AIR QUALITY ASSESSMENT
PREMDOR, DARTON

VERSION 2.0

October 2023

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1 INTRODUCTION

Metrica Environmental Consulting Ltd (Metrica) commissioned Redmore Environmental Ltd to undertake an Air Quality Assessment in support of the extension of the Premdor Manufacturing Facility, Darton. The full report is presented in Appendix 1.

2 SUMMARY OF FINDINGS

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.

Dispersion modelling was undertaken in order to predict pollutant concentrations at sensitive locations during the operational phase 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.

APPENDIX 1: AIR QUALITY ASSESSMENT REPORT

Air Quality Assessment

Premdor Ltd, Darton

Client: Metrica Environmental Consulting Ltd

Reference: 6883r2

Date: 16th August 2023

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Appendices

1.0 INTRODUCTION

1.1 Background

1.1.1 Redmore Environmental Ltd was commissioned by Metrica Environmental Consulting Ltd to undertake an Air Quality Assessment in support of the extension of the Premdor Manufacturing Facility, Darton.

1.1.2 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 undertaken in order to determine baseline conditions and assess potential effects as a result of the scheme.

1.2 Site Location and Context

1.2.1 The site is located on land to the south of the Premdor Manufacturing Facility, off Huddersfield Road, Darton, at approximate National Grid Reference (NGR): 430369, 410416. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise an extension to the southern section of the existing Premdor Manufacturing facility to provide an additional 6,606m^2 of floorspace alongside an office and the construction of one warehouse/workshop and associated car parking. It should be noted that the end-use of the warehouse/workshop was not known at the time of reporting. As such, an assessment of traffic exhaust emissions from vehicles associated with a workshop has been undertaken in order to provide a worst-case appraisal of potential air quality impacts.

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 on 28th 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 exceedances 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, the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Dust

2.3.1 The main requirements for dust control from construction sites is that provided in Section 79 of Part III of the Environmental Protection Act (1990).

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.

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

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 […]."

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

2.6 Local Planning Policy

2.6.1 The Barnsley Local Plan[6] was adopted by Barnsley Metropolitan Borough Council (BMBC) on 3rd January 2019. Review of the document indicated policies AQ1, SD1, GD1 and D1 of relevance to this assessment.

2.6.2 BMBC has 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.

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

6 Barnsley Local Plan, BMBC, 2019.

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

3.0 METHODOLOGY

3.1 Construction Phase Assessment

3.1.1 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].

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

- Earthworks;
- Construction; and,
- Trackout.

3.1.3 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}.

3.1.4 The assessment steps are detailed below.

Step 1

3.1.5 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.

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

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

Step 2

3.1.7 Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on two factors. The magnitude of dust arising from the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

3.1.8 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
	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

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

3.1.9 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

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
Medium	• Users would expect to enjoy a reasonable level of amenity • Aesthetics or value of their property could be diminished by soiling • People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work	• Nationally designated site e.g. Sites of Special Scientific Interest
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

3.1.10 The guidance[9] also provides a number of factors to consider when determining the sensitivity of an area to potential dust impacts. These have been considered in the undertaking of this assessment.

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

Table 5 Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 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

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

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
Low	More than 1	Low	Low	Low	Low

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

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

Receptor Sensitivity	Background Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			Less than 20	Less than 50	Less than 100	Less than 200	Less than 350
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m^3	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m^3	More than 100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28 - 32µg/m^3	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low

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 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

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

Table 7 Construction Dust - Sensitivity of the Area to Ecological Impacts

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

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

3.1.15 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

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

3.1.16 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

3.1.17 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[10] to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

3.1.18 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**.

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

3.1.19 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.

3.2 Operational Phase Assessment

3.2.1 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).

3.2.2 Reference should be made to Appendix 1 for assessment input data and details of the verification process.

3.2.3 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)[11] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[12] 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.

3.2.4 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'[13]. Using this methodology impacts were defined based

[11] LA 105: Air Quality, Highways England, 2019.

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

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

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

3.2.5 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**.

3.2.6 Following the prediction of impacts at discrete receptor locations, the IAQM document[14] provides guidance on determining the overall air quality impact significance of the operation of a development. These were considered as necessary.

3.2.7 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**.

3.2.8 The determination of significance relies on professional judgement and reasoning has been provided as far as practicable. The IAQM guidance[15] 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.

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

4.0 BASELINE

4.1 Introduction

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

4.2 Local Air Quality Management

4.2.1 BMBC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean and 1-hour mean concentrations of NO_2 are above the AQOs within the borough. As such, six AQMAs have been declared. The closest of these to the site is described as follows:

> "AQMA No.1 - 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 90m west 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 levels is undertaken by BMBC throughout their area of jurisdiction. Recent NO_2 concentrations 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
9	Claycliffe Road/Barugh Lane	27.7	31.7	19.2
10	Lansdowne Crescent, Darton	22.2	24.4	-(a)

Note: (a) Monitor decommissioned in 2020.

4.3.2 As shown in Table 11, annual mean NO_2 concentrations were below the AQO of 40µg/m³ at both monitors in recent years. Reference should be made to Figure 2 for a map of the survey positions.

4.3.3 Pollutant concentrations recorded 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 reviewed with caution.

4.3.4 BMBC do not undertake PM_{10} or $PM_{2.5}$ monitoring 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: 430500, 410500. Data for this location was downloaded from the DEFRA website[16] for the purpose of the assessment and is summarised in Table 12.

