Air Quality Assessment

Oxford Road, Kidlington

Client: Manor Oak Homes Limited

Reference: 2792-1r1

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Executive Summary

Redmore Environmental Ltd was commissioned by Manor Oak Homes Limited to undertake an Air Quality Assessment in support of a planning application for a residential development on land off Oxford Road, Kidlington.

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 well as expose future residents to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions, consider location suitability for the proposed end use 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 demolition, earthworks, construction and trackout activities. It is considered that the use of good practice control measures would provide suitable mitigation for a development of this size and nature and reduce potential impacts to an acceptable level.

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

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

The results of the assessment also demonstrated that predicted pollution levels were below the relevant air quality standards across the development. As such, the site is considered suitable for the proposed end use from an air quality perspective.

Based on the assessment results, air quality issues 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 Manor Oak Homes Limited to undertake an Air Quality Assessment in support of a planning application for a residential development on land off Oxford Road, Kidlington.

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 well as expose future residents to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions, consider location suitability for the proposed end use 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 off Oxford Road, Kidlington, at approximate National Grid Reference (NGR): 449475, 212435. Reference should be made to Figure 1 for a map of the site and surrounding area.

1.2.2 The proposals comprise construction of 118 residential dwellings and associated infrastructure.

1.2.3 The proposals have 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. There is also the potential for the exposure of future residents to poor air quality as a result of vehicle exhaust emissions associated with the A4260 roundabout junction. An Air Quality Assessment was therefore undertaken in order to determine baseline conditions and consider potential effects as a result of the proposals. This is detailed in the following report.

2.0 LEGISLATION AND POLICY

2.1 UK Legislation

2.1.1 The Air Quality Standards Regulations (2010) came into force on 11th June 2010 and 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 other 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 Part IV of the Environment Act (1995) requires UK government to produce a national Air Quality Strategy (AQS) which contains standards, objectives and measures for improving ambient air quality. The most recent AQS was produced by the Department for Environment, Food and Rural Affairs (DEFRA) and published in July 2007[1]. The AQS sets out Air Quality Objectives (AQOs) that are maximum ambient pollutant concentrations that are not to be exceeded either without exception or with a permitted number of exceedences over a specified timescale. These are generally in line with the AQLVs, although the requirements for the determination of compliance vary.

2.1.4 Table 1 presents the AQOs and AQLVs for pollutants considered within this assessment.

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

Table 1 Air Quality Objectives/Limit Values

Pollutant	Air Quality Objective/Limit Value	
	Concentration (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean, not to be exceeded on more than 18 occasions per annum
PM_{10}	40	Annual mean
	50	24-hour mean, not to be exceeded on more than 35 occasions per annum
$PM_{2.5}$	20	Annual Mean

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

Table 2 Examples of Where the Air Quality Objectives Apply

Averaging Period	Objective Should Apply At	Objective Should Not Apply At
Annual mean	All locations where members of the public might be regularly exposed Building façades of 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

2 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

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 Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves comparing present and likely future pollutant concentrations against the AQOs. If it is predicted that levels at locations of relevant exposure, as summarised in Table 2, are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan, 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[3] (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 […]"

3 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[4] (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?

[4] 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 Local Plan 2011 - 2031[5] was adopted by Cherwell District Council (CDC) on 20th July 2015. Review of the document identified the following policies of relevance to this assessment:

> "Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment
>
> Protection and enhancement of biodiversity and the natural environment will be achieved by the following:
>
> […]
>
> Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution;
>
> […]."

> "Policy ESD 15: The Character of the Built and Historic Environment
>
> […]
>
> New Development proposals should:
>
> […]
>
> - Consider the amenity of both existing and future development, including matters of privacy, outlook, natural lighting, ventilation and indoor and outdoor space;

5 Doncaster Local Plan 2015 - 2035, DC, 2021.

- Integrate and enhance green infrastructure and incorporate biodiversity enhancement features where possible (see Policy ESD 10: Protection and Enhancement of Biodiversity and the Natural Environment and Policy ESD 17 Green Infrastructure). Well designed landscape schemes should be an integral part of development proposals to support improvements to biodiversity, the micro climate, and air pollution and pro;

[…]."

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

3.0 METHODOLOGY

3.1 Introduction

3.1.1 The proposed development has the potential to cause air quality impacts during the construction and operational phases, as well as expose future site users to elevated pollution levels. These issues have been assessed in accordance with the following methodology, which was agreed with Jim Guest, Environmental Protection Officer at CDC, on 15th February 2022.

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'[6].

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

- Demolition;
- 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 for 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.

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6 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	Demolition	• Total volume of building to be demolished greater than 50,000m^3 • Potentially dusty material (e.g. concrete) • On-site crushing and screening • Demolition activities more than 20m above ground level

Magnitude	Activity	Criteria
	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	Demolition	• Total building volume between 20,000m^3 and 50,000m^3 • Potentially dusty construction material • Demolition activities 10m to 20m above ground level
	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	Demolition	• Total volume of building to be demolished less than 20,000m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities less than 10m above ground and during wetter months

Magnitude	Activity	Criteria
	Earthworks	• Total site area less than 2,500m²Soil type with large grain size (e.g. sand) • Less than 5 heavy earth moving vehicles active at any one time • Formation of bunds less than 4m in height • Total material moved less than 20,000 tonnes • Earthworks during wetter months
	Construction	• Total building volume less than 25,000m³ • Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	• Less than 10 HDV trips per day • Surface material with low potential for dust release • Unpaved road length less than 50m

3.2.20 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

Receptor Sensitivity	Examples	
	Human Receptors	**Ecological Receptors**
Low	• Enjoyment of amenity would not reasonably be expected • Property would not be expected to be diminished in appearance • Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, farmland, short term car parks and roads	• Locally designated site e.g. Local Nature Reserve

3.2.21 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.

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

3.2.23 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

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 350
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

3.2.24 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/m³	More than 100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32µg/m³	More than 100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 - 28µg/m³	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/m³	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/m³	More than 10	High	Medium	Low	Low	Low
		1 - 10	Medium	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
	28 - 32µg/m³	More than 10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24 - 28µg/m³	More than 10	Low	Low	Low	Low	Low
		1 -10	Low	Low	Low	Low	Low
	Less than 24µg/m³	More than 10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1 or more	Low	Low	Low	Low	Low

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

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

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

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

3.2.27 Table 8 outlines the risk category from demolition activities.

Table 8 Construction Dust - Dust Risk Category from Demolition Activities

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

3.2.28 Table 9 outlines the risk category from earthworks and construction activities.

Table 9 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

3.2.29 Table 10 outlines the risk category from trackout activities.

Table 10 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

3.2.30 Step 3 requires the identification of site specific mitigation measures within the IAQM guidance[7] to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with **negligible** risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

3.2.31 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**.

3.2.32 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, as well as expose future residents to any existing air quality issues. Potential impacts have therefore been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2019 - Verification;
- Assessment year Do-Minimum (DM) (predicted traffic flows in 2027 should the proposals not proceed); and,
- Assessment year Do-Something (DS) (predicted traffic flows in 2027 should the proposals be completed).

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

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

Potential Development Impacts

3.3.3 Locations sensitive to potential changes in pollutant concentrations were identified within 200m of the highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[8] on the likely limits of pollutant dispersion from road sources. The criteria provided within DEFRA guidance[9] on where the AQOs and AQLV apply, as summarised in Table 2, was utilised to determine appropriate receptor positions.

3.3.4 The significance of predicted air quality impacts was determined in accordance with the guidance provided within the IAQM document 'Land-Use Planning & Development Control: Planning for Air Quality'[10]. 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 11.

Table 11 Significance of Operational Phase Road Vehicle Exhaust Emissions Impact

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

3.3.5 The matrix shown in Table 11 is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which makes it clearer which cell

8 LA105: Air Quality, Highways England, 2019.

9 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

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

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[11] provides guidance on determining the overall air quality impact significance of the operation of a development. The following factors are identified for consideration by the assessor:

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

3.3.7 The IAQM guidance states that an assessment must reach a conclusion on the likely significance of the predicted impact. It should be noted that this is a binary judgement of either it is **significant** or it is **not significant**.

3.3.8 The determination of significance relies on professional judgement and reasoning should be provided as far as practicable. This has been considered throughout the assessment when defining predicted impacts. The IAQM guidance[12] suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix 3.

Potential Future Exposure

3.3.9 The proposals have the potential to expose future residents to any air quality issues associated with road vehicle exhaust emissions from the A4260 roundabout junction. Pollutant concentrations were therefore quantified across the development using dispersion modelling. The results were subsequently compared with the relevant AQOs and AQLV to determine the potential for any exceedence.

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

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

4.0 BASELINE

4.1 Introduction

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

4.2 Local Air Quality Management

4.2.1 As required by the Environment Act (1995), CDC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual and 1-hour mean concentrations of NO_2 are above the AQOs within the borough. As such, four AQMAs have been declared, with the closest to the site being described as follows:

> "AQMA No. 3 - The designated area incorporates a section of Bicester Road, Kidlington to the north of its junction with Water Eaton Lane."

