Catesby Strategic Land Ltd

Land South of Burford Road, Minster Lovell

Air Quality Assessment

Report No. 444891-01 (00)

NOVEMBER 2022

RSK GENERAL NOTES

Project No.: 444891-02 (00)

Title: Air Quality Assessment: Land South of Burford Road, Minster Lovell

Client: Catesby Strategic Land Ltd

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Summary

An air quality assessment for the proposed development at the Land South of Burford Road, Minster Lovell of up to 140 dwellings, has been undertaken with reference to existing air quality in the area and relevant air quality legislation, policy and guidance.

The assessment considers the impact of existing sources of air pollution at the proposed development site (governed by background pollutant levels and vehicle movements along the local road network), and the impacts of the proposed development on local air quality.

Significant stationary combustion sources such as combined heat and power (CHP) plant or large boilers are not proposed.

Construction phase impacts of the proposed development on local air quality may have the potential to occur, due to fugitive dust and particulate matter (PM) emissions. The risk of dust impacts was predicted to be a maximum of 'medium risk' during the construction phase, using the method outlined in the 'Guidance on the assessment of dust from demolition and construction' guidance (Institute of Air Quality Management, 2014). Mitigation measures are recommended to reduce the risk. It is recommended that a dust management plan (DMP) or a dust and air quality-related contribution to a construction environmental management plan (CEMP) is prepared and that it incorporates the mitigation measures recommended in this document. If appropriate mitigation is implemented, the residual impact of construction phase air quality impacts should be viewed as 'not significant'.

The main potential air quality impact once the proposed development is complete and occupied is likely to be emissions from road traffic associated with the proposed development (i.e. changes in flow volume and distribution). The key air pollutants of concern are NO_2, PM_{10} and $PM_{2.5}$. West Oxfordshire District Council was consulted and the impact of the development on local air quality under the following four scenarios was modelled using the ADMS Roads Extra dispersion modelling software:

- **S1:** '2019 Baseline' scenario, for model verification purposes;
- **S2:** '2024 Baseline' scenario
- **S3:** '2024 With Proposed development' scenario; and
- **S4:** '2024 With Proposed and Committed Development'.

The annual mean NO_2, PM_{10} and $PM_{2.5,}$ daily mean PM_{10} and hourly mean NO_2 concentrations at the proposed development are predicted to be well within the relevant air quality standards, therefore future occupiers are not predicted to be exposed to poor air quality.

The development has been assessed as having an overall 'not significant' effect on air quality at existing sensitive receptor locations, including in Witney Air Quality Management Area.

Abbreviations

AADT	Annual Average Daily Traffic
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Standard
CHP	Combined Heat and Power
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LAQM TG.16	Local Air Quality Management Technical Guidance
LDV	Light Duty Vehicle
NPPF	National Planning Policy Framework
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5µm diameter
PM_{10}	Particulate matter of size fraction approximating to <10µm diameter
RSK	RSK Environment Limited
UK-AIR	UK Atmospheric Information Resource
WODC	West Oxfordshire District Council

Contents

1 INTRODUCTION

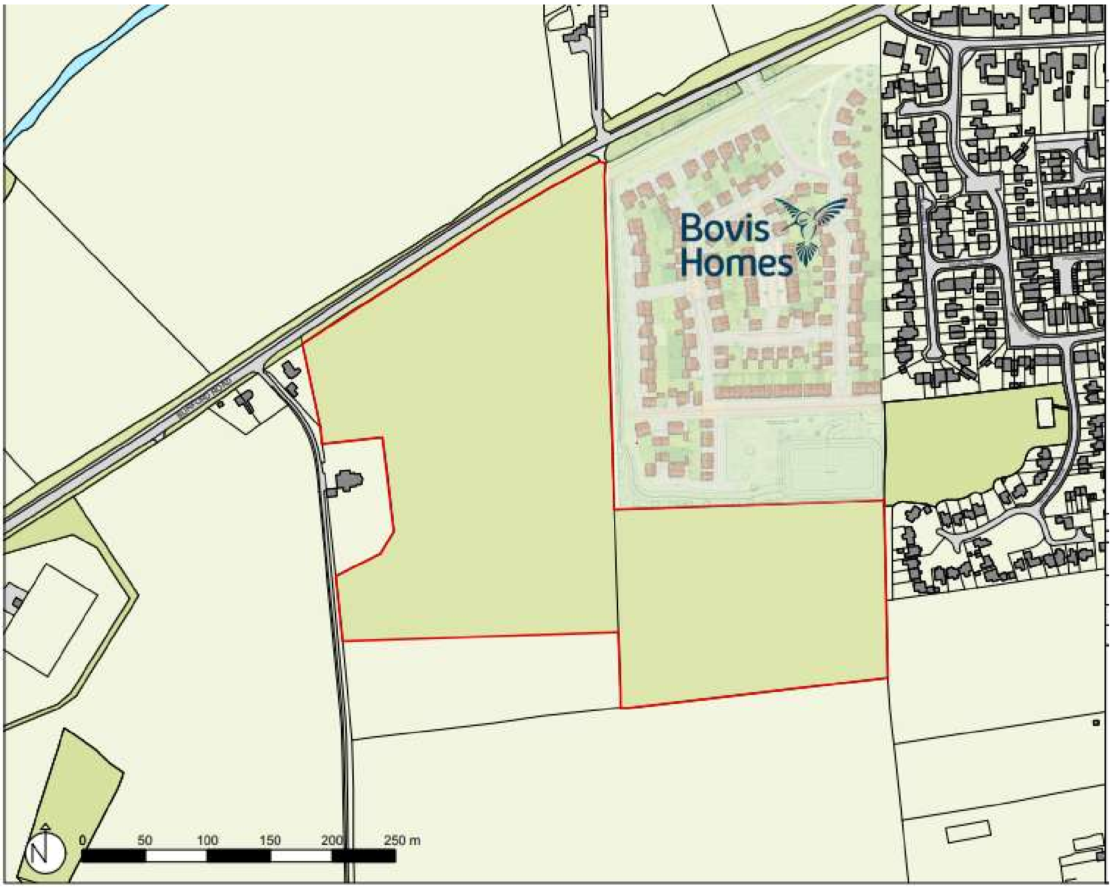
1.1 Background

RSK Environment Ltd (RSK) was commissioned to prepare an assessment of the potential air quality impacts associated with the proposed residential development on land south of Burford Road, Minster Lovell. The proposed scheme comprises the development of up to 140 dwellings (Use Class C3) including means of access into the site (not internal roads) and associated highway works, with all other matters (relating to appearance, landscaping, scale, and layout) reserved.

The proposed development site is in the administrative area of West Oxfordshire District Council (WODC) with approximate grid reference of the centre of the site at 430716, 210512. The proposed development site location plan is displayed in Figure 1.1.

The following report presents the findings of an assessment of existing/baseline air quality conditions and potential air quality impacts during the construction and occupation phases of the proposed development. Mitigation measures are recommended where appropriate.

Figure 1.1: Proposed Site Location Plan



2 LEGISLATION, PLANNING POLICY & GUIDANCE

2.1 Key Legislation

2.1.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007 sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The Clean Air Strategy 2019 supersedes the policies outlined in the 2007 strategy. This latest strategy aims to have a more joined-up approach, outlining actions the Government plans to take to reduce emissions from transport, homes, agriculture and industry. However, the air quality objectives remain as previously detailed within the 2007 strategy.

2.1.2 Air Quality Standards

The air quality standards (AQSs) in the United Kingdom are derived from EC directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010. The European Union (Withdrawal) Act retains existing EU environmental provisions in the UK.

The relevant[1] standards for England and Wales to protect human health are summarised in Table 2.1.

Table 2.1: Air Quality Standards Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	1 calendar year	-	40
	1 hour	18	200
Fine particles (PM_{10})	1 calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 year	-	25

2.1.3 The Environment Act, 1995

These objectives are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995). If exceedances are

[1] Relevance, in this case, is defined by the scope of the assessment.

measured or predicted through the review and assessment process, the local authority must declare an Air Quality Management Area (AQMA) under Section 83 of the act and produce an Air Quality Action Plan (AQAP) to outline how air quality is to be improved.