Table 12 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration (µg/m³)		
	2019	2023	2028
NO_2	15.08	12.23	9.79
PM_{10}	13.47	12.94	12.69
$PM_{2.5}$	8.07	7.65	7.45

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

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[(a)]
Up to 20	10 - 100	0
Up to 50	10 - 100	0
Up to 100	More than 100	-
Up to 350	More than 100	-

Note: (a) Ecological receptors are only considered within 50m of the site boundary.

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	1 - 10	0
Up to 50	10 - 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	The baseline study did not indicate any dust generating activities in the local area
The likelihood of concurrent dust generating activity on nearby sites	A review of the planning portal did not indicate any additional development proposals likely to result in concurrent dust generation in the vicinity of the site
Pre-existing screening between the source and the receptors	Woodland is located beyond the eastern and western site boundaries. This would limit the dispersion of dust to receptors in this area. There is no other significant screening around 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 west. As such, receptors to the east of the development are most likely to be affected by dust releases
Conclusions drawn from local topography	There are no significant topographical constraints to dust dispersion
Duration of the potential impact, as a receptor may become more sensitive over time	Currently it is unclear as to the duration of the construction phase. However, it is likely that it will extend over one year. The sensitivity of the surrounding area is unlikely to change during this period
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 considered to be of **medium** and **high** sensitivity, respectively. It should be noted that only receptors of **medium** sensitivity are present within 100m of the boundary.

4.5.7 The sensitivity of the receiving environment to specific potential dust impacts, based on the criteria shown in Section 3.1, 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 - Brook Hill Farm	429830	410295
R2	Residential - Sike Close	430466	410151
R3	Residential - Sike Close	430641	410064
R4	Residential - Huddersfield Road	430756	409996
R5	Residential - Huddersfield Road	430902	409951

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

5.0 ASSESSMENT

5.1 Introduction

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

5.2 Construction Phase Assessment

Step 1

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

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

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

Step 2

Earthworks

5.2.4 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The 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 The total building volume to be constructed is estimated to 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, it is anticipated that the unpaved road will 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.

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.

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 During Construction

Potential Impact	Sensitivity of the Surrounding Area		
	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 impacts is **low** from earthworks, construction and trackout.

5.2.15 It should be noted that the potential for impacts depends significantly on the distance between the dust generating activity and receptor location. Risk was predicted based on a worst-case scenario of works being undertaken at the site boundary closest to each sensitive area. Therefore, actual risk is likely to be lower than that predicted during the majority of the construction phase.

Step 3

5.2.16 The IAQM guidance[17] provides potential mitigation measures to reduce impacts as a result of fugitive dust emissions during the construction phase. These are shown in Section 8 of the guidance[18] and can be incorporated into a Construction Environmental Management Plan (CEMP) or similar if required by the LA.

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

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

Step 4

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

5.3 Operational Phase Assessment

5.3.1 Vehicle movements associated with the operation of the proposal will generate exhaust emissions on the local and regional road networks. An assessment was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

5.3.2 The assessment 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.

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

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 19.

Table 19 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Brook Hill Farm	25.55	25.55	0.00
R2	Residential - Sike Close	27.12	27.13	0.01
R3	Residential - Sike Close	28.73	28.75	0.02
R4	Residential - Huddersfield Road	30.72	30.74	0.02
R5	Residential - Huddersfield Road	34.73	34.75	0.02

5.3.7 As indicated in Table 19, predicted annual mean NO_2 concentrations were below the AQO at all sensitive receptors in both the DM and DS scenarios.

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 20.

Table 20 Predicted Annual Mean PM_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Brook Hill Farm	13.67	13.67	0.00
R2	Residential - Sike Close	13.90	13.90	0.00
R3	Residential - Sike Close	14.14	14.15	0.00
R4	Residential - Huddersfield Road	14.33	14.33	0.00

Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		DM	DS	Change
R5	Residential - Huddersfield Road	14.90	14.90	0.00

5.3.10 As indicated in Table 20, 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 21.

Table 21 Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)		
		DM	DS	Change
R1	Residential - Brook Hill Farm	8.19	8.19	0.00
R2	Residential - Sike Close	8.34	8.34	0.00
R3	Residential - Sike Close	8.49	8.49	0.00
R4	Residential - Huddersfield Road	8.63	8.63	0.00
R5	Residential - Huddersfield Road	9.00	9.00	0.00

5.3.13 As indicated in Table 21, predicted annual mean $PM_{2.5}$ concentrations were below the Interim Target at all sensitive receptors in both the DM and DS 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 22.

Table 22 Predicted Impacts - NO_2

Receptor		Predicted Annual Mean NO_2 Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact
R1	Residential - Brook Hill Farm	Below 75% of AQO	0	Negligible
R2	Residential - Sike Close	Below 75% of AQO	0	Negligible
R3	Residential - Sike Close	Below 75% of AQO	0	Negligible
R4	Residential - Huddersfield Road	76 - 94% of AQO	0	Negligible
R5	Residential - Huddersfield Road	76 - 94% of AQO	0	Negligible

5.3.16 As indicated in Table 22, 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 23.

Table 23 Predicted Impacts - PM_{10}

Receptor		Predicted Annual Mean PM_{10} Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact
R1	Residential - Brook Hill Farm	Below 75% of AQO	0	Negligible
R2	Residential - Sike Close	Below 75% of AQO	0	Negligible
R3	Residential - Sike Close	Below 75% of AQO	0	Negligible
R4	Residential - Huddersfield Road	Below 75% of AQO	0	Negligible
R5	Residential - Huddersfield Road	Below 75% of AQO	0	Negligible