4.2.2 The development is located approximately 1.2km south-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 The development is also located in the vicinity of Oxfordshire City Council's (OCC's) administrative extents. OCC have 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 AQO within the district. As such, one AQMA has been declared, which is described as follows:

> "The area covered is described as the city of Oxford and is detailed on a map supplied with the Order creating the AQMA."

4.2.4 The development is located approximately 1.3km 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.

4.2.5 CDC and OCC have 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 CDC and OCC throughout their areas of jurisdiction. Recent NO_2 results from sites in the vicinity of the development are shown in Table 12. Exceedences of the AQO are shown in **bold**.

Table 12 Monitoring Results - NO_2

Monitoring Site		Monitored NO_2 Concentration ($\mu g/m^3$)		
		2017	2018	2019
Bicester Road (2)		**41.0**	37.9	33.6
Oxford Road		28.8	28.9	24.7
Bramley Close		26.7	26.3	24.0
Benmead Road		12.6	13.4	13.8
DT29	Pear Tree P&R N Gateway	28	25	26

4.3.2 As shown in Table 12, annual mean NO_2 concentrations were above $40\mu g/m^3$ at the Bicester Road monitoring location in 2017. As this monitor is positioned adjacent to a road within an AQMA, elevated levels would be expected. Pollutant levels have since reduced to below the were below the AQO in recent years. Annual mean NO_2 concentrations were below the AQO at all other locations between 2017 and 2019. Reference should be made to Figure 2 for a map of the survey positions.

4.3.3 CDC and OCC do not undertake monitoring of PM_{10} or $PM_{2.5}$ concentrations in the vicinity of the site.

4.4 Background Pollutant Concentrations

4.4.1 Predictions of background pollutant concentrations on a 1km by 1km grid basis have been produced by DEFRA for the entire of the UK to assist LAs in their Review and Assessment of air quality. The proposed development site is located in grid square NGR:

449500, 212500. Data for this location was downloaded from the DEFRA website[13] for the purpose of the assessment and is summarised in Table 13.

Table 13 Background Pollutant Concentration Predictions

Pollutant	Predicted Background Pollutant Concentration ($\mu g/m^3$)		
	2019	2022	2027
NO_2	12.51	11.09	9.51
PM_{10}	15.39	14.77	14.25
$PM_{2.5}$	10.27	9.78	9.37

4.4.2 As shown in Table 13, predicted background NO_2, PM_{10} and $PM_{2.5}$ concentrations are below the relevant AQOs and AQLV 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 demolition, 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 14.

Table 14 Demolition, Earthworks and Construction Dust Sensitive Receptors

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 20	10 - 100	0
Less than 50	10 - 100	0
Less than 100	More than 100	-

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

Distance from Site Boundary (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 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 15.

Table 15 Trackout Dust Sensitive Receptors

Distance from Site Access Route (m)	Approximate Number of Human Receptors	Approximate Number of Ecological Receptors
Less than 20	More than 100	0
Less than 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 16.

Table 16 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	Planning applications for a number of developments have recently been submitted in the vicinity of the site. It is therefore possible that these schemes will result in concurrent dust generation should they be granted consent and the construction phases overlap with that of the proposals
Pre-existing screening between the source and the receptors	Trees are located around the site boundary. These may act as a barrier between emission sources and receptors during the construction phase

Guidance	Comment
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 direction at the site is from the south-west. As such, receptors to the north-east 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
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 Based on the criteria shown in Table 4, the sensitivity of the receiving environment to potential dust impacts was determined as **high**. This was because the identified receptors included residential properties.

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 17.

Table 17 Sensitivity of the Surrounding Area to Potential Dust Impacts

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

Operational Phase Sensitive Receptors

4.5.8 Receptors sensitive to potential operational phase road vehicle exhaust emission impacts were identified from a desk-top study. These are summarised in Table 18. Existing monitoring locations within the model extents were also included as part of the assessment.

Table 18 Operational Phase Road Vehicle Exhaust Emission Sensitive Receptor Locations

Receptor		NGR (m)		Height (m)
		X	Y	
R1	Residential - Oxford Road	449823.9	212440.3	1.5
R2	West Kidlington Nursery School	449535.8	213300.3	1.5
R3	Residential - Oxford Road	449583.7	213469.7	1.5
R4	Residential - Oxford Road	449738.1	212885.2	1.5
R5	Residential - Bicester Road	450026.2	212864.3	1.5
R6	Residential - Bicester Road	449908.5	213478.1	1.5
R7	Residential - Water Eaton Lane	450389.1	212983.8	1.5
R8	Residential - Frieze Farm	449505.0	211409.9	1.5
R9	Residential - Peartree Hill	449285.6	211063.4	1.5
R10	Residential - Peartree Hill	449196.0	211155.8	1.5
R11	Residential - Woodstock Road	448928.5	211655.9	1.5
R12	Residential - Red Barn Farm Cottage	449389.5	210722.5	1.5
R13	Residential - Lakeside	449736.2	210636.1	1.5
R14	Bicester Road (2) - Monitor	450267.0	213511.0	2.0
R15	Oxford Road - Monitor	449122.0	213947.0	2.0
R16	Bramley Close - Monitor	450322.0	213587.0	2.0

4.5.9 Reference should be made to Figure 4 for a graphical representation of the 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, as well as the exposure of future residents to poor air quality. These issues are assessed in the following Sections.

5.2 Construction Phase Assessment

Step 1

5.2.1 The undertaking of activities such as demolition, 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

Demolition

5.2.4 Demolition will be undertaken at the site of the construction phase and will involve clearance of existing buildings on site. It is estimated that the building volume to be demolished is less than 20,000m^3. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from demolition is therefore **small**.

5.2.5 Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. 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 demolition activities.

5.2.6 Table 17 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 **negligible** risk site for human health impacts as a result of demolition activities.

Earthworks

5.2.7 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling, as well as site levelling and landscaping. The proposed development site covers an area greater than 10,000m^2. In accordance with the criteria outlined in Table 3, the magnitude of potential dust emissions from earthworks is therefore **large**.

5.2.8 Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **high** risk site for dust soiling as a result of earthworks.

5.2.9 Table 17 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 earthworks.

Construction

5.2.10 Due to the size of the development the total building volume is likely 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**.

5.2.11 Table 17 indicates the sensitivity of the area to dust soiling effects on people and property is **high**. In accordance with the criteria outlined in Table 9, the development is considered to be a **medium** risk site for dust soiling as a result of construction activities.

5.2.12 Table 17 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 construction activities.

Trackout

5.2.13 Based on the site area, it is anticipated that the unpaved road length is likely to 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**.

5.2.14 Table 17 indicates the sensitivity of the area to dust soiling effects to people and property is **high**. In accordance with the criteria outlined in Table 10, the development is considered to be a **high** risk site for dust soiling as a result of trackout activities.

5.2.15 Table 17 indicates the sensitivity of the area to human health impacts is **medium**. In accordance with the criteria outlined in Table 10, the development is considered to be a **medium** risk site for human health impacts as a result of trackout activities.

Summary of the Risk of Dust Effects

5.2.16 A summary of the risk from each dust generating activity is provided in Table 19.

Table 19 Summary of Potential Unmitigated Dust Risks

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

5.2.17 As indicated in Table 19, the potential risk of dust soiling is **high** from earthworks and trackout and **medium** from demolition and construction. The potential risk of human health effects is **medium** from trackout, **low** from earthworks and construction and **negligible** from demolition.

5.2.18 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

5.2.19 The IAQM guidance[14] 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 20. 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.

Table 20 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), which may include measures to control other emissions, approved by the LA
Site management	• Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Make the complaints log available to the LA upon request • Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book
Monitoring	• Undertake daily on-site and off-site inspection to monitor dust, record inspection results, and make the log available to the LA upon request • 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

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

Issue	Control Measure
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 site or specific operations where there is a high potential for dust production and they are active for an extensive period • Avoid site runoff of water or mud • 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
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 or burning of waste materials
Demolition	• Soft and strip inside buildings prior to any demolition activities • Ensure effective water suppression is used during demolition operations • Avoid explosive blasting, using appropriate manual or mechanical alternatives • Bag and remove any biological debris or damp down such material prior to any demolition activities
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 • Only remove the cover in small areas during work and not all at once
Construction	• Avoid scabbling (roughening of concrete surfaces) • Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out

Issue	Control Measure
Trackout	• Use water-assisted dust sweeper on access and local roads, if required • Avoid dry sweeping of large areas • Ensure vehicles entering and leaving site are covered to prevent escape of materials • Implement a wheel washing system, if required • Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits • Access gates to be located at least 10m from receptors where possible

Step 4

5.2.20 Assuming the relevant mitigation measures outlined in Table 20 are implemented, the residual impacts from all dust generating activities is predicted to be **not significant**, in accordance with the IAQM guidance[15].

5.3 Operational Phase Assessment

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

5.3.2 The assessment considered the following scenarios:

- 2019 - Verification;
- 2027 - DM; and,
- 2027 - DS.