2.1.4 The Environment Act, 2021

The new Environment Act (2021) amends the Environment Act (1995) to reinforce the local air quality management (LAQM) framework in order to encourage cooperation at the local level and broaden the range of organisations that play a role in improving local air quality. The Environment Act requires targets to be set for fine particulate matter PM2.5, but at the time of writing, these have not been finalised.

2.2 Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concern that relates to land use and its development can, depending on the details of the proposed development, be a material consideration in the determination of planning applications.

2.2.1 National Planning Policy Framework

In July 2021 the revised National Planning Policy Framework (NPPF) was published, superseding the previous 2012 NPPF (revised in July 2018 and updated in February 2019) with immediate effect. The revised NPPF aims to "place greater emphasis on beauty, place-making, the environment, sustainable development and underlines the importance of local design codes."

Section 15 of the NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent '*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*' and goes on to state that '*new development* [should be] *appropriate for its location' and 'the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as wells as the potential sensitivity of the site or wider area to impacts that could arise from the development*.'

With specific regard to air quality, the NPPF 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."*

2.2.2 Local Planning Policy

In 2018, the WODC adopted the West Oxfordshire Local Plan 2031. Policy EH8 is relevant to this assessment, stating:

"*Environmental Protection*

Proposals which are likely to cause pollution or result in exposure to sources of pollution or risk to safety, will only be permitted if measures can be implemented to minimise pollution and risk to a level that provides a high standard of protection for health, environmental quality, and amenity.

The following issues require particular attention: The air quality within West Oxfordshire will be managed and improved in line with National Air Quality Standards, the principles of best practice and the Air Quality Management Area Action Plans for Witney and Chipping Norton. Where appropriate, developments will need to be supported by an air quality assessment."

2.3 Guidance

2.3.1 Guidance on the Assessment of Dust from Demolition and Construction

The Institute of Air Quality Management (IAQM) published a guidance document (Holman *et al*., 2014 with minor updates in 2016) on the assessment of construction phase impacts (herein the 'IAQM construction dust guidance'). The guidance was produced to provide advice to developers, consultants, and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measure appropriate to the level of risk identified.

2.3.2 Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance is referred to in this document as the Local Air Quality Management Technical Guidance (Defra, 2022) ('LAQM TG.22')

2.3.3 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK's (EPUK) and the IAQM jointly published a revised version of the guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM guidance') to facilitate consideration of air quality within local development control processes. It provides a framework for air quality considerations, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes methods for undertaken an air quality assessment and an approach for assessing the significance of effects. The guidance note is widely accepted as an appropriate reference method for this purpose.

3 ASSESSMENT METHODS

3.1 Overall Scope & Approach

The approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Baseline characterisation of local air quality;
- Qualitative impact assessment of the construction and operational phases of the development;
- Advanced dispersion modelling assessment of air quality impacts of increased road traffic associated with the proposed development and other 'committed' developments, under the following four scenarios:
    - Scenario 1 (S1) - 'Baseline' scenario representing the 'existing' air quality situation in 2019;
    - Scenario 2 (S2) - 'Future Baseline' scenario (2024, the proposed occupation year for the development):
    - Scenario 3 (S3): 2024 Baseline + Development flows; and
    - Scenario 4 (S4) 2024 Baseline Flows + Committed Development

Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

3.2 Consultation

We are grateful for the help and support of WODC in the preparation of this air quality assessment. In response to a request for comments, WODC advised as follows:

"We would, however, ask you to ensure you include cumulative effects of current and future housing developments, particularly on the Witney Air Quality Management Area. Future developments would need to include the East Witney SDA, North Witney SDA, and developments around Ducklington."

3.3 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study was undertaken including a review of monitoring data available from WODC and estimated background data from the LAQM Support website maintained by Defra.

Consideration was also given to potential sources of air pollution and any AQMAs in the vicinity of the application site.

3.4 Construction Phase Assessment

3.4.1 Construction Dust and Particulate Matter

Construction works for the proposed development have the potential to lead to the release of fugitive dust and particulate matter. An assessment of the likely significant effects of construction phase dust and particulate matter at sensitive receptors has therefore been undertaken following the IAQM's construction dust guidance. Three aspects of dust impacts were considered:

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

In order to assess the potential impacts of construction, activities are divided into four types:

- Demolition;
- Earthworks;
- Construction; and
- Trackout[2].

The risk of dust and PM_{10} arising to cause disamenity and/or health or ecological impacts was based on an assessment of likely emissions magnitude and the sensitivity of the surrounding environment. The risk category may be different for each of the four 'construction' activities.

Appendix A sets out the construction dust assessment methodology in detail as per IAQM construction dust guidance. Once the level of risk has been determined, then site specific mitigation proportionate to the level of risk can be identified (as detailed in Appendix B).

The Magic Map application available online by Defra was used to identify statutory ecological receptors near the proposed development site area.

3.4.2 Emissions to Air from Construction Traffic and Plant

Exhaust emissions from construction phase vehicles and plant may have an impact on local air quality close to routes used by these vehicles to access the proposed development site and in the vicinity of the proposed development site itself.

Detailed information on the number of vehicles and plant associated with the construction phase is not available at this stage (and would not be until after appointment of the main construction contractors). Therefore, a qualitative impact assessment has been undertaken based on professional judgement and considering the following factors:

- The likely duration of the construction phase;

[2] Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

- The potential number and type of construction traffic and plant that could be required; and
- The number and proximity of sensitive receptors to the proposed development site and along the likely construction vehicle routes.

3.5 Operational Phase Impact Assessment

3.5.1 Traffic Emissions

The proposed development will generate additional road traffic emissions in the local area. NO_2, PM_{10} and $PM_{2.5}$ are generally regarded as the most significant air pollutants released by vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

The EPUK-IAQM 2017 guidance provides an approach for determining the significance of air quality impacts associated with a development in relation to emissions from traffic. To assess the impacts of a development on the surrounding area, the guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion. The approach is further described in Appendix B including the descriptors for the impact significance.

The following subsectors provide further information regarding proposed methodology and dispersion model input for the air quality impact assessment.

3.5.2 Modelling Software

ADMS-Roads is an advanced dispersion model developed by the UK consultancy CERC (Cambridge Environmental Research Consultants). ADMS-Roads is widely used and validated within the UK and Europe. The model allows for the skewed nature of turbulence within the atmospheric boundary layer. ADMS-Roads is capable of processing hourly sequential meteorological data, whilst taking the turbulence caused by vehicles into account in calculating the dispersion profiles of emitted pollutants. ADMS-Roads enables the user to predict concentrations of pollutants of concern at multiple receptor locations.

ADMS-Roads (Version 5.0.0.1) was used for this assessment.

3.5.3 Modelling Scenarios

The following scenarios have been considered in this assessment:

- Scenario 1 (S1): 2019 Base year model verification;
- Scenario 2 (S2): Future Baseline- 2024
- Scenario 3 (S3): 2024 Baseline + Development flows; and
- Scenario 4 (S4) 2024 Baseline Flows + Committed Development

The 2019 base year was selected to represent the 'base case' and for model verification. The occupation year for the proposed development is 2024. Therefore, 2024 was used as the 'opening year' in this assessment.

3.5.4 Traffic Data

Traffic data used in the air quality assessment were provided by the appointed project transport consultant. The traffic data used in the air quality dispersion modelling are presented in Appendix D.

The road network included in the dispersion model is presented in Figure 3.1. Guidance in LAQM TG.16 and professional judgement was used to estimate speeds for use within the assessment, including reduced speeds at junctions.

3.5.5 Traffic Emission Factors

Version 11.0 of the emissions factor toolkit (EFT), published by Defra, was used to derive vehicle emissions factors (i.e. the amount of pollution emitted from the vehicle fleet, in g/km/s) for nitrogen oxide (NOx), PM10 and PM2.5. Within the EFT, emission factors are available for 2018 through to 2050 for England (not London), and 2018 to 2030 for Wales, Scotland, Northern Ireland, and London.

EFT version 11.0 takes into account the most recent evidence relating to factors such as advances in vehicle and exhaust technology and changes in composition of the vehicle fleet. The emission factors consequently reduce over time. Emission factors for 2019 were used to estimate vehicle emissions for S1 modelling scenario and 2024 emission factors were used for S2, S3 and S4.