5.3.18 As indicated in Table 23, 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 24.

Table 24 Predicted Impacts - $PM_{2.5}$

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration	Predicted Concentration Change as Proportion of Interim Target (%)	Impact
R1	Residential - Brook Hill Farm	Below 75% of Interim Target	0	Negligible
R2	Residential - Sike Close	Below 75% of Interim Target	0	Negligible
R3	Residential - Sike Close	Below 75% of Interim Target	0	Negligible
R4	Residential - Huddersfield Road	Below 75% of Interim Target	0	Negligible
R5	Residential - Huddersfield Road	Below 75% of Interim Target	0	Negligible

5.3.20 As indicated in Table 24, 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 Overall operational phase road traffic emissions impacts were determined as **negligible**. This was based on the overall predicted impacts at discrete receptor locations and the considerations outlined previously.

5.3.22 The IAQM guidance[20] 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[21] 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 a

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

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

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 of 4,000m^2 for General industrial (B2) 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[22] provides a number of mitigation options that should be considered for inclusion within developments. These were reviewed and those to be incorporated within the proposals include the following:

- Implementation of the Fugitive Dust Emission Mitigation Measures outlined within the IAQM guidance on the Assesment of Dust from Demolition and Construction [23], to control emissions during the construction phase of the development;
- Provision of Electric Vehicle (EV) charging points for 10% of available parking spaces, to encourage the use of sustainable transport modes to and from the site; and,
- Provision of a minimum of three secure cycle spaces.

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

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

23 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 Metrica Environmental Consulting Ltd to undertake an Air Quality Assessment in support of the extension of the Premdor Manufacturing Facility, Darton.

6.1.2 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**.

6.1.3 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.

6.1.4 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. Following consideration of the relevant issues, air quality impacts as a result of the operation of the development were considered to be **not significant**, in accordance with the IAQM guidance.

6.1.5 A number of mitigation measures were identified in line with the requirements of the Barnsley Air Quality and Emissions Good Practice Guidance[24] 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.

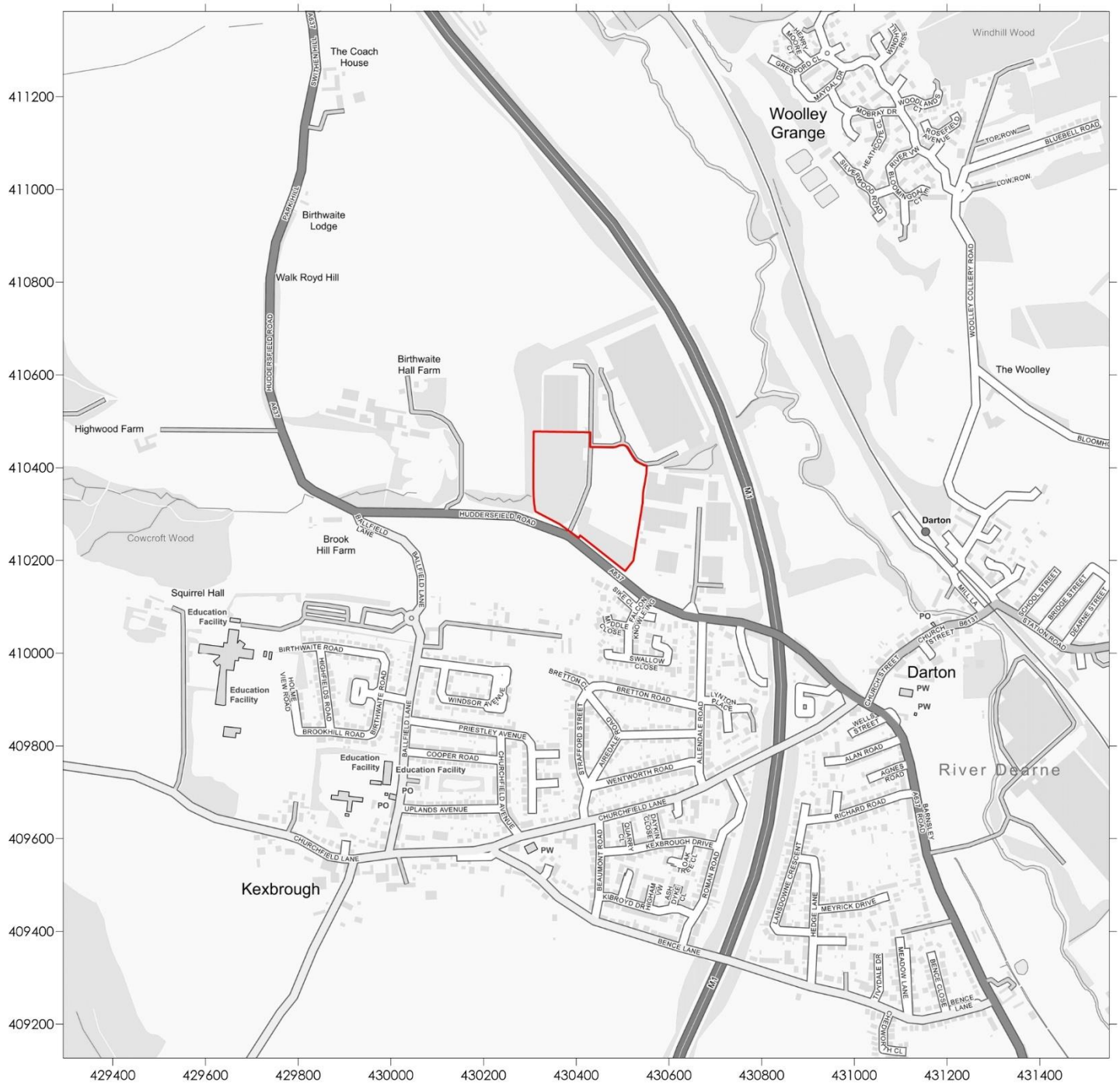
6.1.6 Based on the assessment results, air quality factors are not considered a constraint to the development.