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

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

5.3.4 For the purpose of the assessment traffic data for 2027 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 and background pollutant concentrations for 2019 were utilised within the dispersion model. The use of 2027 traffic data and 2019 emission factors and background pollutant concentrations is considered to provide a worst-case scenario and therefore a sufficient level of confidence can be placed within the results.

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

Potential Development Impacts

Predicted Concentrations

5.3.6 Annual mean NO_2 concentrations were predicted at sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 21.

Table 21 Predicted Annual Mean NO_2 Concentrations

Receptor		Predicted Annual Mean NO_2 Concentration (µg/m³)		
		DM	DS	Change
R1	Residential - Oxford Road	20.18	20.24	0.06
R2	West Kidlington Nursery School	16.05	16.07	0.02
R3	Residential - Oxford Road	24.97	25.03	0.06
R4	Residential - Oxford Road	23.46	23.51	0.05
R5	Residential - Bicester Road	16.60	16.62	0.02
R6	Residential - Bicester Road	16.97	16.97	0.00
R7	Residential - Water Eaton Lane	16.37	16.38	0.01
R8	Residential - Frieze Farm	18.55	18.57	0.02
R9	Residential - Peartree Hill	20.97	21.00	0.03
R10	Residential - Peartree Hill	20.55	20.59	0.04
R11	Residential - Woodstock Road	18.27	18.29	0.02
R12	Residential - Red Barn Farm Cottage	21.78	21.79	0.01

Receptor		Predicted Annual Mean NO_2 Concentration (µg/m³)		
		DM	DS	Change
R13	Residential - Lakeside	15.80	15.80	0.00
R14	Bicester Road (2) - Monitor	32.19	32.33	0.14
R15	Oxford Road - Monitor	32.22	32.34	0.12
R16	Bramley Close - Monitor	22.19	22.25	0.06

5.3.7 As indicated in Table 21, predicted annual mean NO_2 concentrations were below the relevant AQO at all receptors in both scenarios.

5.3.8 Annual mean PM_{10} 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_{10} Concentrations

Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m³)		
		DM	DS	Change
R1	Residential - Oxford Road	16.01	16.02	0.01
R2	West Kidlington Nursery School	15.62	15.62	0.00
R3	Residential - Oxford Road	16.38	16.38	0.01
R4	Residential - Oxford Road	16.44	16.44	0.01
R5	Residential - Bicester Road	15.70	15.70	0.00
R6	Residential - Bicester Road	15.73	15.73	0.00
R7	Residential - Water Eaton Lane	15.66	15.66	0.00
R8	Residential - Frieze Farm	15.91	15.92	0.00
R9	Residential - Peartree Hill	16.19	16.19	0.00
R10	Residential - Peartree Hill	16.08	16.08	0.00
R11	Residential - Woodstock Road	15.94	15.94	0.00
R12	Residential - Red Barn Farm Cottage	16.28	16.28	0.00
R13	Residential - Lakeside	15.61	15.61	0.00
R14	Bicester Road (2) - Monitor	17.04	17.05	0.01

Receptor		Predicted Annual Mean PM_{10} Concentration (µg/m³)		
		DM	DS	Change
R15	Oxford Road - Monitor	17.24	17.25	0.01
R16	Bramley Close - Monitor	16.40	16.41	0.01

5.3.9 As indicated in Table 22, predicted annual mean PM_{10} concentrations were below the relevant AQO at all sensitive receptors in both the DM and DS scenarios.

5.3.10 Annual mean $PM_{2.5}$ concentrations were predicted at the sensitive receptor locations for the DM and DS scenarios. These are summarised in Table 23.

Table 23 Predicted Annual Mean $PM_{2.5}$ Concentrations

Receptor		Predicted Annual Mean $PM_{2.5}$ Concentration (µg/m³)		
		DM	DS	Change
R1	Residential - Oxford Road	11.34	11.34	0.01
R2	West Kidlington Nursery School	10.67	10.67	0.00
R3	Residential - Oxford Road	11.94	11.95	0.01
R4	Residential - Oxford Road	12.08	12.09	0.01
R5	Residential - Bicester Road	10.81	10.81	0.00
R6	Residential - Bicester Road	10.86	10.87	0.00
R7	Residential - Water Eaton Lane	10.75	10.75	0.00
R8	Residential - Frieze Farm	11.18	11.18	0.01
R9	Residential - Peartree Hill	11.65	11.66	0.01
R10	Residential - Peartree Hill	11.46	11.46	0.01
R11	Residential - Woodstock Road	11.23	11.23	0.00
R12	Residential - Red Barn Farm Cottage	11.80	11.80	0.00
R13	Residential - Lakeside	10.66	10.66	0.00
R14	Bicester Road (2) - Monitor	13.04	13.06	0.02
R15	Oxford Road - Monitor	13.42	13.44	0.02
R16	Bramley Close - Monitor	12.03	12.05	0.01

5.3.11 As indicated in Table 23, predicted annual mean $PM_{2.5}$ concentrations were below the relevant AQLV at all sensitive receptors in both the DM and DS scenarios.

Predicted Impacts

5.3.12 Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 24.

Table 24 Predicted Impacts - NO_2

Receptor		Predicted Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R2	West Kidlington Nursery School	Below 75% of AQO	0	Negligible
R3	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R4	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R5	Residential - Bicester Road	Below 75% of AQO	0	Negligible
R6	Residential - Bicester Road	Below 75% of AQO	0	Negligible
R7	Residential - Water Eaton Lane	Below 75% of AQO	0	Negligible
R8	Residential - Frieze Farm	Below 75% of AQO	0	Negligible
R9	Residential - Peartree Hill	Below 75% of AQO	0	Negligible
R10	Residential - Peartree Hill	Below 75% of AQO	0	Negligible
R11	Residential - Woodstock Road	Below 75% of AQO	0	Negligible
R12	Residential - Red Barn Farm Cottage	Below 75% of AQO	0	Negligible
R13	Residential - Lakeside	Below 75% of AQO	0	Negligible
R14	Bicester Road (2) - Monitor	76 - 94% of AQO	0	Negligible
R15	Oxford Road - Monitor	76 - 94% of AQO	0	Negligible
R16	Bramley Close - Monitor	Below 75% of AQO	0	Negligible

5.3.13 As indicated in Table 24, impacts on annual mean NO_2 concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

5.3.14 Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 25.

Table 25 Predicted Impacts - PM_{10}

Receptor		Predicted Concentration	Predicted Concentration Change as Proportion of AQO (%)	Impact Significance
R1	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R2	West Kidlington Nursery School	Below 75% of AQO	0	Negligible
R3	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R4	Residential - Oxford Road	Below 75% of AQO	0	Negligible
R5	Residential - Bicester Road	Below 75% of AQO	0	Negligible
R6	Residential - Bicester Road	Below 75% of AQO	0	Negligible
R7	Residential - Water Eaton Lane	Below 75% of AQO	0	Negligible
R8	Residential - Frieze Farm	Below 75% of AQO	0	Negligible
R9	Residential - Peartree Hill	Below 75% of AQO	0	Negligible
R10	Residential - Peartree Hill	Below 75% of AQO	0	Negligible
R11	Residential - Woodstock Road	Below 75% of AQO	0	Negligible
R12	Residential - Red Barn Farm Cottage	Below 75% of AQO	0	Negligible
R13	Residential - Lakeside	Below 75% of AQO	0	Negligible
R14	Bicester Road (2) - Monitor	Below 75% of AQO	0	Negligible
R15	Oxford Road - Monitor	Below 75% of AQO	0	Negligible
R16	Bramley Close - Monitor	Below 75% of AQO	0	Negligible

5.3.15 As indicated in Table 25, impacts on annual mean PM_{10} concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

5.3.16 Predicted impacts on annual mean $PM_{2.5}$ concentrations at the sensitive receptor locations are summarised in Table 26.

Table 26 Predicted Impacts - $PM_{2.5}$

Receptor		Predicted Concentration	Predicted Concentration Change as Proportion of AQLV (%)	Impact Significance
R1	Residential - Oxford Road	Below 75% of AQLV	0	Negligible
R2	West Kidlington Nursery School	Below 75% of AQLV	0	Negligible
R3	Residential - Oxford Road	Below 75% of AQLV	0	Negligible
R4	Residential - Oxford Road	Below 75% of AQLV	0	Negligible
R5	Residential - Bicester Road	Below 75% of AQLV	0	Negligible
R6	Residential - Bicester Road	Below 75% of AQLV	0	Negligible
R7	Residential - Water Eaton Lane	Below 75% of AQLV	0	Negligible
R8	Residential - Frieze Farm	Below 75% of AQLV	0	Negligible
R9	Residential - Peartree Hill	Below 75% of AQLV	0	Negligible
R10	Residential - Peartree Hill	Below 75% of AQLV	0	Negligible
R11	Residential - Woodstock Road	Below 75% of AQLV	0	Negligible
R12	Residential - Red Barn Farm Cottage	Below 75% of AQLV	0	Negligible
R13	Residential - Lakeside	Below 75% of AQLV	0	Negligible
R14	Bicester Road (2) - Monitor	Below 75% of AQLV	0	Negligible
R15	Oxford Road - Monitor	Below 75% of AQLV	0	Negligible
R16	Bramley Close - Monitor	Below 75% of AQLV	0	Negligible

5.3.17 As indicated in Table 26, impacts on annual mean $PM_{2.5}$ concentrations as a result of the proposed development were predicted to be **negligible** at all receptors.