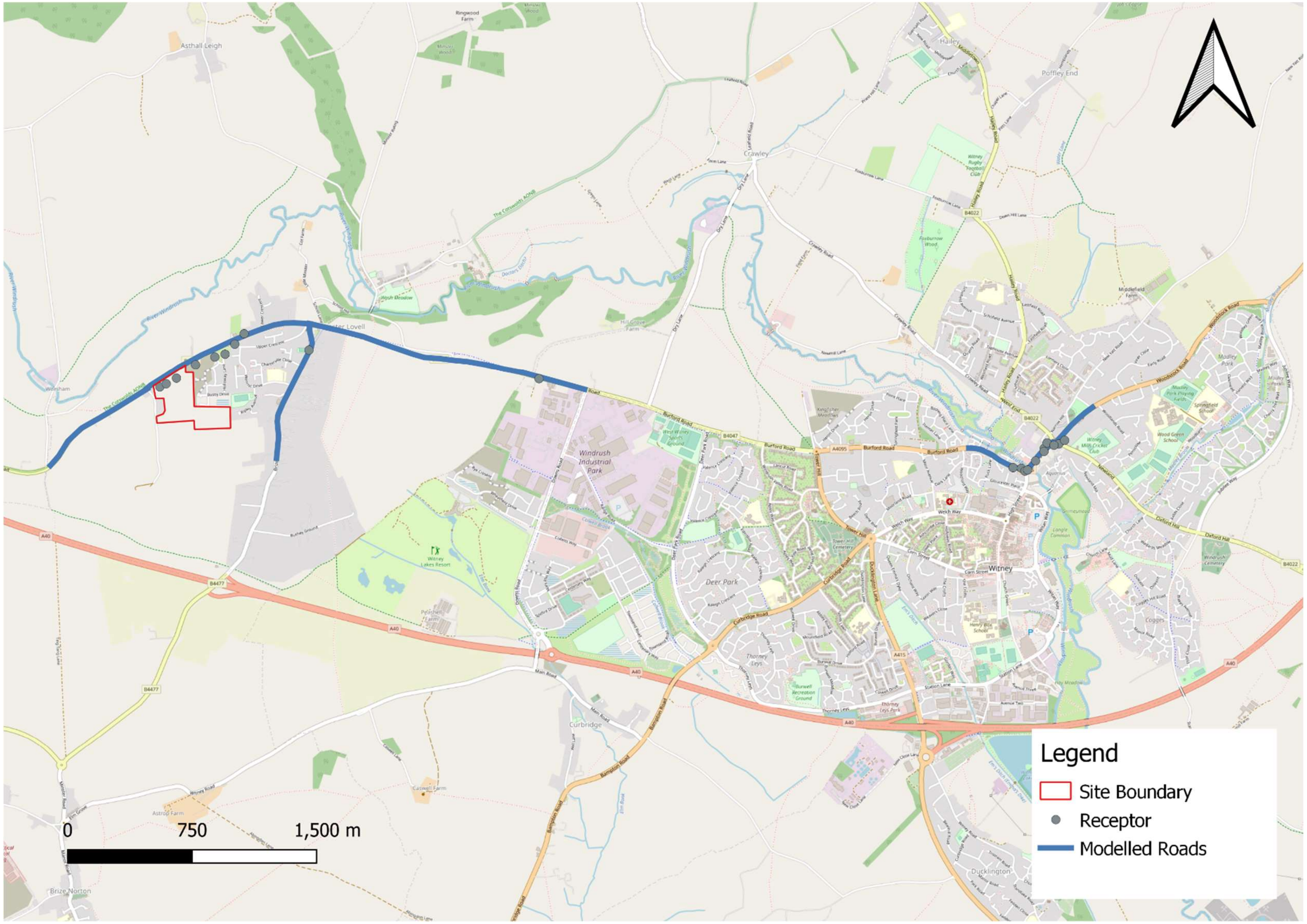
3.5.6 Time-Varying Profile

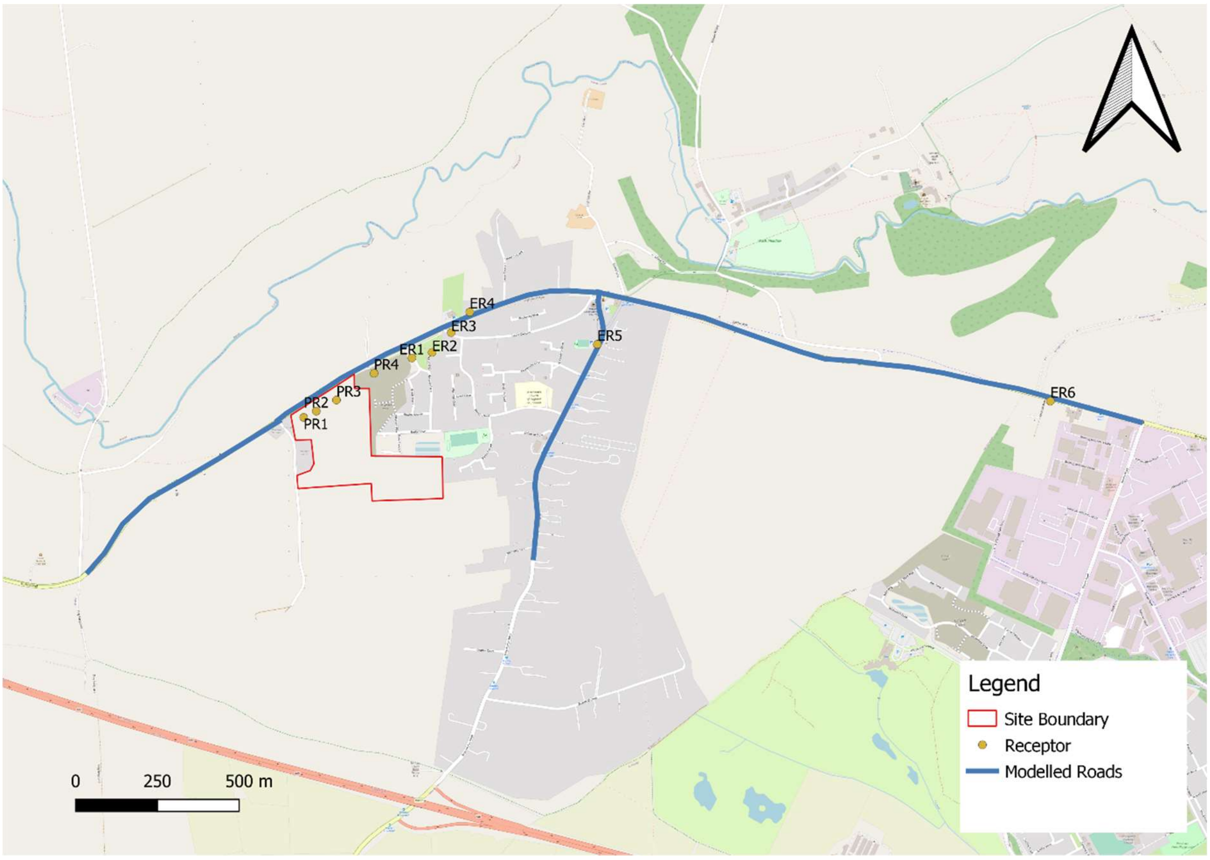
Vehicle movements vary with time. Diurnal profiles for the roads included within the model were not available and instead the UK National Profile 2019 published by the Department for Transport (DfT) was applied to all of the assessed roads. The diurnal profile is presented in Appendix D. A value of 1 on the y-axis is equivalent to the hourly average flow over 24 hours.

3.5.7 Meteorological Data

2019 hourly sequential meteorological data from the Brize Norton meteorological station was employed in the dispersion model. This meteorological station is located approximately 4km to the south-west of the study area and is considered to be representative of the development site condition. The windrose derived from the 2019 dataset is presented in Figure 3.2. The predominant wind direction was from the southwest.