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

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
BMBC	Bradford Metropolitan Borough Council
CEMP	Construction Environmental Management Plan
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
DS	Do-Something
GFA	Gross Floor Area
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
SP	Slow Phase
z_0	Roughness length

Figures



Legend

Site Boundary

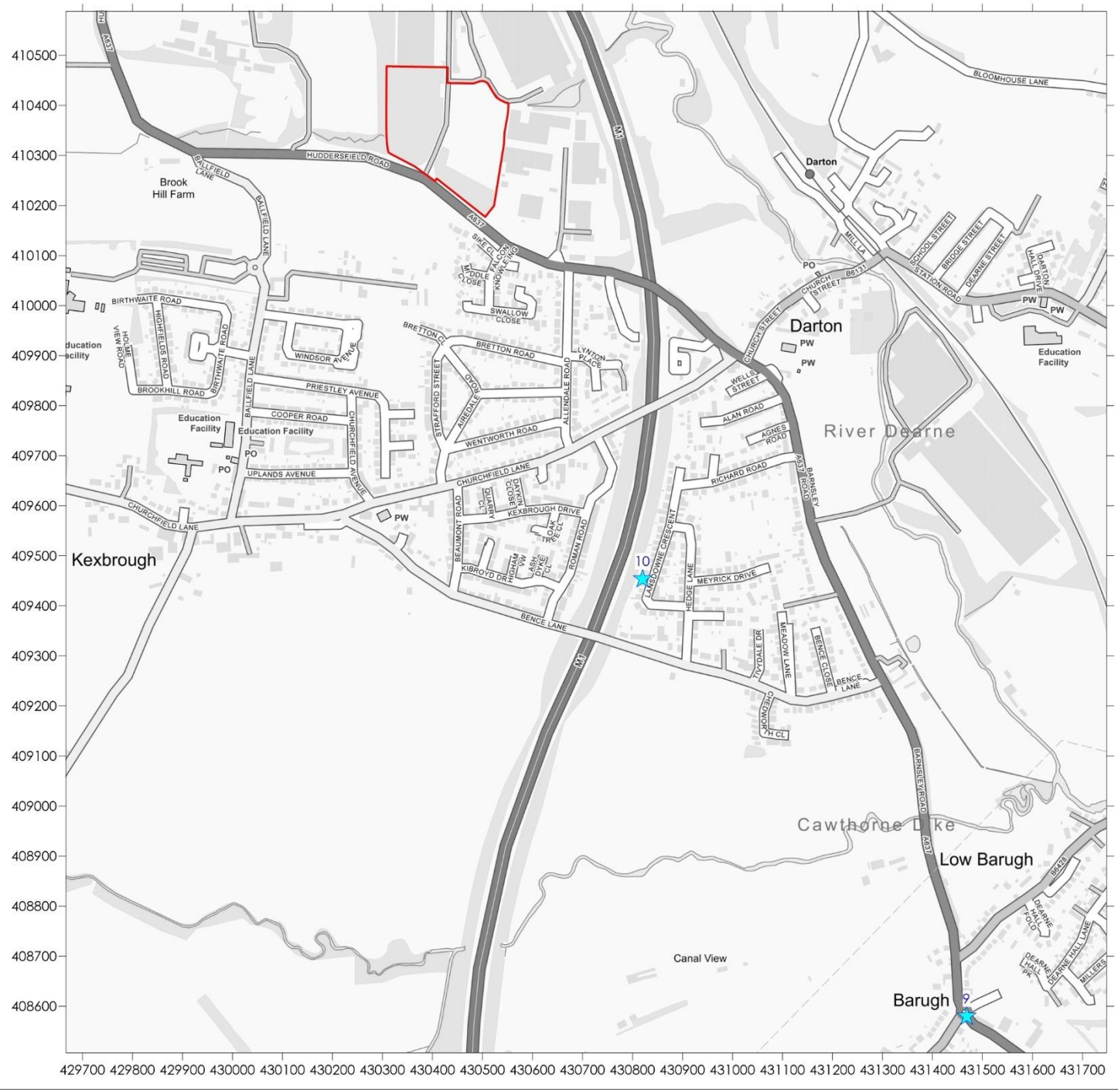
