
L33	A6135 Sheffield Road, Hoyland Road junction	9,092	9,878	9,952	1.68	1.68	1.71
L34	A6135 Sheffield Road	9,092	9,878	9,952	1.68	1.68	1.71
L35	M1, SB	48,724	52,938	53,022	9.48	9.48	9.48

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)		
		Verif.	2028 DM	2028 DS	Verif.	2028 DM	2028 DS
L36	M1, NB	50,036	54,364	54,413	11.30	11.30	11.29

Road widths and vehicle speeds were estimated from aerial photography and UK highway design standards. A summary of the relevant parameters is shown in Table A1.2.

Table A1.2 Traffic Data

Link		Speed (km/h)	Road Width (m)
L1	Dearne Valley Parkway, east of Shortwood Way, EB	80	7.3
L2	Dearne Valley Parkway, east of Shortwood Way, WB	60	7.3
L3	Dearne Valley Parkway, west of Shortwood Way, WB	80	7.3
L4	Dearne Valley Parkway, east of Rockingham Roundabout, WB	30	7.3
L5	Dearne Valley Parkway, east of Rockingham Roundabout, EB	30	7.3
L6	Dearne Valley Parkway, west of Shortwood Way, EB	80	7.3
L7	Dearne Valley Parkway, south of Rockingham Roundabout, SB	40	7.3
L8	Dearne Valley Parkway, north of Rockingham Roundabout, NB	40	7.3
L9	A61 Sheffield Road to Birdwell Roundabout	25	13.9
L10	Birdwell Roundabout to A61 Sheffield Road	25	4.5
L11	A61 to A61 Sheffield Road	25	4.5
L12	A61 Sheffield Road, south of The Walk	30	7.3
L13	A61 Sheffield Road, north of The Walk	40	7.3
L14	East of Rockingham Roundabout	30	8.5
L15	North of A6135	45	7.3
L16	A6135 Sheffield Road, EB	30	4.5
L17	A6135 Sheffield Road, WB	30	4.5
L18	A6135 Sheffield Road	45	7.3
L19	A61 south of Birdwell Roundabout, SB	30	7.3

Link		Speed (km/h)	Road Width (m)
L20	A61 south of Birdwell Roundabout, NB	30	7.3
L21	A6135, east of Birdwell Roundabout, EB	40	7.3
L22	A6135, east of Birdwell Roundabout, WB	40	7.3
L23	M1, NB	100	11.25
L24	M1, SB	100	11.25
L25	Shortwood Roundabout	40	7.3
L26	Rockingham Roundabout	40	7.3
L27	Roundabout	40	7.3
L28	Roundabout	40	7.3
L29	Birdwell Roundabout	40	11.25
L30	M1 Roundabout	40	11.25
L31	M1 slip road, SB	25	6.5
L32	M1 slip road, NB	25	6.2
L33	A6135 Sheffield Road, Hoyland Road junction	25	7.3
L34	A6135 Sheffield Road	40	7.3
L35	M1, SB	100	11.25
L36	M1, NB	100	11.25

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

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 11.0). This has been produced by DEFRA and incorporates COPERT 5.3 vehicle emission factors and fleet information.

There is current uncertainty over NO_2 concentrations within the UK, with the implementation of new vehicle emission standards not resulting in the previously expected reduction in roadside levels. Therefore, 2019 emission factors were utilised in preference to the scheme opening year in

order to provide robust model outputs. As predictions for 2019 were verified, it is considered the results are a robust indication of worst case concentrations for the future year.

Meteorological Data

Meteorological data used in the assessment was taken from Doncaster-Sheffield Airport meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Doncaster-Sheffield Airport is located at NGR: 465930, 398920, which is approximately 31.4km south-east of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

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

Roughness Length

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

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

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 development site and is suggested within ADMS-Roads as being suitable for 'cities and large towns.'

A minimum Monin-Obukhov length of 10m was used to describe the meteorological site.

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

Background Concentrations

Annual mean NO_2, PM_{10} and $PM_{2.5}$ background concentrations for use in the assessment were obtained from the DEFRA mapping study for the grid square containing the site, as shown in Table 12.

Similarly to emissions factors, background concentrations from 2019 were utilised in preference to the development opening year. This provided a robust assessment and is likely to overestimate pollutant concentrations during the operation of the proposals.

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations were converted to NO_2 concentrations using the spreadsheet (version 8.1) provided by DEFRA, which is the method detailed within DEFRA guidance[23].

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.