Potential Future Exposure

5.3.18 The proposed development has the potential to cause the exposure of future residents to elevated pollution levels. Dispersion modelling was therefore undertaken with the inputs described in Appendix 1 to quantify concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the site.

Reference should be made to Figures 5, 6 and 7 for graphical representations of the results, respectively.

5.3.19 As shown in Figure 5, annual mean NO_2 concentrations were predicted to be below the AQO of 40µg/m^3 at all locations across the site. The maximum level at the boundary was 19.63µg/m^3.

5.3.20 As shown in Figure 6, annual mean PM_{10} concentrations were predicted to be below the AQO of 40µg/m^3 at all locations across the site. The maximum level at the boundary was 15.94µg/m^3.

5.3.21 As shown in Figure 7, annual mean $PM_{2.5}$ concentrations were predicted to be below the AQO of 20µg/m^3 at all locations across the site. The maximum level at the boundary was 11.22µg/m^3.

5.3.22 Based on the assessment results, future residents are not predicted to be exposed to annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations above the relevant AQOs and AQLV. The site is therefore considered suitable for the proposed end use from an air quality perspective.

Overall Impact Significance

5.3.23 The overall significance of operational phase road traffic emission impacts was determined as **negligible.** This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 3.3. Further justification is provided in Table 27.

Table 27 Overall Impact Significance of Road Vehicle Exhaust Emission Impacts

Guidance	Comment
The existing and future air quality in the absence of the development	Predicted annual mean NO_2, $PM_{2.5}$ and PM_{10} concentrations were below the AQO and AQLV at all receptor locations in the DM scenario The predictions are unlikely to change in the absence of the proposals given the relatively established nature of the area

Guidance	Comment
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 and AQLV
The influence and validity of any assumptions adopted when undertaking the prediction of impacts	The assessment assumed that vehicle exhaust emission rates and background pollutant levels will not reduce in future years. This provides worst-case results when compared with DEFRA and National Highways methodologies Due to the adopted assumptions it is considered the presented results are sufficiently robust for an assessment of this nature

5.3.24 The IAQM guidance[16] 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.

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

6.0 CONCLUSION

6.1.1 Redmore Environmental Ltd was commissioned by Manor Oak Homes Limited to undertake an Air Quality Assessment in support of a planning application for a residential development on land off Oxford Road, Kidlington.

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 well as expose future residents to any existing air quality issues at the site. As such, an Air Quality Assessment was undertaken in order to determine baseline conditions, consider location suitability for the proposed end use 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 demolition, earthworks, construction and trackout activities was predicted to be **not significant**.

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

6.1.5 Review of the dispersion modelling results indicated that impacts on annual mean 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.

6.1.6 The results of the dispersion modelling assessment indicated that predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations were below the relevant AQOs and AQLV at all locations across the development. The site is therefore considered suitable for the proposed end use from an air quality perspective.

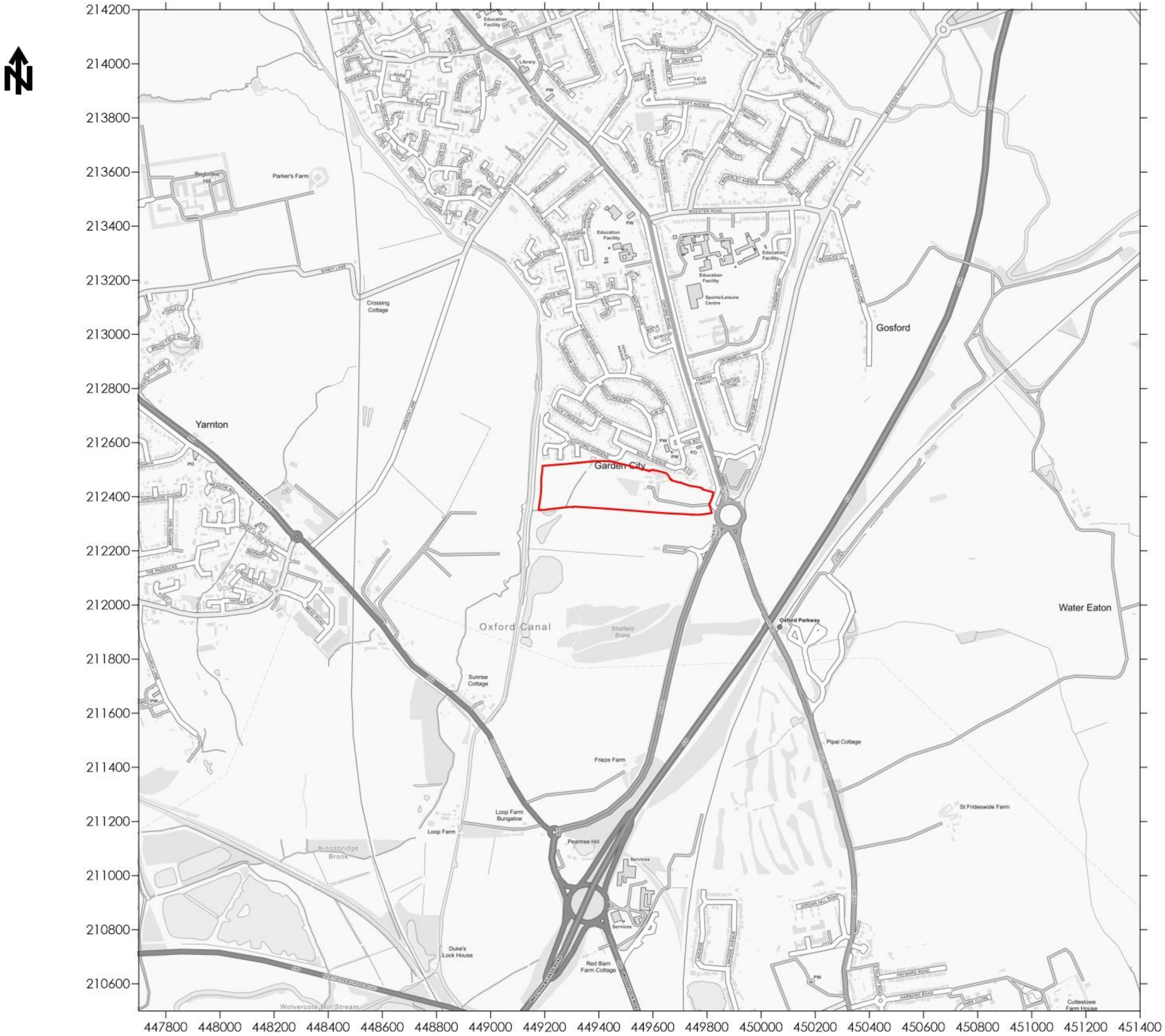
6.1.7 Following consideration of the relevant issues, air quality impacts as a result of the operation of the development were considered to be **not significant**, in accordance with the IAQM guidance.

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

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQMA	Air Quality Management Area
AQO	Air Quality Objective
AQS	Air Quality Strategy
CDC	Cherwell District Council
CERC	Cambridge Environmental Research Consultants
DC	Doncaster Council
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DM	Do-Minimum
DMRB	Design Manual for Roads and Bridges
DMP	Dust Management Plan
DS	Do-Something
EFT	Emissions Factor Toolkit
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
OCC	Oxford City Council
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
z_0	Roughness length