Title
Figure 1 - Site Location Plan

Project
Air Quality Assessment
Premdor Ltd, Darton

Project Reference
6883

Client
Metrica Environmental Consulting Ltd

Redmore environmental
www.red-env.co.uk | 0161 7060075



Legend

Site Boundary

Monitor

Title
Figure 2 - Monitoring Locations

Project
Air Quality Assessment
Premdor Ltd, Darton

Project Reference
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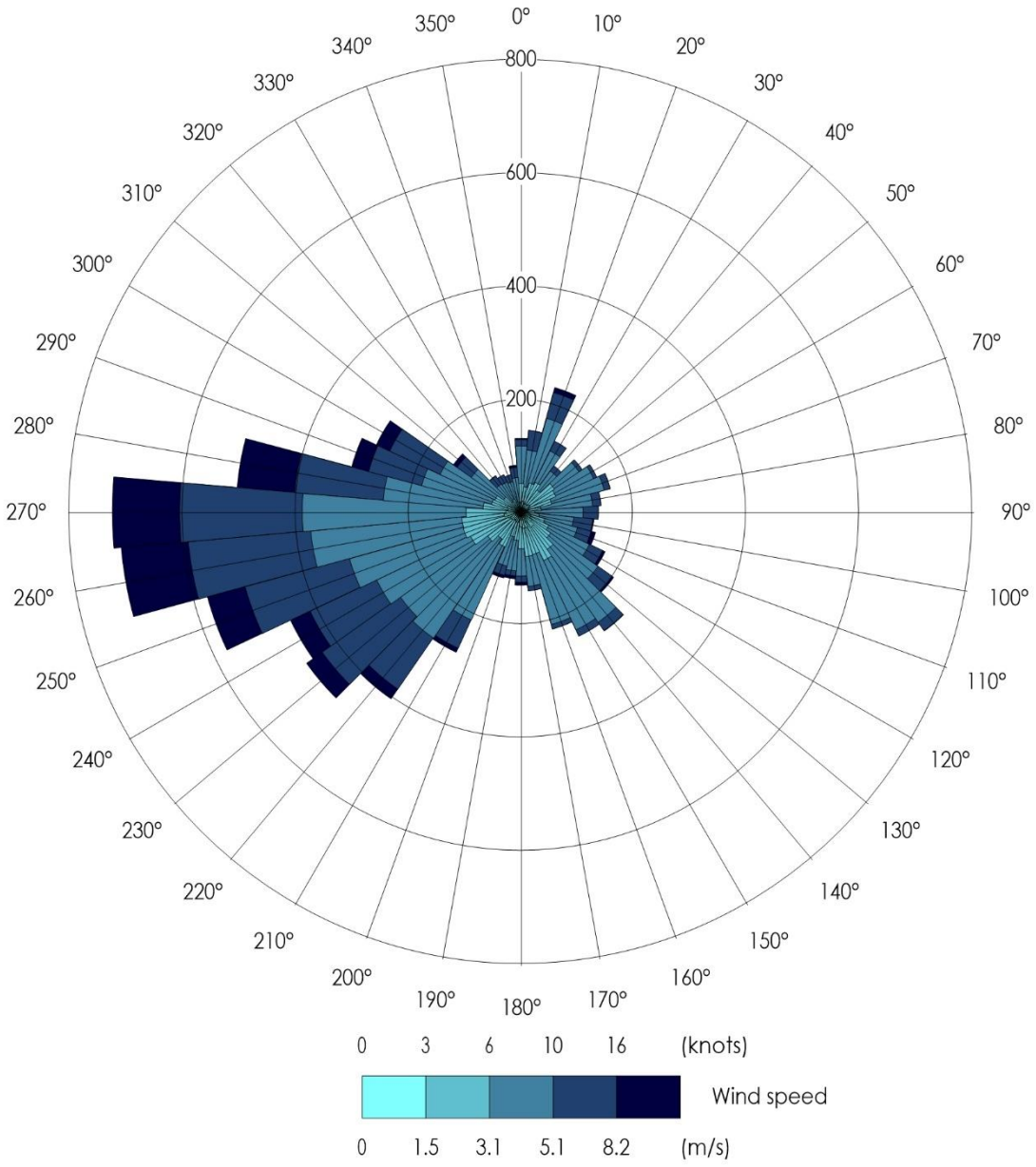