[23] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

For the purpose of the assessment, model verification was undertaken for 2019 using traffic data, meteorological data and monitoring results from this year. The choice of 2019 as the verification year aligns with the IAQM position statement 'Use of 2020 and 2021 Monitoring Datasets'[24], which states:

> "If you are carrying out an air quality study that includes validation against monitoring data, use 2019 monitoring data as the last typical year"

Monitoring of NO_2 concentrations was undertaken at six locations within the vicinity of roads included within the model during 2019. The results were obtained and the road contribution to total NO_x concentrations calculated following the methodology contained within DEFRA guidance[25]. The monitored annual mean NO_2 concentrations and calculated road NO_x concentrations are summarised in Table A1.4.

Table A1.4 NO_x Verification - Monitoring Results

Monitoring Location		Monitored NO_2 Concentration (µg/m³)	Calculated Road NO_x Concentration (µg/m³)
DT24	A6135 Hoyland	30.30	25.21
DT25	A61 Sheffield Road, Birdwell	38.60	42.96
DT26	A61 Sheffield Road, Birdwell	40.30	46.76
DT27	A61 Sheffield Road, Birdwell	39.80	45.64
DT31	Sheffield Road, Birdwell	29.70	23.98
DT32	Sheffield Road, Chapel Street, Birdwell	35.50	36.17

The annual mean road NO_x concentrations predicted from the dispersion model and the 2019 road NO_x concentrations calculated from the monitoring results are summarised in Table A1.5.

Table A1.5 NO_x Verification - Modelling Results

Monitoring Location		Calculated Road NO_x Concentration (µg/m³)	Modelled Road NO_x Concentration (µg/m³)
DT24	A6135 Hoyland	25.21	7.82

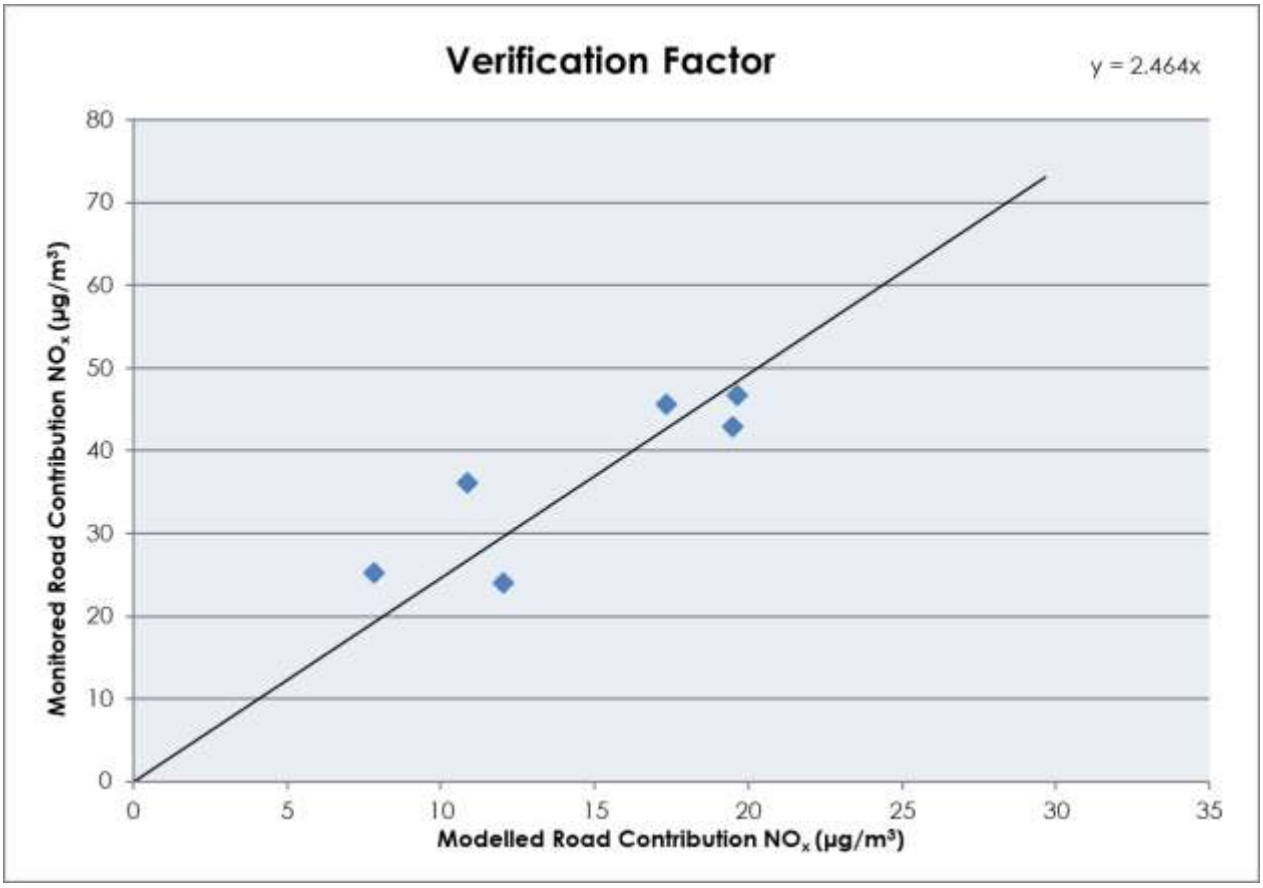
[24] Use of 2020 and 2021 Monitoring Datasets, IAQM, 2021.