Figures



Legend

Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

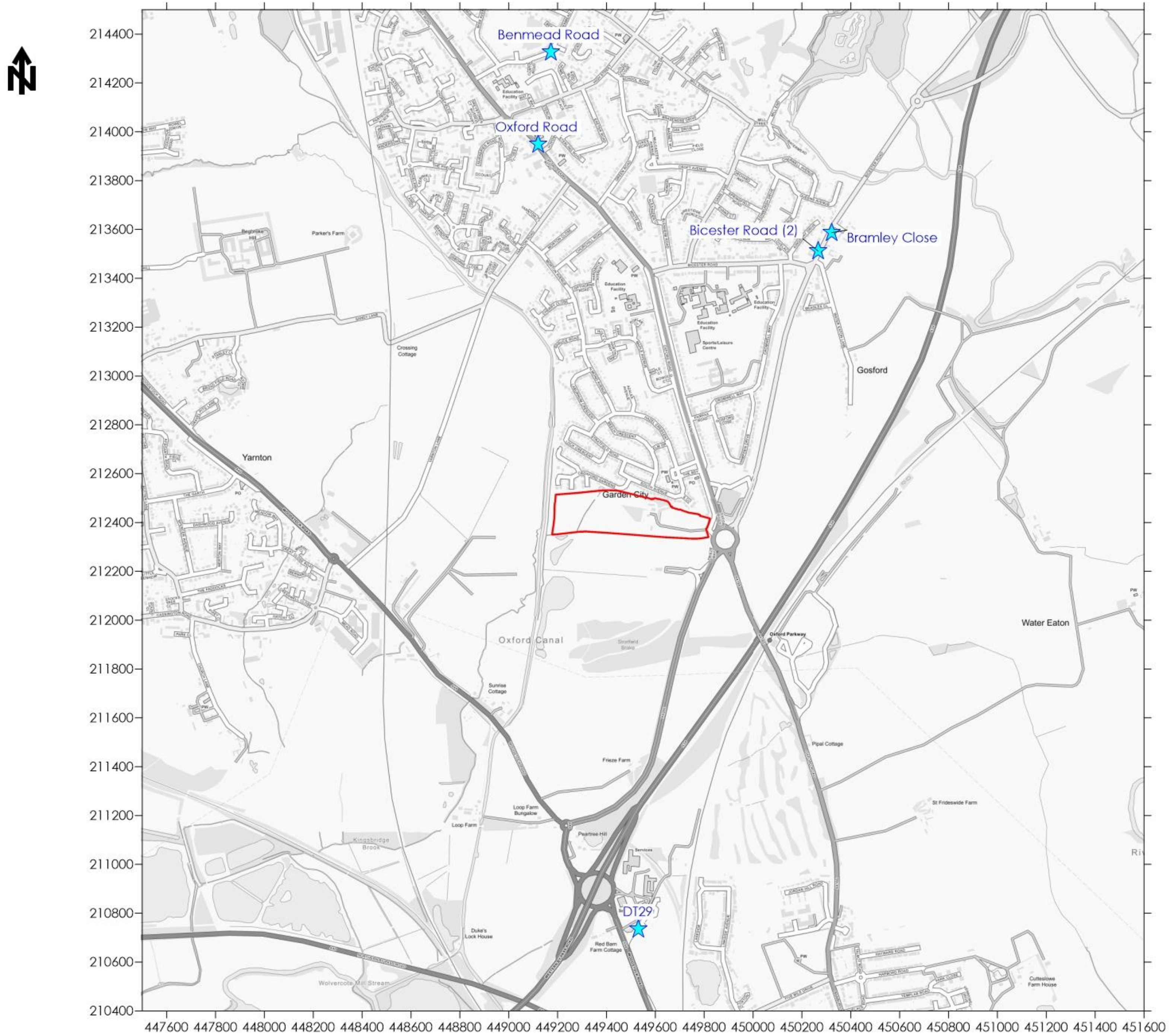
2792-1

Client

Manor Oak Homes Limited

Redmore environmental

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



Legend

Site Boundary

Monitor

Title

Figure 2 - Monitoring Locations

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

Client

Manor Oak Homes Limited

Redmore environmental

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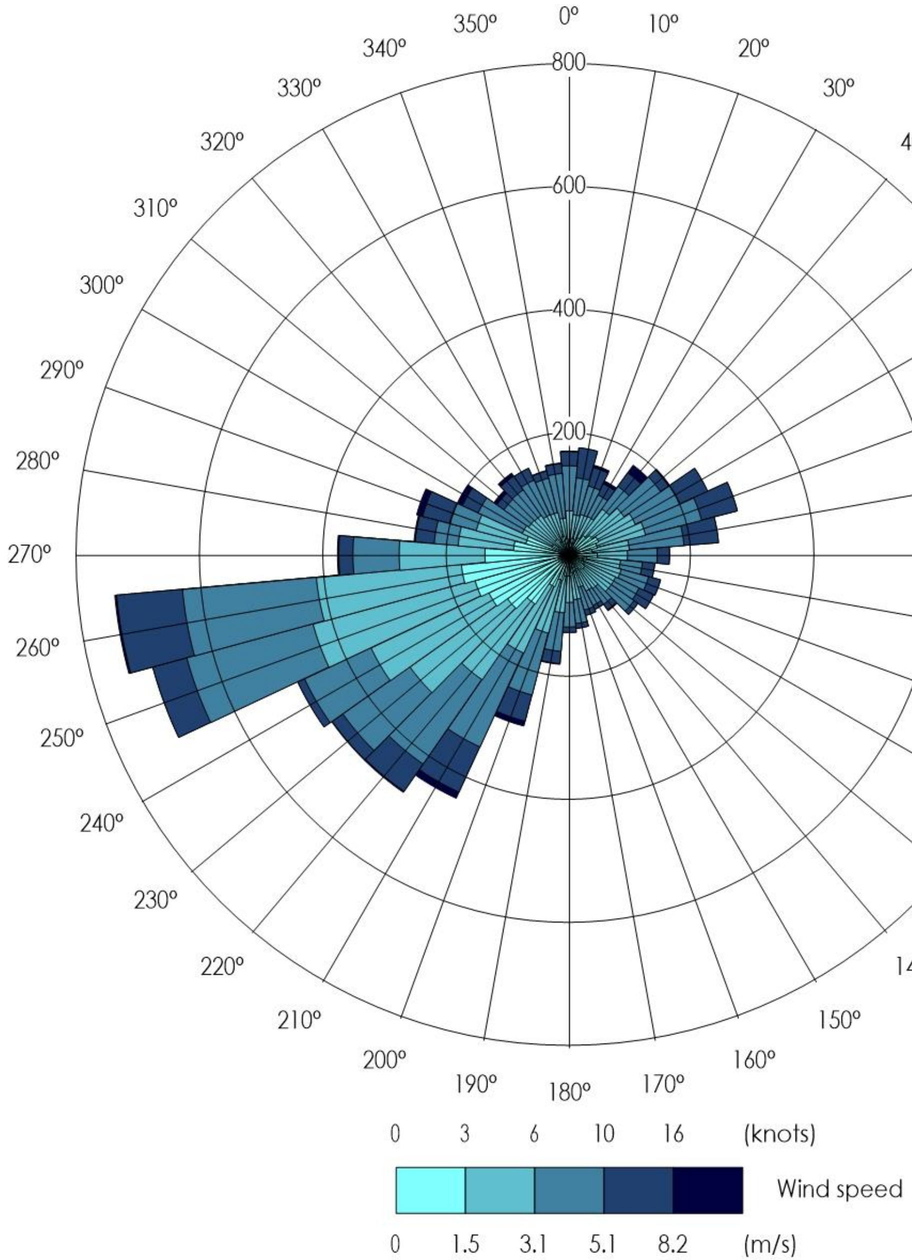

Legend

Title

Figure 3 - Wind Rose of 2019 Brize Norton Meteorological Data

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

Client

Manor Oak Homes Limited

Redmore environmental

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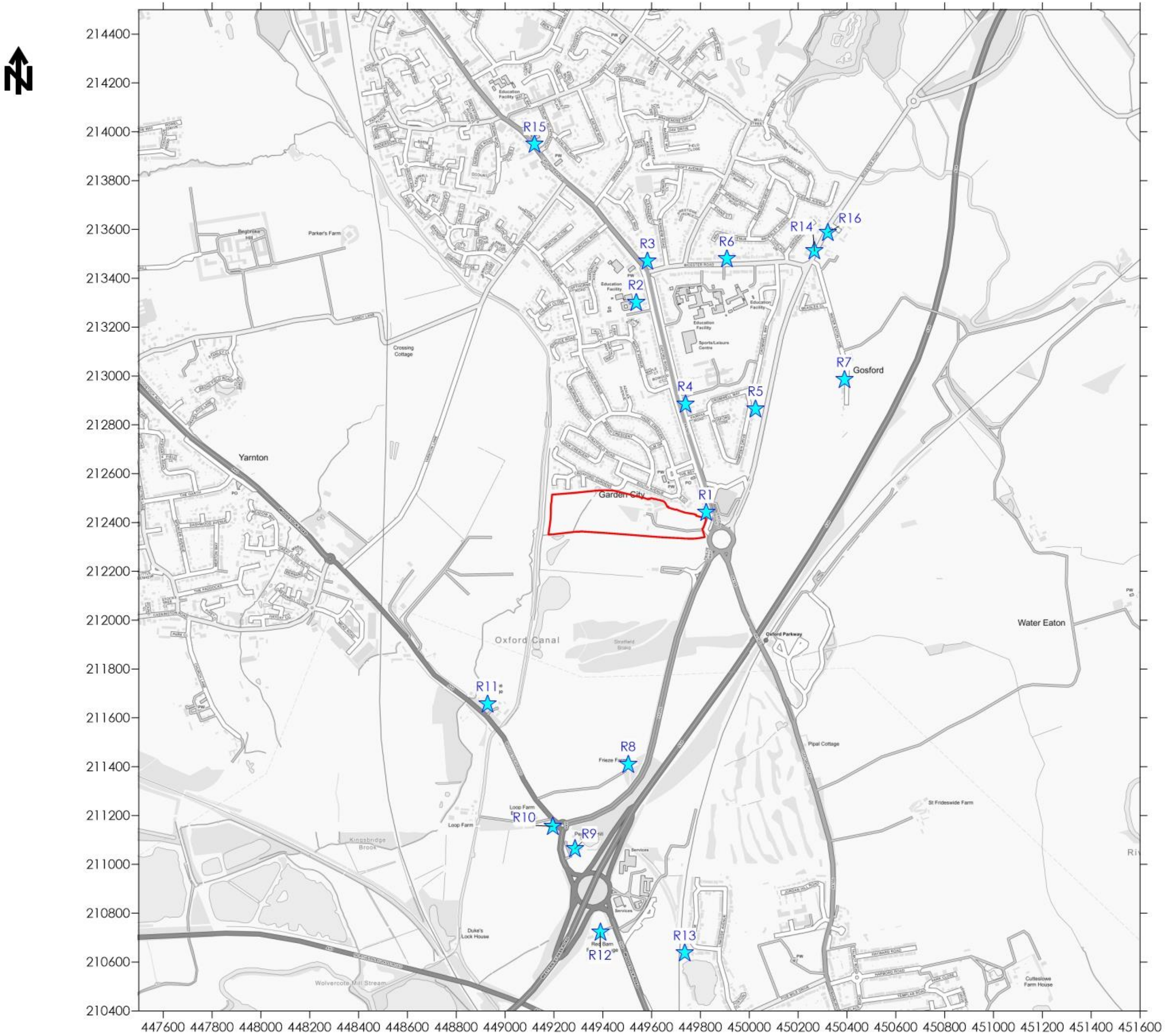