Legend

Title
Figure 3 - Wind Rose of 2019
Leeds Bradford Airport
Meteorological Data

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Air Quality Assessment
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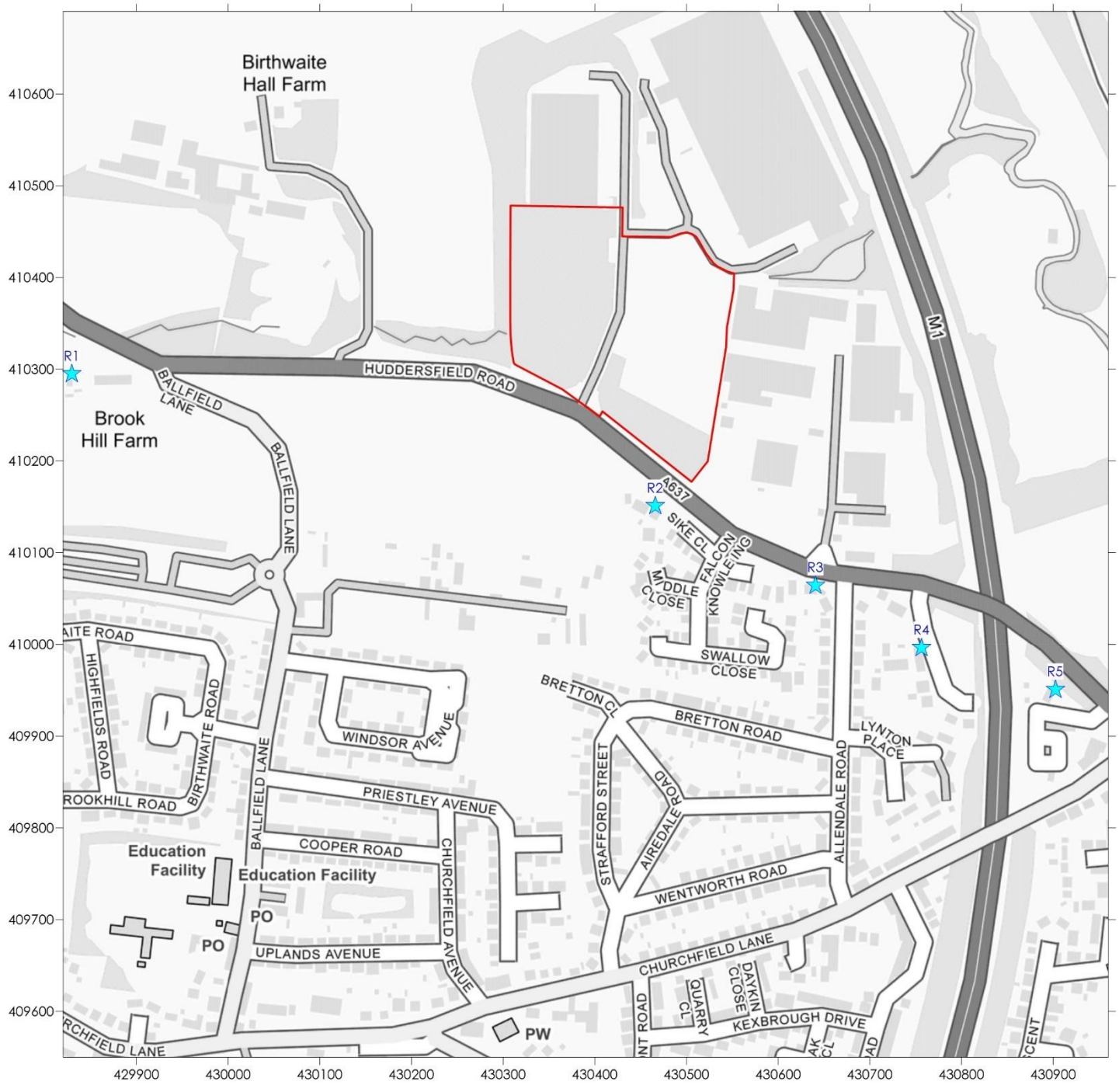

Legend

Site Boundary

Sensitive Receptor

Title
Figure 4 - Operational Phase Road Vehicle Exhaust Emissions Sensitive Receptor Locations

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Legend

Site Boundary

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

68
64
60
56
52
48
44
40
36
32
28

Title

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

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Site Boundary

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

68
64
60
56
52
48
44
40
36
32
28

Title

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

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Site Boundary

Annual Mean PM_{10} Concentration ($\mu g/m^3$)

20
19
18
17
16
15
14

Title

Figure 7 - Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$) Do-Minimum

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Site Boundary

Annual Mean PM_{10} Concentration ($\mu g/m^3$)

20
19
18
17
16
15
14

Title

Figure 8 - Predicted Annual Mean PM_{10} Concentrations ($\mu g/m^3$) Do-Something

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Site Boundary

Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)

11.8
11.4
11
10.6
10.2
9.8
9.4
9
8.6

Title

Figure 9 - Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$) Do-Minimum

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Site Boundary

Annual Mean $PM_{2.5}$ Concentration ($\mu g/m^3$)

11.8
11.4
11
10.6
10.2
9.8
9.4
9
8.6

Title

Figure 10 - Predicted Annual Mean $PM_{2.5}$ Concentrations ($\mu g/m^3$) Do-Something