Figure 3.1: The Roads and Receptors Included in the Dispersion Modelling Assessment




ER4
ER3
ER1
ER2
PR4
PR3
PR2
PR1
ER5
ER6
Legend
Site Boundary
Receptor
Modelled Roads
0
250
500 m

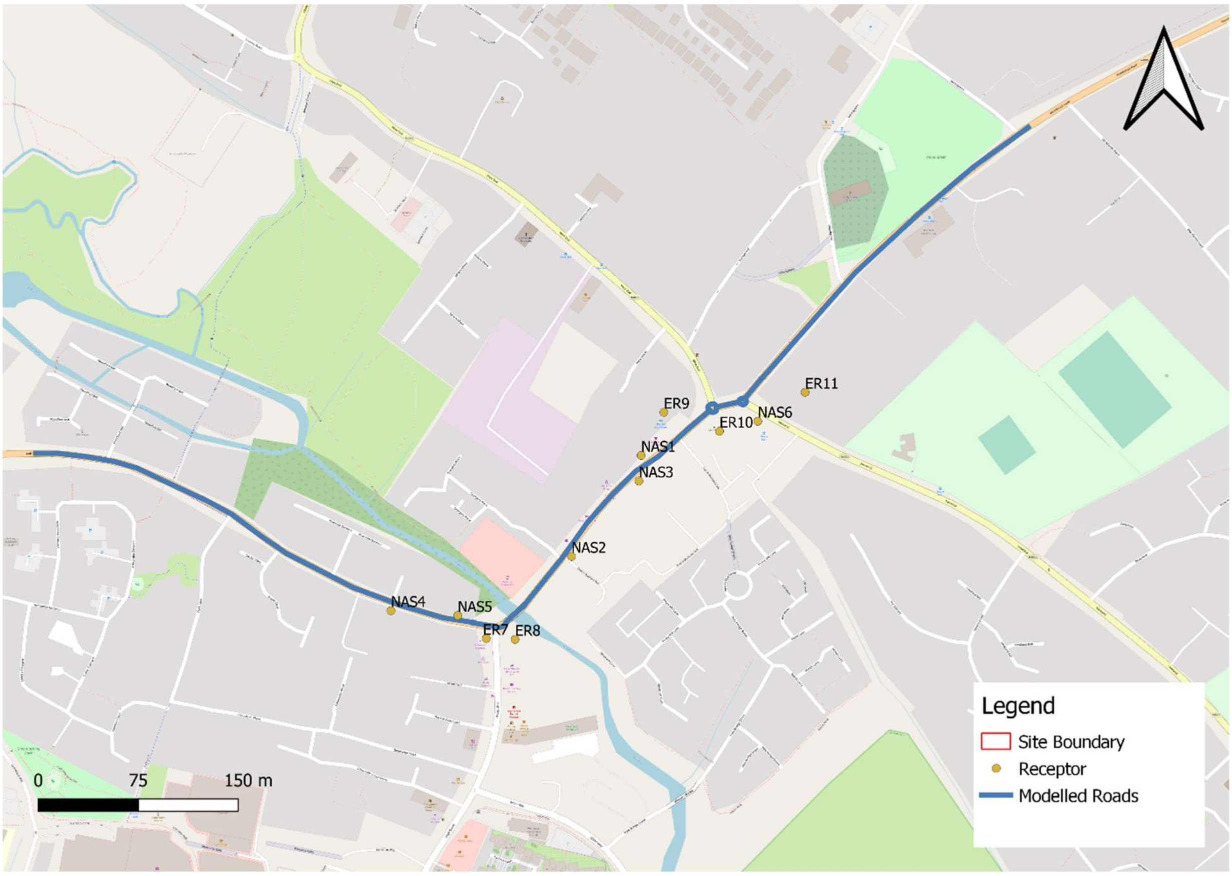
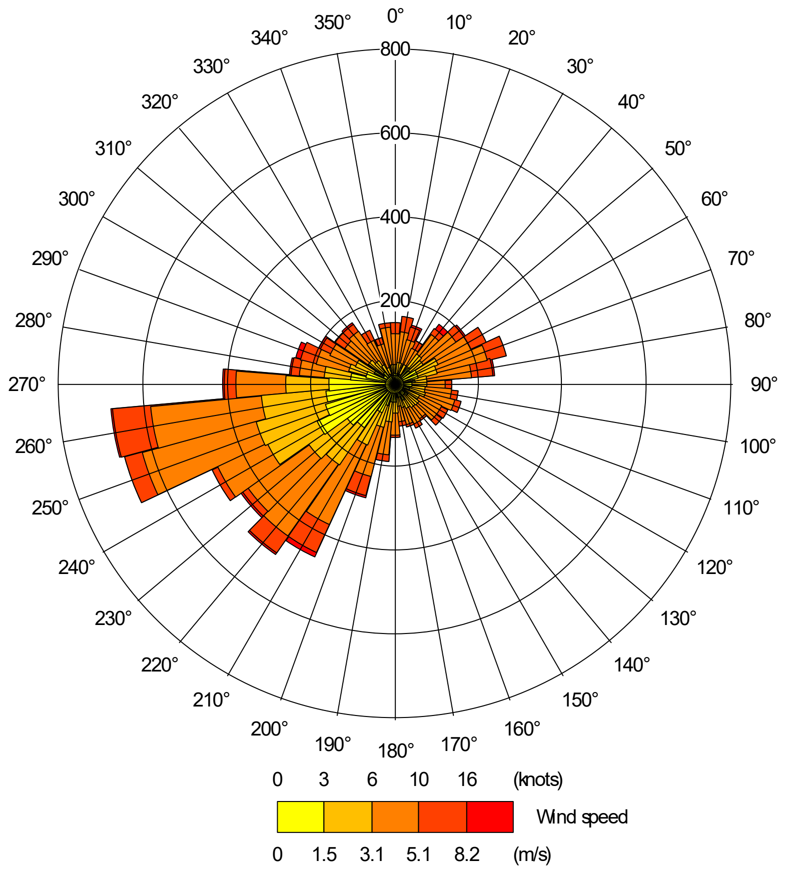

ER9
ER10
NAS6
ER11
NAS1
NAS3
NAS2
NAS4
NAS5
ER7
ER8
Legend
Site Boundary
Receptor
Modelled Roads
0
75
150 m

Figure 3.2: Windrose from the Brize Norton Meteorological Station in 2019



3.5.8 Sensitive Receptor Location

Impacts on the Witney AQMA were assessed. The roads where the greatest changes in traffic flows, and therefore to be used within the model verification, were identified as:

- Burford Road B407;
- Bridge Street;
- Mill Street;
- Woodgreen and/or West End B4022.

Details of all specific human receptors included in the modelling study (and hence the air quality impacts assessed) are summarised in Table 3.1. The locations of all assessed receptors are shown in Figure 3.1.

Table 3.1: Diffusion Tubes and Receptors Included in the Dispersion Modelling Assessment

Receptor ID	Receptor Location	Grid Reference		Height (m)
		X	Y	
Diffusion tubes used for verification				
NAS1	25 Bridge Street, Witney	435856.7	210308.6	2.29
NAS2	10 Bridge Street, Witney	435810	210236.6	2.56
NAS3	20 Bridge Street, Witney	435860.1	210293.4	2.33
NAS4	9 Mill Street, Witney	435675.2	210196.8	2.74
NAS5	4A West End, Witney	435726.4	210201.4	2.30
NAS6	Woodgreen Hill, Witney	435948.9	210338.8	2.28
Receptors				
ER1	Existing Residential Receptor, Holloway Lane	430867.6	210828.5	1.5
ER2	Existing Residential Receptor, Upper Crescent	430929.2	210845.8	1.5
ER3	Exiting Residential Receptor, Upper Crescent	430987.3	210906.6	1.5
ER4	Existing Receptor, Ivydene Flower Farm	431043.3	210969.6	1.5
ER5	Existing Receptor, Minster Lovell Village Hall	431433.8	210873.7	1.5
ER6	Existing Residential Receptor, Burford Road	432819.1	210708.8	1.5
ER7	Existing Receptor, Stonham Housing Association	435746.4	210174.8	1.5
ER8	Existing Residential Receptor, High Street, Witney	435768	210174.3	1.5
ER9	Existing Receptor, The Old Court Hotel	435878.5	210344.9	1.5
ER10	Existing Residential Receptor, Mill House Care Home	435920.3	210331.1	1.5
ER11	Existing Residential Receptor, road between Woodgreen/Hill Close	435984.2	210360.7	1.5
PR1	Proposed Receptor	430538	210645.1	1.5

Receptor ID	Receptor Location	Grid Reference		Height (m)
		X	Y	
PR2	Proposed Receptor	430576.1	210664.4	1.5
PR3	Proposed Receptor	430637.6	210698.7	1.5
PR4	Proposed Receptor	430752	210781.1	1.5

3.5.9 Background Air Quality Data Used in the Modelling

There are currently no nearby representative background monitoring locations for NO_2, PM_{10} and $PM_{2.5}$,, therefore estimated background concentrations were obtained from the 2018-based background maps on the Defra LAQM Support website.