Legend

Site Boundary

Sensitive Receptor

Title

Figure 4 - Vehicle Exhaust Emissions Sensitive Receptor Locations

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

Client

Manor Oak Homes Limited

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Legend

Site Boundary

Annual Mean NO_2 Concentration (μg/m³)

44
40
36
32
28
24
20
16

Title

Figure 5 - Predicted Annual Mean NO_2 Concentrations (μg/m³) Do-Something

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

Client

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Redmore environmental

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Title

Figure 6 - Predicted Annual Mean PM_{10} Concentrations (µg/m³) Do-Something

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

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Legend

Site Boundary

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

11, 12, 13, 14, 15, 16

Title

Figure 7 - Predicted Annual Mean $PM_{2.5}$ Concentrations (μg/m³) Do-Something

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

Client

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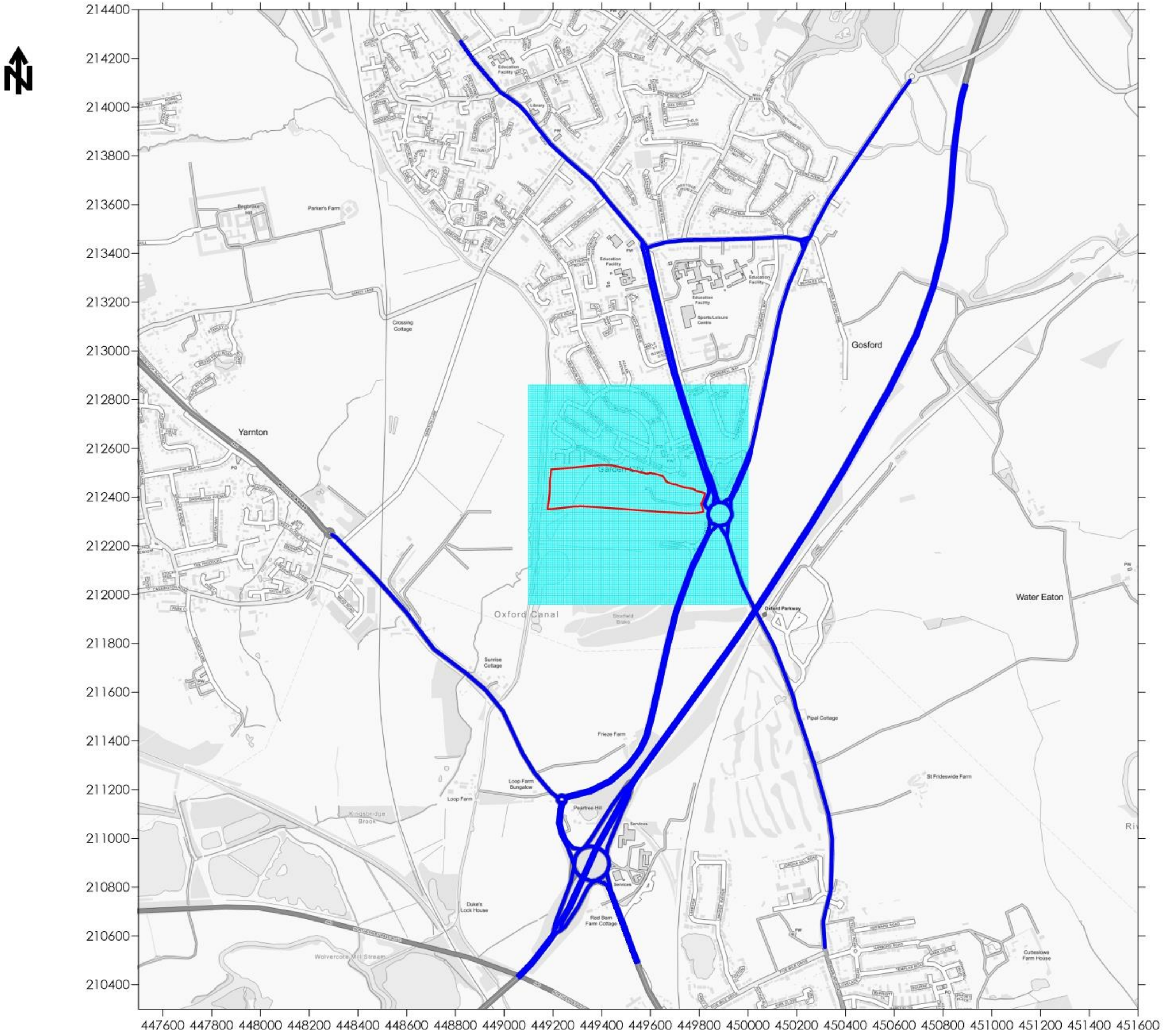

Legend

Site Boundary

Road Link

Output Grid

Title

Figure 8 - ADMS-Roads Inputs

Project

Air Quality Assessment
Oxford Road, Kidlington

Project Reference

2792-1

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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, as well as expose future residents to elevated pollution levels. 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 5.0.0.1). 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.

Additional options can also be selected within the ADMS-Roads interface to take account of site specific characteristics that may affect model output, such as canyons.

The relevant inputs are detailed in the following Sections.

Assessment Area

The assessment area was defined based on the site location and anticipated vehicle trip distribution from the development. Ambient concentrations were predicted over NGR: 449100, 211960 to 450000, 212860. One Cartesian grid was used within the model to produce data suitable for contour plotting using the Surfer software package.

Reference should be made to Figure 11 for a map of the assessment area.

Traffic Flow Data

Traffic data for use in the assessment, including 24-hour Annual Average Daily Traffic (AADT) flows, fleet composition as Heavy Duty Vehicle proportion was provided by MAC Limited, the Transport Consultants for the project.

Traffic data for a number of links within the model was obtained using flows from the Department for Transport (DfT). 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 the selected minor roads, in Great Britain for the years 1999 to 2020. It should be noted that the DfT web tool is reference in DEFRA guidance[17] as being a suitable source of data for air quality assessment and it is therefore considered to provide a reasonable estimate of traffic flows in the vicinity of the site.

Traffic data was converted to the relevant assessment years utilising a factor obtained from TEMPro (version 7.2). This software package has been development by the DfT to calculate future traffic growth throughout the UK.