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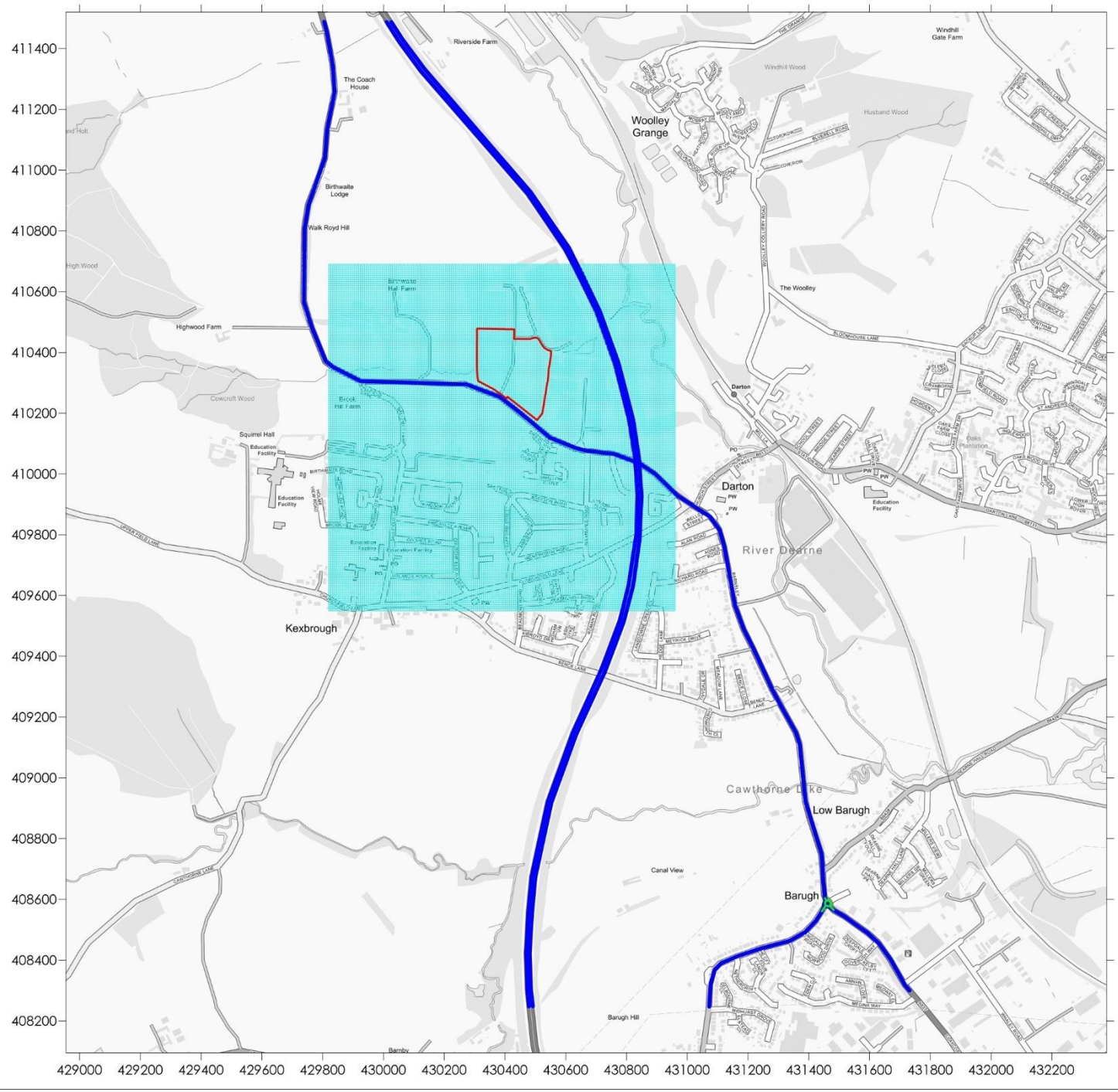

Legend

- Site Boundary
- Road Link Verification
- Road Link DM/DS
- Output Grid

Title
Figure 11 - ADMS-Roads Inputs

Project
Air Quality Assessment
Premdor Ltd, Darton

Project Reference
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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.

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:

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

The relevant inputs are detailed in the following Sections.

Traffic Flow Data

Baseline traffic data for use in the assessment, including 24-hour AADT flows and fleet composition as HDV proportion, was obtained from the Department for Transport (DfT)[25]. The DfT web tool enables the user to view and download traffic flows on every link of the 'A' road and motorway network, as well as selected minor roads, in Great Britain for the years 1999 to 2022. It

[25] https://roadtraffic.dft.gov.uk/#6/55.254/-11.107/basemap-regions-countpoints.

should be noted that the DfT web tool is referenced in DEFRA guidance[26] as being a suitable source of data for air quality assessments and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

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

Development trip generation and associated distribution was provided by the Applicant. Flows were added to the relevant links to provide an estimation of traffic flows with the development in place.

A summary of the traffic flow data is provided 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	A637 - South of Barugh Lane	9,310	10,060	10,110	7.00	7.00	7.02
L2	A637 - South of Barugh Lane junction Slow phase (SP)	9,310	10,060	10,110	7.00	7.00	7.02
L3	A637 - North of Barugh Lane junction SP	10,001	10,807	10,906	7.13	7.13	7.16
L4	A637 - North of Barugh Lane	10,001	10,807	10,906	7.13	7.13	7.16
L5	A637 - North of site access	10,001	10,807	10,928	7.13	7.13	7.17
L6	M1 Northbound (NB)	50,362	54,421	54,481	11.05	11.05	11.05
L7	M1 Southbound (SB)	51,663	55,827	55,887	10.18	10.18	10.18
L8	Barugh Lane SP joining A637 Junction	7,123	7,697	7,746	4.65	4.65	4.69
L9	Barugh Lane	7,123	7,697	7,746	4.65	4.65	4.69
R1	Mini roundabout	8,811	-(a)	-(a)	7.13	-(a)	-(a)
R2	Roundabout	-(a)	9,522	9,571	-(a)	6.42	6.44

Note: (a) New roundabout layout operational in 2021.

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

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

Road widths were estimated from aerial photography and UK highway design standards. A summary of the link parameters is provided in Table A1.2.

Table A1.2 Road Parameters

Link		Road Width (m)	Average Vehicle Speed (km/h)
L1	A637 - South of Barugh Lane	6.7	50
L2	A637 - South of Barugh Lane junction SP	8.5	20
L3	A637 - North of Barugh Lane junction SP	11.2	20
L4	A637 - North of Barugh Lane	8.5	50
L5	A637 - North of site access	6.9	80
L6	M1 NB	11.0	95
L7	M1 SB	11.0	95
L8	Barugh Lane SP joining A637 Junction	10.8	20
L9	Barugh Lane	7.3	45
R1	Mini roundabout	5.9	20
R2	Roundabout	12.6	20

Emission Factors

Emission factors were calculated using the relevant traffic flows and the Emission 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 Leeds Bradford Airport meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Leeds Bradford Airport is located at NGR: 422676, 441150, which is approximately 32km north-west of the development. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

All meteorological records used in the assessment were provided by Atmospheric Dispersion Modelling (ADM) Ltd, which is an established distributor of data within the UK. Reference should be made to Figure 3 for a wind rose of 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 0.3m 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 (max)'.