The LAQM Support 'background maps' provide estimated annual average background concentrations of NO_2, NO_X, PM_{10} and $PM_{2.5}$ on a 1 km^2 grid basis.

The Defra LAQM background concentration maps assume that background concentrations will improve (i.e. reduce) over time, in line with predicted reduction in vehicle emissions as well as reduction in emissions from other sources. For a conservative approach, Defra background data for 2019 were used for all modelled scenarios.

The background concentrations included in the dispersion modelling assessment are presented in Table 3.2. Estimated background concentrations for NO_2, NO_X, PM_{10} and $PM_{2.5}$ for the year 2024 were also obtained from the 2018-background maps and are presented in Table 3.3.

Table 3.2: Estimated 2019 Background Concentrations

Receptor	2019 Annual Average (µg/m^3)				Source
	NO_2	NO_X	PM_{10}	$PM_{2.5}$	
ER1	7.6	9.0	14.7	9.2	NO_2, PM10 & $PM_{2.5}$ – 2019 estimated data from Defra 2018 based Background maps
ER2	7.6	9.0	14.7	9.2	
ER3	7.6	9.0	14.7	9.2	
ER4	7.6	9.0	14.7	9.2	
ER5	7.6	9.0	14.7	9.2	
ER6	8.2	10.6	14.9	9.3	
ER7	8.9	11.6	14.8	10.1	
ER8	8.9	11.6	14.8	10.1	
ER9	8.9	11.6	14.8	10.1	
ER10	8.9	11.6	14.8	10.1	

ER11	8.9	11.6	14.8	10.1	
PR1	7.6	9.0	14.7	9.2	
PR2	7.6	9.0	14.7	9.2	
PR3	7.6	9.0	14.7	9.2	
PR4	7.6	9.0	14.7	9.2	

Table 3.3: Estimated Background Concentrations for 2024

Receptor	2024 Annual Average (µg/m³)				Source
	NO_2	NO_X	PM_{10}	$PM_{2.5}$	
ER1	6.0	7.6	13.8	8.5	NO_2, PM10 & $PM_{2.5}$ – 2024 estimated data from Defra 2018 based Background maps
ER2	6.0	7.6	13.8	8.5	
ER3	6.0	7.6	13.8	8.5	
ER4	6.0	7.6	13.8	8.5	
ER5	6.0	7.6	13.8	8.5	
ER6	7.0	9.0	14.0	8.5	
ER7	7.5	9.6	13.8	9.4	
ER8	7.5	9.6	13.8	9.4	
ER9	7.5	9.6	13.8	9.4	
ER10	7.5	9.6	13.8	9.4	
ER11	7.5	9.6	13.8	9.4	
PR1	6.0	7.6	13.8	8.5	
PR2	6.0	7.6	13.8	8.5	
PR3	6.0	7.6	13.8	8.5	
PR4	6.0	7.6	13.8	8.5	

3.5.10 Other Model Input Parameters

In order to represent the nature of the study area and surrounding area, a surface roughness of 0.5 was used in the model. The Monin-Obukhov length (related to atmospheric stability) was assumed to be 10m (small towns).

3.5.11 Model Verification and Results Processing

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the study area considered in this assessment. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results and was carried out following the methodology specified in LAQM.TG.22.

There are twenty-five diffusion tube locations within West Oxfordshire. Six of them (i.e. NAS1, NAS2, NAS3, NAS4, NAS5, NAS6) are located within the study area. 2019 monitored annual mean NO_2 concentration from three of the diffusion tubes (NAS1, NAS2, NAS3) were used to 'verify' the predicted road NO_x concentrations.

Details of the verification calculations are presented within Appendix E.

An adjustment factor of 3.49 was obtained as part of the verification process for NO_2. The adjustment factor was applied to the modelled road-NO_x component before estimation of annual mean NO_2 concentrations using the NO_x: NO_2 calculator (version 8.1) available from the Defra website.

Local monitoring data were not available for concentrations of PM_{10} and $PM_{2.5}$ and consequently, the predicted road-PM_{10} and road-$PM_{2.5}$ contributions were adjusted using the factor calculated for road-NO_x, before adding the appropriate background concentrations. This approach is consistent with guidance given in LAQM.TG.22.

LAQM TG.22 advises that an exceedance of the 1 hour mean NO_2 objective is unlikely to occur where the annual mean concentration is below 60µg/m^3, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.

Once processed, the predicted concentrations (full results presented in Section 5) were compared against the current statutory limit values and objectives for NO_2, PM_{10} and $PM_{2.5}$ set out in Table 2.1.

The modelling input parameters for the dispersion modelling assessment are summarised in Table 3.4.

Table 3.4: Summary of Inputs into the Dispersion Model

Parameter	Brief description	Input into Model
Emission year	Predicted emission rates depend on the year of emission being used	2019 for S1, 2024 for S2, S3 and S4
Road source emissions	Road source emission rates calculated from traffic flow data using an emission factor toolkit from AQC or Defra EFT	EFT V11.0

Time varied emissions	Diurnal variations of emissions applied to road sources	2019 national diurnal profile
Road elevation	Elevation of road above ground level	No elevated roads and no terrain file used (due to relatively flat nature of study area)
Road width	Width of road (m)	Road widths determined based on approximate measurement of roads (internet mapping)
Road type	Selection of different types of road to be assessed, inputted into the emission factor toolkit calculations	'Urban (not London)' settings
Road speeds	Speed of the road effects the vehicle emissions to air	Standard speed limits used and professional judgement with slowing at junctions or bends
Meteorology	Representative hourly sequential meteorological data	Brize Norton meteorological station 2019
Latitude	Allows the location of the model area to be determined	51.8^{o}
Surface roughness	This defines the surface roughness of the model area	0.5m
Monin-Obukhov length	A boundary layer parameter required to precisely describe the atmospheric stability conditions and to predict dispersion of pollutants released from road traffic	10m

3.6 Uncertainties and Assumptions

The following uncertainties and assumptions were made in the air quality assessment:

- In the absence of measured NO_2, PM_{10} and $PM_{2.5}$ at the proposed development location, estimated background data from the Defra LAQM website were used in the assessment. In reality, baseline air quality levels vary with time and location but in the absence of on-site baseline monitoring data, the assumption that the baseline concentrations obtained from the above-mentioned data source is applicable to the site location, is considered appropriate;

- Emissions from the average vehicle fleet using the local road network cannot be known, and therefore it is assumed those generated by the EFT provide an accurate representation of emissions generated by vehicles which currently and will use the modelled roads.
- There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that wind conditions measured at Brize Norton meteorological station in 2019 were representative of wind conditions at the site. Furthermore, it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution over flat terrain in order to simplify the real-world dilution and dispersion conditions;
- An important step in the assessment is verifying the dispersion model against measured data. The model verification was based on the comparison of model results based on 2019 traffic data with 2019 measured roadside NO_2 diffusion tube data. As no PM_{10} or $PM_{2.5}$ monitoring data were available near the site area, the adjustment factors used for the predicted roadside NO_x concentrations have been applied to the predicted PM_{10} and $PM_{2.5}$ concentrations, as per guidance in LAQM.TG.16.
- The national diurnal profile published by the Department for Transport for 2019, has been assumed to be applicable for the roads assessed.
- There is an element of uncertainty in all measured and modelled data. All values presented in this report are best possible estimates.

4 BASELINE AIR QUALITY CHARACTERISATION

4.1 Emission Sources and Key Air Pollutants

The application site is located in an area where the main source of air pollution is likely to be road traffic emissions. The proposed development site is located close to the B407, Burford Road.

The principal pollutants relevant to this assessment are considered to be NO_2, PM_{10} and $PM_{2.5}$, generally regarded as the most significant air pollutants released by vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions.