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

Table A1.1 Traffic Data

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Av. Vehicle Speed (km/h)
		Verif.	2027 DM	2027 DS			
L1	Oxford Road, south of Site Access	3,786	4,316	5,033	1.98	8.6	20
L2	Oxford Road, north of Site Access	3,786	4,316	4,411	1.98	5.4	30
L3	Oxford Road to A4260	3,786	4,316	4,411	1.98	5.2	20

17 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Av. Vehicle Speed (km/h)
		Verif.	2027 DM	2027 DS			
L4	A4260, north of Bicester Road	23,429	27,253	27,443	13.00	11.0	25
L5	A4260, adjacent to Green Road	23,429	27,253	27,443	13.00	9.6	45
L6	A4260, north of Sterling Approach	23,429	27,253	27,443	13.00	9.1	35
L7	A4260	23,429	27,253	27,443	13.00	9.0	45
L8	A4260, Northbound (NB), exit from Roundabout	11,715	13,627	13,674	13.00	7.9	30
L9	A4260, NB	11,715	13,627	13,674	13.00	5.2	45
L10	A4260, Southbound (SB), approach to Roundabout	11,715	13,627	13,674	13.00	9.4	25
L11	A4260, south of Bicester Road	23,429	27,253	27,348	13.00	9.5	45
L12	A4260, approach to Bicester Road Junction	23,429	27,253	27,348	13.00	12.9	25
L13	Bicester Road, NB, exit from Roundabout	5,199	6,048	6,102	12.00	7.2	45
L14	Bicester Road, NB	5,199	6,048	6,102	12.00	7.8	65
L15	Bicester Road, SB	5,199	6,048	6,102	12.00	7.4	65
L16	Bicester Road, approach to Roundabout	5,199	6,048	6,102	12.00	8.1	30
L17	Bicester Road	10,399	12,096	12,205	12.00	7.3	65
L18	Bicester Road, approach to Water Eaton Lane	10,399	12,096	12,205	12.00	9.8	25
L19	Bicester Road, north of Water Eaton Lane	10,399	12,096	12,205	12.00	7.8	65
L20	Bicester Road to Water Eaton Lane Junction	6,796	7,751	7,751	1.85	11.0	20
L21	Bicester Road to Water Eaton Lane Junction	6,796	7,751	7,751	1.85	4.0	20
L22	Bicester Road to Water Eaton Lane Junction	6,796	7,751	7,751	1.85	4.3	20
L23	Bicester Road	6,796	7,751	7,751	1.85	6.6	45
L24	Bicester Road, approach to A4260	6,796	7,751	7,751	1.85	10.9	25

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Av. Vehicle Speed (km/h)
		Verif.	2027 DM	2027 DS			
L25	A4165, exit from Roundabout, SB	9,123	10,612	10,736	16.20	9.3	45
L26	A4165, approach to Roundabout, NB	9,123	10,612	10,736	16.20	7.3	30
L27	A4165	18,245	21,223	21,472	16.20	10.1	65
L28	Frieze Way, exit from Roundabout SB	6,434	7,484	7,617	14.60	7.6	45
L29	Frieze Way, approach to Roundabout, SB	6,434	7,484	7,617	14.60	10.3	30
L30	Frieze Way, SB	6,434	7,484	7,617	14.60	7.2	65
L31	Frieze Way, approach to Peartree Hill Roundabout, SB	6,434	7,484	7,617	14.60	7.7	30
L32	Frieze Way, NB	6,434	7,484	7,617	14.60	7.2	65
L33	A44, Peartree Hill, SB	14,533	16,575	16,654	5.37	6.9	50
L34	A44, Peartree Hill, approach to A34 Roundabout	14,533	16,575	16,654	5.37	11.3	30
L35	A44, Peartree Hill, NB	15,284	17,431	17,511	5.12	9.9	50
L36	A44, Peartree Hill, approach to Peartree Hill Roundabout	15,284	17,431	17,511	5.12	10.5	30
L37	A34, Slip Road on, NB	8,044	9,174	9,214	12.27	6.8	65
L38	A34 Slip Road, off, SB	9,582	10,928	10,967	10.73	13.0	65
L39	A34 Slip Road on, SB	9,725	11,092	11,131	9.78	3.4	65
L40	A34 Slip Road off, NB	10,106	11,526	11,566	9.65	3.1	65
L41	A34, south of Roundabout, NB	40,424	46,104	46,143	9.65	7.4	110
L42	A34, NB	27,225	31,050	31,050	12.27	7.1	110
L43	A34, north of Roundabout, NB	32,176	36,697	36,736	12.27	7.2	110
L44	A34, north of Roundabout, SB	38,326	43,711	43,750	10.73	7.2	110
L45	A34, SB	28,960	33,029	33,029	10.73	7.1	110
L46	A34, south of Roundabout, SB	38,901	44,367	44,406	9.78	7.4	110
L47	Woodstock Road, SB	17,100	19,503	19,503	6.02	10.5	65

Link		24-hour AADT Flow			HDV Prop. of Fleet (%)	Road Width (m)	Av. Vehicle Speed (km/h)
		Verif.	2027 DM	2027 DS			
L48	Woodstock Road, NB	13,253	15,115	15,115	7.08	7.3	65
L49	Woodstock Road, approach to Roundabout, NB	13,253	15,115	15,115	7.08	11.8	30
L50	Woodstock Road, approach to Peartree Hill Roundabout	24,295	27,708	27,814	4.96	11.7	30
L51	Woodstock Road	24,295	27,708	27,814	4.96	7.6	80
L52	Bicester Road, approach to Water Eaton Lane	10,399	12,096	12,205	12.00	8.6	25
R1	Oxford Road Roundabout	7,426	8,633	8,992	16.20	10.9	30
R2	Peartree Hill Roundabout	10,967	12,566	12,698	14.60	8.3	30
R3	A34 Roundabout	12,203	13,918	13,997	12.27	11.2	35

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

Emission Factors

Emissions factors for each link were calculated using the relevant traffic flows and the EFT (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 development 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.

Canyons

Where buildings or walls surround roads, pollutant dispersion patterns are altered which can lead to high pollutant concentrations. These street canyons can significantly influence air quality along a road and therefore it is important to take consideration of their effects when undertaking dispersion modelling.

The release of ADMS-Roads version 4.0.1.0 in December 2015 incorporated a number of new features including and advanced street canyon module, which have been retained in version 5.0.01. Advanced street canyon modelling allows a number of parameters to be included in the dispersion model in order to predict pollutant dispersion patterns which better reflect air flow within complex urban geometries.

Canyons have five principal effects on dispersion which can influence pollutant concentrations. These are

- Pollutants are channelled along street canyons;
- Pollutants are dispersed across street canyons by circulating flow at road height;
- Pollutants are trapped in recirculation regions;
- Pollutants leave the canyon through gaps between buildings - as if there was no canyons; and,
- Pollutants leave the canyon from the canyon top.

The combined modelling of these effects will result in concentration patterns unique to each canyon. The parameters used in the assessment are outlined in Table A1.2. It should be noted that the "left" parameters of L1 were purposefully included at 0m as buildings are only present on one side of the road on this link.

Table A1.2 Canyon Parameters

Link	Parameters (m)					
	Canyon Width to Left	Average Height of Buildings to Left	Building Length Left	Canyon Width Right	Average Height of Buildings to Right	Building Length Right
L52	7.7	7.8	59.0	0	0	0

A choice of two modes is provided for use in the advanced canyon module. Standard mode assumes that each road is part of a continuous network of roads with similar canyon properties. Network mode analyses the road network to determine transport of pollutants between adjoining street canyons, allows for varying concentrations along the canyon and accounts for transport pollutants out of the end of a canyon. Network mode is considered most accurate for a detailed local analysis and as such was selected for use in the model.

Meteorological Data

Meteorological data used in the assessment was taken from Brize Norton meteorological station over the period 1st January 2019 to 31st December 2019 (inclusive). Brize Norton meteorological station is located at NGR: 429091, 205783, which is approximately 21.8km south-west of the assessment area. It is anticipated that conditions would be reasonably similar over a distance of this magnitude. The data was therefore considered suitable for an assessment of this nature.

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

Roughness Length

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

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 and meteorological site. This is considered appropriate for the nature of both areas 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 Benmead Road diffusion tube during 2019 was 13.80μg/m^3, higher than the DEFRA background of 12.51μg/m^3. As such, the monitoring result was used in order to provide worst-case predictions.

CDC do not undertake monitoring of annual PM_{10} and $PM_{2.5}$ concentrations at a background location within the vicinity of the site. As such, levels for these species were obtained from the DEFRA grid square containing the site, as shown in Table 13.

Similarly to emission factors, the background concentrations from 2019 were utilised in preference to the 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[18].

Verification

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

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

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

For the purpose of the assessment model verification was undertaken for 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'[19], which states:

18 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

19 Use of 2020 and 2021 Monitoring Datasets, IAQM, 2021.

"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 three locations within the modelling extents during 2019. The results were obtained and the road contributions to total NO_x concentrations calculated following the methodology contained within DEFRA guidance[20]. The monitored annual mean NO_2 concentrations and calculated road NO_x concentrations are summarised in Table A1.3.

Table A1.3 NO_x Verification - Monitoring Results

Monitoring Location	Monitored NO_2 Concentration ($\mu g/m^3$)	Calculated Road NO_x Concentration ($\mu g/m^3$)
Bicester Road (2)	33.6	39.20
Oxford Road	24.7	20.75
Bramley Close	24.0	19.36

The annual mean road NO_x concentrations predicted from the dispersion model and the road NO_x concentrations calculated from the 2019 monitoring results are summarised in Table A1.4.