[25] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Monitoring Location		Calculated Road NO_x Concentration (µg/m³)	Modelled Road NO_x Concentration (µg/m³)
DT25	A61 Sheffield Road, Birdwell	42.96	19.48
DT26	A61 Sheffield Road, Birdwell	46.76	19.64
DT27	A61 Sheffield Road, Birdwell	45.64	17.35
DT31	Sheffield Road, Birdwell	23.98	12.03
DT32	Sheffield Road, Chapel Street, Birdwell	36.17	10.86

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 2.4640 was required to be applied to all NO_x modelling results, as shown in Graph 1.

Graph 1 NO_x verification Factor



Monitoring of PM_{10} or $PM_{2.5}$ concentrations was not undertaken within the assessment extents. The NO_x verification factor was therefore used to adjust model predictions of these species in lieu of more accurate data in accordance with DEFRA guidance[26].

[26] Local Air Quality Management Technical Guidance (TG22), DEFRA, 2022.

Appendix 2 - Curricula Vitae

JETHRO REDMORE

Director

BEng (Hons), MSc, MIAQM, MIEnvSc, PIEMA, CEnv

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.

AMELIA REED

Principal Air Quality Consultant

BSc (Hons), MIAQM, AMIEnvSc

Tel: 0161 706 0075 | Email: amelia.reed@red-env.co.uk

KEY EXPERIENCE:

Amelia is a Principal 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 and industrial emissions using ADMS-Roads and ADMS-5. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of Environmental Impact Assessments (EIAs) and scoping reports for developments throughout the UK.
- Advanced canyon modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Air quality monitoring at industrial sites to quantify pollutant concentrations.
- 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.
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.

SELECT PROJECTS SUMMARY:

Bradley Road, Huddersfield

Air Quality EIA in support of a hybrid planning application for a residential development on land off Bradley Road, Huddersfield. This included a detailed application for circa 300 units and an outline application for the remainder of the site allocation of +1,000 dwellings. Dispersion modelling was undertaken due to the proximity of nearby Air Quality Management Areas (AQMAs). Using sensitive receptors located in areas where increased road traffic may affect pollutant levels, a comparison was made between concentrations with and without the development in place. Site suitability for residential use due to potential constraints associated with vehicle emissions from the M62 and odour emissions from an adjacent landfill site and poultry farm, was also considered.

Kingston Road, New Malden

Air Quality Neutral Assessment for a mixed-use development in Kingston upon Thames to determine compliance with the London Plan requirements. This indicated an acceptable level of emissions from the scheme and the development was considered to be air quality neutral.

The Burrell Collection Museum, Glasgow

Air Quality Assessment in support of an energy centre at an existing museum. The scheme included provision of three gas fired boilers. Concerns were raised the proximity of the flues to the building intake and surrounding Pollok Country Park. Impacts associated with emissions from the proposed gas boilers were assessed through detailed dispersion modelling using ADMS-5. This indicated impacts on annual mean NO_2 and PM_{10} concentrations were predicted to be not significant.

Magnitude, Middlewich

Air Quality EIA and a number of Air Quality Assessments in support of Phases 1b, 3, 4a, 4b and Plot 1c of the Magnitude sites in Middlewich. Detailed dispersion modelling was undertaken with the inclusion of advanced canyon modelling to evaluate the impact of the urban topography within the locality on the dispersion of traffic related pollutants, particularly with in AQMAs nearby. The Results indicated the in-combination impacts were not significant.

Rookery Avenue, Whiteley

Odour Impact Assessment in support of a hot food takeaway with a drive thru facility in Whiteley. The assessment considered the scale and nature of potential emissions, the location of nearest receptors and the proposed cooking type in accordance with the relevant DEFRA guidance. An appropriate ventilation system was identified and described on the basis of the assessment results. The scheme was granted planning permission.

Old Knotty Way, Uttoxeter

Air Quality Assessment in support an Aldi food store and associated facilities. Concerns had been raised in relation to the impacts during the operational phase of the proposals. Changes in pollution levels were therefore considered at sensitive receptors as a result of variations to road geometry and associated redistribution of vehicle movements across the local area. Results of the dispersion modelling study indicated air quality impacts as a result of the scheme were not significant and the scheme was granted planning permission.