4.2 Presence of AQMAs

WODC has declared two AQMAs, the proposed development site is not located within an AQMA but is close to the Witney AQMA, and some road traffic associated with the proposed development may travel through the Witney AQMA and affect air quality in it.

4.3 Baseline Monitoring Data

According to the 2021 WODC Air Quality Annual Status Report, there are no automatic monitoring locations in the district, but there is a network of 25 diffusion tubes monitoring nitrogen dioxide. The closest monitor to the proposed site is a diffusion tube positioned on Mill Street, Witney (NAS4), approximately 4.8 km away from the proposed development site.

The 2016 to 2020 annual average NO_2 concentrations for the diffusion tube locations within 5km of the development site are reproduced in Table 4.1 below. No exceedances of the annual mean NO_2 air quality objective were recorded.

Table 4.1: Annual Average Measured NO_2 Concentrations at Monitoring Location within 5km from Proposed Development Site

Site ID	Site Name	Approx distance from proposed development (km)	Annual Average NO_2 (µg/m3)				
			2016	2017	2018	2019	2020
NAS4	9 Mill Street Witney	4.8	33.8	34.4	31.9	33.9	26.2
NAS5	4A West End Witney	5	-	33.9	35.5	33.1	25.9

4.4 LAQM Background Data

In addition to the local monitoring data, estimated background air quality data available from the LAQM-Tools website may also be used to establish likely background air quality conditions at the proposed development site. The website provides estimated annual average background concentrations of NO_2, PM_{10} and $PM_{2.5}$ on a 1km^2 grid basis.

Table 4.2 identifies estimated annual average background concentrations for the grid square containing the proposed development site for years from 2022 to 2024. No exceedances of the NO_2, PM_{10} or $PM_{2.5}$ AQS are predicted. As background concentrations are predicted to fall with time, background concentrations in future years would not be expected to exceed their respective annual mean standards.

It should also be noted that the Defra website states that *'The projections in the 2018 background maps are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these maps do not reflect short or longer term impacts on emissions in 2020 and beyond resulting from behavioural change during national or local lockdowns'.* As there has generally been a decrease in traffic resulting from the Covid-19 lockdowns, the data presented in Table 4.2 are considered to be conservative.

Table 4.2: Estimated Background Annual Average NO_2, PM_{10} and $PM_{2.5}$ Concentrations at the Proposed Development Site (from 2018 base map)

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Support Website (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
2022	6.4	14.1	8.7
2023	6.3	14.0	8.6
2024	6.0	13.8	8.5
Air Quality Objective	**40**	**40**	**25**

Notes: Presented concentrations for 1km^2 grid centred on 430500, 210500; approximate centre of development site is 430716, 210512.

5 ASSESSMENT OF IMPACTS

5.1 Construction Phase

5.1.1 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants NO_x, PM_{10}, volatile organic compounds and carbon monoxide. The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Based on the size of the proposed development site and the temporary nature of the construction activities, it is considered unlikely that vehicle movements associated with staff commutes to and from the site would have a significant impact on local air quality.

Plant would be used to facilitate earthworks and construction. The operation of site equipment and machinery will result in emissions to atmosphere of exhaust gases, but these emissions are unlikely to be significant in comparison with traffic flows on the local road network.

Nonetheless, potential measures to reduce impacts from construction related traffic and plant are outlined in Section 6.1.

5.1.2 Fugitive Construction Dust and Particulate Matter

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Fugitive dust arising from construction is mainly of a particle size greater than the PM_{10} fraction (which can potentially impact upon human health), however construction activities may contribute to local PM_{10} concentrations.

Appropriate dust control measures can be highly effective for controlling emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

5.1.2.1 Potential Dust Emission Magnitude

With reference to the IAQM construction dust guidance criteria outlined in Appendix A, the estimation of dust emissions magnitudes for earthworks, construction and trackout activities are summarised in Table 5.1. Where information is not yet known, a conservative approach has been adopted and professional judgement has been used based on the scale of the proposed development and experience of working on similar schemes.

Table 5.1: Summary of Dust Emission Magnitudes (Before Mitigation)

Activity	IAQM Criteria	Dust Emission Magnitude
Earthworks	- Total area where earthworks will take place is >10,000m² - The soil type in the area is mudstone/limestone - The number of earthmoving equipment are estimated to be <5 at any one time - The height of stockpiled materials is estimated to <4m	**Medium**
Construction	- Total volume of buildings to be built is estimated to be between 25,000-100,000 m³ - No concrete batching or sandblasting is proposed - Does include dusty construction materials	**Medium**
Trackout	- Number of heavy vehicles (>3.5t) per day out of the site is estimated to be <10 - Surface type on the site is mudstone/limestone - Extent of unpaved road length within the site is estimated to be >100m	**Medium**

5.1.2.2 Sensitivity of the Area

As per the IAQM construction dust guidance, the sensitivity of the area takes into account a number of factors, including:

- The sensitivity of individual receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Consideration is given to human and ecological receptors from the impact of the construction site boundary and the routes along which trackout may be expected to occur. In this instance trackout is anticipated to be 50m – 100m along Burford Road. This is because the trackout dust emissions magnitude was classified as medium and the IAQM construction dust guidance suggests that trackout should be considered for 50m, 200m and 500m from a site exit for small, medium, and large sites, respectively.

Table 5.2 presents the determined sensitivity of the area. Earthworks and construction activities are relevant up to 350m from the proposed development site boundary, whereas trackout activities are only considered relevant up to 50m from the edge of the roads likely to be affected by trackout (up to 50m from the site access), as per the IAQM construction dust guidance. Following the IAQM construction dust guidance, no ecological receptors have been identified within 50m of the proposed site or anticipated trackout route.

Table 5.2: Sensitivity of the Area

Potential Impact		Sensitivity of the Surrounding Area		
		Earthworks	Construction	Trackout
Dust soiling	Receptor sensitivity	Medium	Medium	Medium
	Number of receptors	10-100	10-100	10-100
	Distance from the source	<50m	<50m	<50m
	Sensitivity of the area	**Medium**	**Medium**	**Medium**
Human health	Receptor sensitivity	High	High	High
	Annual mean PM_{10} concentration	<24 $\mu g/m^3$ (see Table 4.2)	<24 $\mu g/m^3$ (see Table 4.2)	<24 $\mu g/m^3$ (see Table 4.2)
	Number of receptors	10-100	10-100	10-100
	Distance from the source	<50m	<50m	<50m
	Sensitivity of the area	**Low**	**Low**	**Low**
Ecological	Receptor sensitivity	N/A		

Figure 5.1 and 5.2 show maps indicating the construction and trackout buffers, respectively, for identifying the sensitivity of the area.