Monin-Obukhov Length

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

A minimum Monin-Obukhov length of 30m was used to describe the meteorological site. This is considered appropriate for the nature of the area and is suggested within ADMS-Roads as being suitable for 'cities and large towns'.

Background Concentrations

A review of DEFRA data and local monitoring results was undertaken in order to identify an appropriate background value for use in the assessment. This indicated the annual mean NO_2 concentration recorded at the 10 - Lansdowne Crescent, Darton, monitor during 2019 was 24.4µg/m^3, higher than the DEFRA background for the grid square containing the development, as shown in Table 12. As such, the monitoring result was used to represent existing annual mean NO_2 concentrations within the vicinity of the site without the contribution from road vehicle exhaust emissions in order to provide robust predictions.

Background monitoring of PM_{10} and $PM_{2.5}$ concentrations is not undertaken by BMBC. As such, annual mean concentrations for these species were taken from the DEFRA grid square containing the site, as shown in Table 12.

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

NO_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[27].

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.

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

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

For the purpose of the assessment, model verification was undertaken for 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'[28], 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 one location within the vicinity of roads included within the model during 2019. The result was obtained and the road contribution to total NO_x concentration calculated following the methodology contained within DEFRA guidance[29]. The monitored annual mean NO_2 concentration and calculated road NO_x concentration is summarised in Table A1.3.

Table A1.3 Verification - Monitoring Result

Monitoring Location		Monitored NO_2 Concentration (µg/m^3)	Calculated Road NO_x Concentration (µg/m^3)
9	Claycliffe Road/Barugh Lane	31.70	14.29

The annual mean road NO_x concentration predicted from the dispersion model and the 2019 road NO_x concentration calculated from the monitoring result is summarised in Table A1.4.

Table A1.4 Verification - Modelling Result

Monitoring Location		Calculated Road NO_x Concentration (µg/m^3)	Modelled Road NO_x Concentration (µg/m^3)
9	Claycliffe Road/Barugh Lane	14.29	14.23

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

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

The monitored and modelled road NO_x concentrations were compared to calculate the associated ratio. This indicated a verification factor of 1.0043 was required to be applied to all modelling results.

Monitoring of PM_{10} and $PM_{2.5}$ concentrations is 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[30].

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

Appendix 2 - Curricula Vitae

EMILY MACEY

Senior Air Quality Consultant

BSc (Hons), MSc, MIEnvSc, MIAQM

Tel: 0161 706 0075 | Email: emily.macey@red-env.co.uk

KEY EXPERIENCE:

Emily is a Senior Environmental Consultant with specialist experience in the air quality sector. Her key capabilities include:

- Production of Air Quality Assessments in accordance with Department for Environment, Food and Rural Affairs (DEFRA) methodologies for a range of residential, commercial and industrial sectors.
- Detailed dispersion modelling of road vehicle exhaust emissions using ADMS-Roads. Studies have included assessment of road traffic exhaust emissions on sensitive receptors and exposure of new residents to poor air quality.
- Advanced canyon modelling to evaluate the impact of altered urban topography on air quality in built up areas.
- Assessment of construction dust impacts from a range of development sizes.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Air quality monitoring at industrial sites to quantify pollutant concentrations
- Odour surveys to assess amenity and suitability of sites for potential future development for residential use.

SELECT PROJECTS SUMMARY:

Bowlers Yard, Manchester

Air Quality Assessment in support of an eleven storey residential development to provide circa 65 units on land known as Bowlers Yard, Manchester. The site was located in an Air Quality Management Area (AQMA) and concerns were raised regarding the exposure of future occupants to poor air quality due to road traffic emissions. Detailed dispersion modelling was undertaken using ADMS-roads to assess $PM_{2.5}$, PM_{10} and NO_2 concentrations across the site. Results indicated that pollution levels were below the air quality objectives across the development.

Freemasons Arms Hotel, Heywood

Air Quality Assessment to support a residential-led development in an AQMA. 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. Predicted concentrations of NO_2 were found to exceed air quality criteria at the building façade fronting Market Place at first floor level. As such, mitigation was specified for the affected units to ensure future residents would not be exposed to poor air quality.

Griffin Road, London

Air Quality Assessment in support of a residential development located in an AQMA. Detailed dispersion modelling was undertaken using ADMS-roads to assess PM_{10} and NO_2 concentrations across the site. Results indicated that pollution levels were classified as APEC - A in accordance with the London Councils Air Quality and Planning Guidance.

High Street, Dudley

Odour Impact Assessment in support of a proposed residential-led development. Due to the location of the site, being above an existing hot food takeaway, odour surveys were required to assess the level of odour across the development. A risk assessment was also undertaken in accordance with the relevant odour guidance. An appropriate ventilation system was identified on the basis of the assessment results.

East Common Lane, Selby

Air Quality Assessment in support of an industrial development on land associated with Access 63 Business Park, Selby. Due to the size of the development it was possible that traffic generated from the scheme may cause negative impacts on sensitive receptors nearby. NO_2 and PM_{10} concentrations were quantified at specific receptor points to ensure there would be no significant increases in pollution levels. Results revealed negligible impacts at all locations.

Wharton Road, Winsford

Air Quality Assessment in support of a residential development of circa 138 units on land off Wharton Road, Winsford. Using sensitive receptors, located in areas where increased road traffic may affect NO_2 concentrations, a comparison was made between overall concentrations with and without the development in place. Results revealed pollutant concentrations were below the relevant standards across the site and impacts associated with the development were not significant.