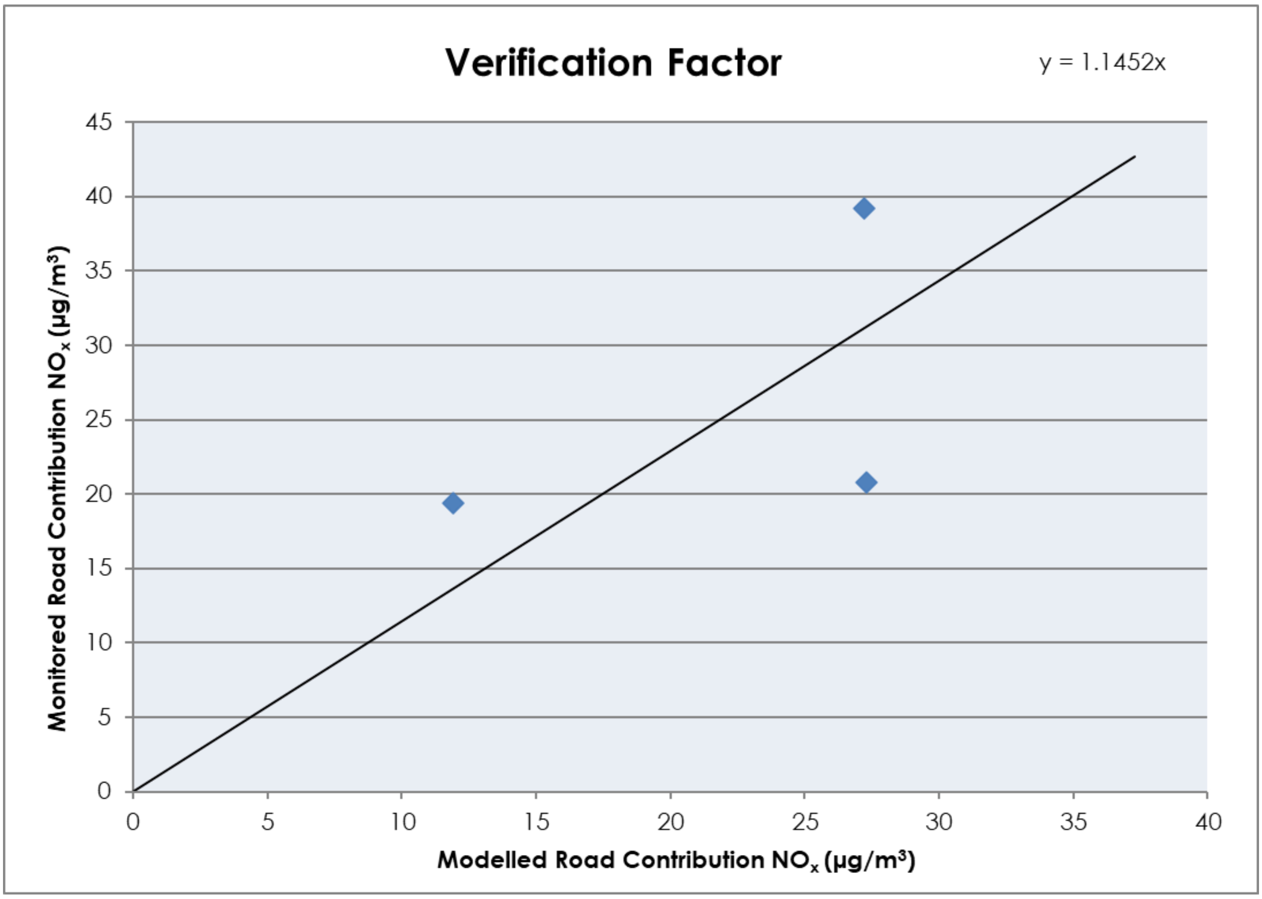
Table A1.4 NO_x Verification - Modelling Results

Monitoring Location	Calculated Road NO_x Concentration ($\mu g/m^3$)	Modelled Road NO_x Concentration ($\mu g/m^3$)
Bicester Road (2)	39.20	27.20
Oxford Road	20.75	27.30
Bramley Close	19.36	11.92

The monitored and modelled road NO_x concentrations were graphed and the equation of the trendline based on linear progression though zero calculated. This indicated that a verification factor of 1.1452 was required to be applied to all road NO_x modelling results, as shown in Graph 1.

20 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

Graph 1 NO_x Verification Factor



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 the information provided within DEFRA guidance[21].

21 Local Air Quality Management Technical Guidance (TG16), DEFRA, 2021.

Appendix 2 - Curricula Vitae

EMILY PEARS-RYDING

Principal Air Quality Consultant

BSc (Hons), MIAQM, AMIEnvSc

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KEY EXPERIENCE:

Emily 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 and scoping reports for developments throughout the UK.
- Assessment of fugitive dust impacts from a range of mineral extraction developments.
- Assessment of petrol stations to address benzene concentrations and their impact on adjacent developments.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Assessment of potential effects associated with network realignment schemes and highway developments.

SELECT PROJECTS SUMMARY:

Broad Street, Birmingham

Air Quality Assessment in support of a residential-led development on land at Broad Street, Birmingham. The proposals were located adjacent to a section of the Midland Metro Westside which runs along Broad Street. Consideration was made to the potential for re-alignment of the local road network as a result of the Metro to effect pollution levels at the development. The assessment indicated NO_2 concentrations exceeded air quality criteria from ground to third floor level as a result of road vehicle exhaust emissions. Mitigation was therefore specified for the affected units.

Home Farm, Forest Road, Warfield

Ecological Air Quality Assessment in support of a residential development. Natural England held concerns regarding potential impacts at sensitive ecological designations as a result of traffic exhaust emissions associated with the development. The predicted change in NO_x and ammonia concentrations and nitrogen and acid deposition was below the relevant criteria at all locations within the ecological designations. Impacts were therefore not considered to be significant.

Saltcoats Road, Stevenston

Air Quality Assessment in support of an educational campus and associated energy centre. Impacts associated with emissions from the proposed gas and biomass boilers were assessed through detailed dispersion modelling. This indicated impacts on annual mean NO_2 and PM_{10} concentrations were predicted to be not significant.

Blackthorn & Piddington

Environmental Impact Assessment in support of a railway embankment scheme on land at the Network Railway Embankment between Piddington and Blackthorn. Due to the extensive stabilisation works a Fugitive Dust Emissions Assessment was undertaken in addition to consideration of road vehicle exhaust emissions. Due to the location of the site in relation to nearby sensitive receptors, potential impacts associated with construction works were not considered to be significant.

Blackmoorfoot Road, Huddersfield

Air Quality in support of a residential-led development in close proximity to an operational minerals facility. Due to the presence of the Johnsons Wellfield Quarry to the south of the site a Fugitive Dust Emissions Assessment was undertaken to determine potential impacts. Dispersion modelling of road vehicle exhaust emissions was also undertaken in support of the scheme. Results indicated the overall significance of fugitive dust emissions from the quarry and air quality impacts associated with operation of the development itself were not significant.

Lockwood Bar, Huddersfield

Air Quality Assessment for the proposed highway realignment scheme along Lockwood Road, Huddersfield. Changes in pollution levels were considered at sensitive receptors as a result of variations to road geometry and associated redistribution of vehicle trips across the local area. Results of the dispersion modelling study indicated air quality impacts as a result of the scheme were not significant.

OLLY HANLON

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KEY EXPERIENCE:

Olly is an Environmental Consultant with specialist experience in the air quality sector. His 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.
- Detailed dispersion modelling of industrial emission sources using ADMS-5. Studies have included assessment of pollutant concentrations and consideration of associated impacts.
- Assessment of construction dust impacts from a range of development sizes.
- Production of air quality mitigation strategies specifically tailored to address issues at individual sites.
- Definition of baseline air quality and identification of sensitive areas across the UK.
- Air quality monitoring at industrial sites to quantify pollutant concentrations.

SELECT PROJECTS SUMMARY:

Millharbour, Isle of Dogs

Air Quality Assessment for the development of residential units within an Air Quality Management Area (AQMA). 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_{10} and NO_2 concentrations across the site. Results identified that pollution levels were below the air quality standards across the development.

Station Road, Howden

Air Quality Assessment in support of a residential development. 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 indicated pollutant concentrations were below the relevant standards across the site and impacts associated with the development were not significant.

Honeycombe Beach, Bournemouth

Air Quality Assessment to determine air quality conditions within a covered car park serving a residential complex and evaluate the effectiveness of the existing ventilation system. Monitoring of pollutant concentrations over a three-month period at four locations at the site was undertaken. Internal concentrations of pollutants were below the relevant Work Exposure Limits (WELs) at all locations. As such, natural ventilation was considered to provide adequate control of internal air quality.

Matching Airport, Abbess Roding

Air Quality Assessment in support of a flexible generation facility. Dispersion modelling was undertaken to determine potential changes in pollution levels as a result of emissions from the installation and consider the potential impact at nearby sensitive receptor locations. Predicted concentrations of NO_2 were below the relevant air quality criteria at all locations of relevant exposure across all meteorological data sets modelled. The overall effects of the development were predicted to be not significant in accordance with the stated guidance.

High Road, Wood Green, London

Air Quality Assessment for a residential scheme located in an AQMA. Detailed dispersion modelling was undertaken at several heights reflective of residential units within the development. Results indicated that NO_2 and PM_{10} concentrations were below air quality criteria across the development.

Anlaby Road, Hull

Air Quality Assessment for the development of a six storey hotel and associated infrastructure within an AQMA. Concerns were raised about the exposure of future occupants to elevated pollution concentrations during operation due to road traffic exhaust emissions. 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 below the air quality standards across the development.