Figure 5.1: Construction Buffers

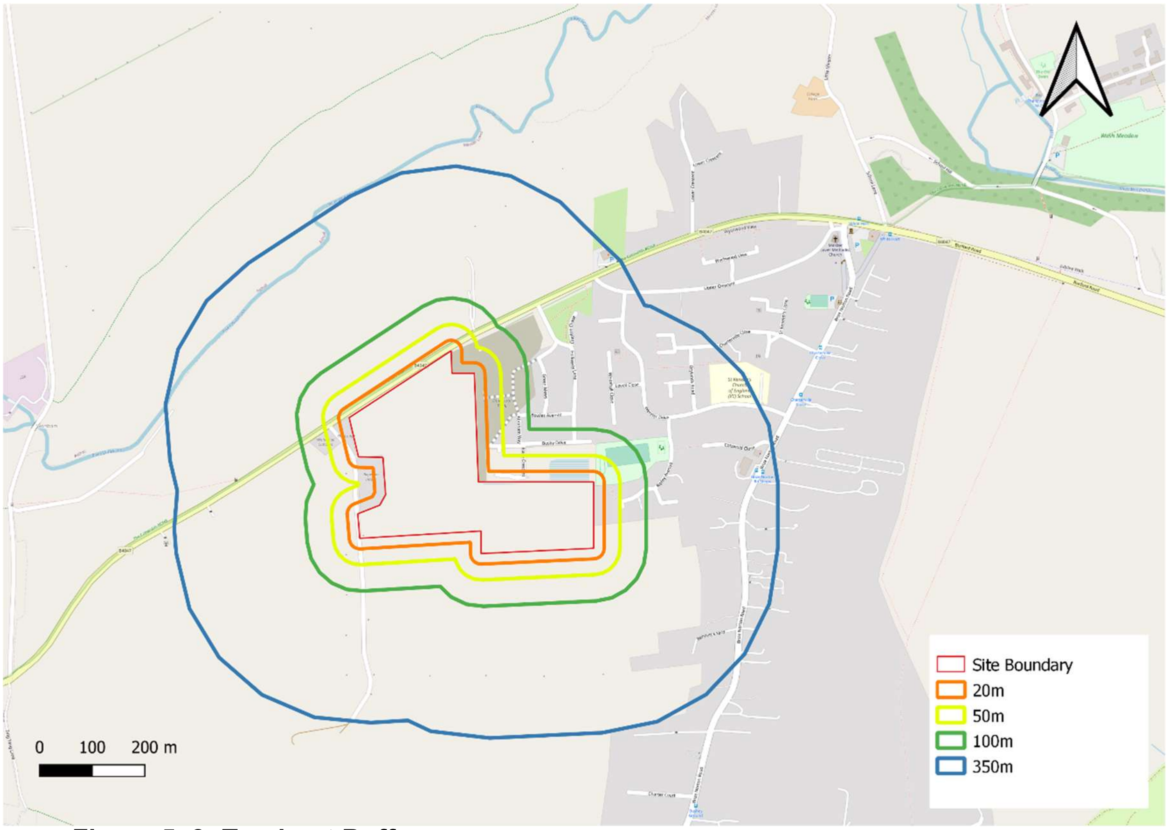
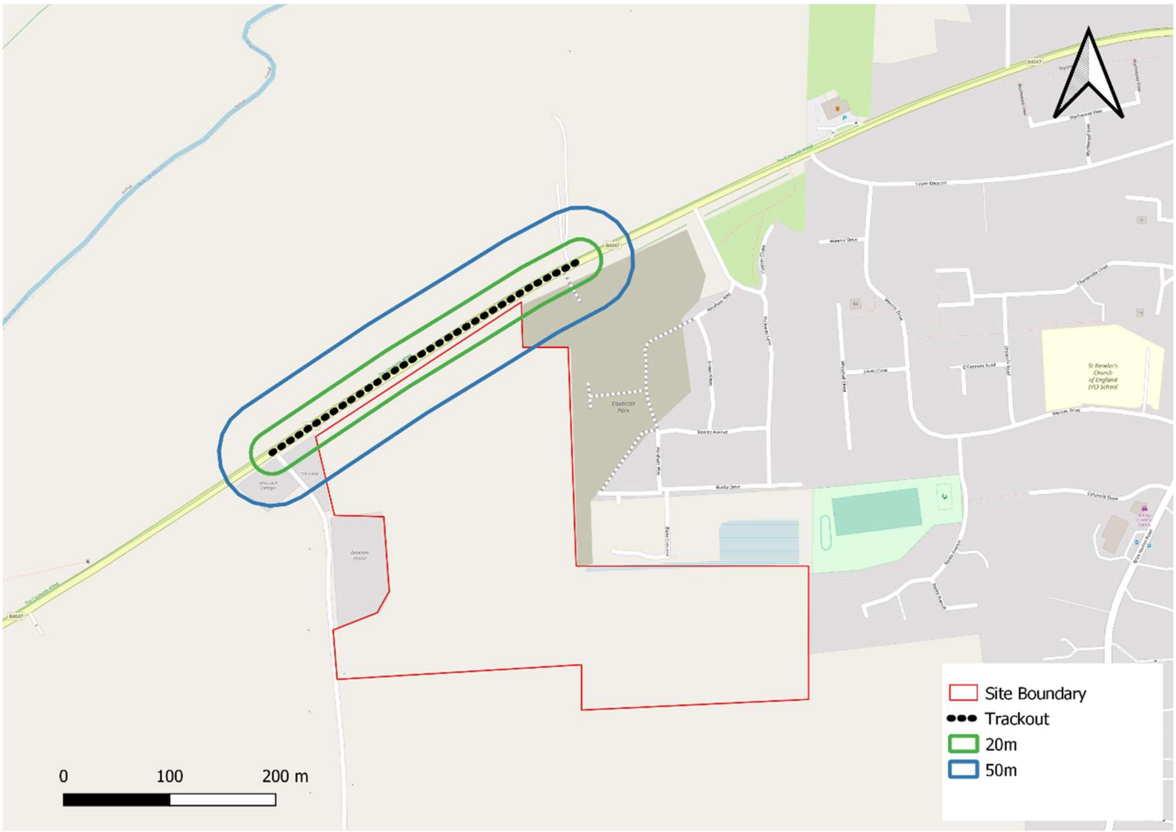


Figure 5. 2: Trackout Buffers



5.1.2.3 Risk of Impacts

The dust emission magnitude summary in Table 5.1 has been combined with the sensitivity of the area in Table 5.2 to determine the risk of impacts of construction activities before mitigation, as summarised in Table 5.3. Mitigation measures to reduce construction phase impacts have been defined based on these dust risks as detailed in Section 6 and Appendix B.

Table 5.3: Summary of the Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact		
	Earthworks	Construction	Trackout
Dust soiling	Medium Risk	Medium Risk	Negligible
Human health	Low Risk	Low Risk	Negligible

5.2 Operational Phase

5.2.1 Dispersion Modelling Results

Detailed dispersion modelling was undertaken with ADMS-Roads dispersion modelling software. The modelled concentrations were verified and results processed as detailed in Section 3 and Appendix E.

Full results are presented in Appendix F and a summary is provided below.

5.2.1.1 Nitrogen Dioxide (NO_2)

The UK air quality objective concentration for annual mean NO_2 concentrations is 40μg/m^3. The results of the assessment predict that concentrations are predicted to meet the annual mean NO_2 objective at all assessment receptors, under all scenarios.

Under the 'with development' scenario, annual mean concentrations at all discrete receptors modelled are predicted to be 'well below' (ie 75% or less) the objective. Under the 'with cumulative development' scenario, all but one receptor (ER10) are predicted to experience annual mean NO2 concentrations 'well below' the objective.

Table 5.4 shows the comparison of annual mean NO_2 concentrations between the 'S2 2024 baseline', the 'S3 2024 with proposed development' and 'S4 2024 with proposed and committed development' scenarios at the assessed receptor locations. The percentage changes in annual mean NO_2 concentrations relative to the air quality objective and the classification of impact magnitudes with reference to the EPUK-IAQM guidance are also presented.

The proposed development is not predicted to cause any new exceedances of the annual mean NO_2 objective.

The changes in annual mean NO_2 concentrations as a result of the proposed development are a maximum of 1% and would be classified as 'negligible'.

The cumulative impact of the proposed development with the other committed developments ranges from 0% to 6% of the air quality assessment level (AQAL), and are classified as 'negligible' at all receptor locations besides receptor ER7 which has been considered 'slight' and ER10 which is considered 'moderate'. The contribution of the proposed development to this 'moderate' impact is 'negligible', therefore this impact is overwhelmingly due to the other committed developments, and would therefore be expected whether consent for the proposed development is granted or not.

LAQM.TG(22) advises that 'exceedances of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60µg/m^3 or above'. In the year of 2024, annual mean NO_2 concentrations (see Table 5.4) are not predicted to exceed 60µg/m^3 at any receptors. Therefore, it is not anticipated that the hourly mean NO_2 objective would be exceeded under any of the assessed scenarios.

Table 5.4: Predicted Annual Mean Nitrogen Dioxide Concentrations & Impact

Receptor ID	Annual Mean NO_2 Concentration								Impacts**
	AQ-S2 – 2024 Without Development		AQ-S3 - 2024 With Development		AQ-S4 – 2024 With Proposed and Committed Development		Change Between AQ-S2 and AQ-S3 as % of AQAL*	Change Between AQ-S2 and AQ-S4 as % of AQAL*	Cumulative Impact Classification
	NO_2 Concentration (µg/m³)	As % of AQAL	NO_2 Concentration (µg/m³)	As % of AQAL	NO_2 Concentration (µg/m³)	As % of AQAL			
ER1	9.0	22%	9.2	23%	9.2	23%	0	0	Negligible
ER2	8.8	22%	8.9	22%	8.9	22%	0	0	Negligible
ER3	9.7	24%	10.0	25%	10.0	25%	1	1	Negligible
ER4	11.4	29%	11.9	30%	11.9	30%	1	1	Negligible
ER5	13.3	33%	13.6	34%	13.6	34%	1	1	Negligible
ER6	13.2	33%	13.4	33%	13.4	33%	0	0	Negligible
ER7	24.0	60%	24.2	60%	26.2	66%	0	6	Slight
ER8	26.7	67%	27.0	67%	28.8	72%	0	5	Negligible
ER9	21.0	53%	21.1	53%	22.4	56%	0	4	Negligible
ER10	29.8	74%	29.8	75%	32.0	80%	0	6	Moderate
ER11	22.5	56%	22.5	56%	24.3	61%	0	5	Negligible
PR1	-	-	9.4	24%	9.4	24%	-	-	-
PR2	-	-	9.3	23%	9.2	23%	-	-	-
PR3	-	-	9.1	23%	9.1	23%	-	-	-
PR4	-	-	9.6	24%	9.6	24%	-	-	-

*As recommended in the EPUK-IAQM guidance, percentages have been rounded to whole numbers. Changes less than 0.5% i.e. 0%, have been described as negligible.

**Impacts are determined in accordance with EPUK-IAQM guidance.

5.2.1.2 Particular Matter (PM_{10})

Table 5.5 shows the comparison of annual mean PM_{10} concentrations between the 'S2 2024 baseline', the ' S3 2024 with proposed development' and 'S4 2024 with proposed and committed development' scenarios at the assessed receptor locations. The percentage changes in annual mean PM_{10} concentrations relative to the air quality objective and the classification of impact magnitudes with reference to the EPUK-IAQM guidance are also presented.

Predicted annual mean concentrations of PM_{10} are all 'well below' the UK Air Quality Objective concentration of 40µg/m^3 for all modelled scenarios.

The proposed development is not predicted to cause any new exceedances of the annual mean PM_{10} objective.

The changes in annual mean PM_{10} concentrations as a result of the proposed development are between 0% and 2% of the AQAL. The impacts of the proposed development on nearby sensitive receptors in relation to PM_{10} concentrations are predicted to be 'negligible' at all receptor locations.

LAQM TG.22 indicates that the number of annual exceedances of the 24-hour mean PM_{10} AQS can be estimated using the following formula: *-18.5 + 0.00145 × annual mean^3 + (206/annual mean).*

Table 5.6 presents results for the 24-hour mean PM_{10} concentrations as number of day greater than 50µg/m^3 for S2, S3 and S4. The objective for 24-hour mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year. The number of days exceeding 50µg/m^3 predicted is a maximum of 6 day/annum, which is well below the objective.

The results indicate that in the opening year of 2024, no exceedances of annual mean PM_{10} concentrations are predicted with the proposed development at any of the proposed receptors.

Table 5.5: Predicted Annual Mean PM_{10} Concentrations & Impact

Receptor ID	Annual Mean PM_{10} Concentration								Impacts**
	AQ-S2 - 2024 Without Development		AQ-S3 - 2023 With Development		AQ-S4 – 2024 With Proposed and Committed Development		Change Between AQ-S2 and AQ-S as % of AQAL*	Change Between AQ-S2 and AQ-S4 as % of AQAL*	Cumulative Impact Classification
	PM_{10} Concentration (µg/m³)	As % of AQAL	PM_{10} Concentration (µg/m³)	As % of AQAL	PM_{10} Concentration (µg/m³)	As % of AQAL			
ER1	15.1	38%	15.2	38%	15.2	38%	0	0	Negligible
ER2	15.1	38%	15.1	38%	15.1	38%	0	0	Negligible
ER3	15.4	38%	15.5	39%	15.5	39%	0	0	Negligible
ER4	16.0	40%	16.1	40%	16.1	40%	0	0	Negligible
ER5	16.5	41%	16.6	41%	17.0	41%	0	1	Negligible
ER6	16.6	42%	16.7	42%	17.0	42%	0	1	Negligible
ER7	19.2	48%	19.3	48%	20.0	50%	0	2	Negligible
ER8	20.1	50%	20.2	50%	21.0	52%	0	2	Negligible
ER9	18.4	46%	18.4	46%	19.0	47%	0	1	Negligible
ER10	20.9	52%	21.0	52%	22	54%	0	2	Negligible
ER11	18.7	47%	18.7	47%	19.0	48%	0	1	Negligible
PR1	-	-	15.3	38%	15.3	38%	-	-	-
PR2	-	-	15.2	38%	15.2	38%	-	-	-
PR3	-	-	15.2	38%	15.2	38%	-	-	-
PR4	-	-	15.3	38%	15.3	38%	-	-	-

*As recommended in the EPUK-IAQM guidance, percentages have been rounded to whole numbers. Changes less than 0.5% i.e. 0%, will be described as negligible.

**Impacts are determined in accordance with EPUK-IAQM guidance.

Table 5.6: Predicted 24-Hour Mean PM_{10} Impact

Receptor ID	24-Hour Mean PM_{10}* (number of days >50µg/m^3)				
	AQ-S2 - 2024 Without Development	AQ-S3 – 2024 With Development	AQ- S4 – 2024 With Proposed and committed Development	Change between AQ-S2 and AQ-S3	Change Between AQ-S2 and AQ-S4
ER1	0	0	0	0	0
ER2	0	0	0	0	0
ER3	0	0	0	0	0
ER4	0	0	0	0	0
ER5	0	1	1	1	1
ER6	1	1	1	0	0
ER7	3	3	3	0	0
ER8	4	4	4	0	0
ER9	2	2	2	0	0
ER10	5	5	6	0	1
ER11	2	2	3	0	1
PR1	-	0	0	-	-
PR2	-	0	0	-	-
PR3	-	0	0	-	-
PR4	-	0	0	-	-
	*Rounded to whole days				

5.2.1.3 *Particular Matter ($PM_{2.5}$)*

Table 5.7 shows the comparison of annual mean $PM_{2.5}$ concentrations between the 'S2 2024 baseline', the 'S3 2024 with proposed development' and 'S4 2024 with proposed and committed development' scenarios at the assessed receptor locations.

The results as percentages of the AQAL (i.e. the UK AQS objectives) are also presented and are used in the determination of significance of impacts (based on the EPUK-IAQM guidance).

Predicted annual mean concentrations of $PM_{2.5}$ are all 'well below' the National Air Quality Strategy Objective concentration of 25µg/m^3 for all modelled scenarios. The proposed development is not predicted to cause any new exceedances of the annual mean $PM_{2.5}$ objective.

The changes in annual mean $PM_{2.5}$ concentrations both as a result of the proposed development and cumulatively with the other committed developments are between 0% and 2% of the AQAL. The impacts of the proposed development on nearby sensitive receptors in relation to $PM_{2.5}$ concentrations, are predicted to be 'negligible' at all receptor locations.

The results indicate that in the opening year of 2024, no exceedances of annual mean $PM_{2.5}$ concentrations are predicted with the proposed development at any of the proposed receptors.

Table 5.7: Predicted Annual Mean $PM_{2.5}$ Impact

Receptor ID	Annual Mean $PM_{2.5}$ Concentration								Impacts**
	AQ-S2 – 2024 Without Development		AQ-S3 - 2024 With Development		AQ-S4 – 2024 With Proposed and Committed Development		Change Between AQ-S2 and AQ-S3 as % of AQAL*	Change Between AQ-S2 and AQ-S4 as % of AQAL*	Cumulative Impact Classification
	$PM_{2.5}$ Concentration (µg/m³)	As % of AQAL	$PM_{2.5}$ Concentration (µg/m³)	As % of AQAL	$PM_{2.5}$ Concentration (µg/m³)	As % of AQAL			
ER1	9.4	38%	9.5	38%	9.5	38%	0	0	Negligible
ER2	9.4	38%	9.4	38%	9.4	38%	0	0	Negligible
ER3	9.6	38%	9.6	39%	9.6	39%	0	0	Negligible
ER4	9.9	40%	10.0	40%	10.0	40%	0	0	Negligible
ER5	10.2	41%	10.3	41%	10.3	41%	0	0	Negligible
ER6	10.3	41%	10.3	41%	10.3	41%	0	0	Negligible
ER7	12.6	50%	12.6	50%	13.0	52%	0	2	Negligible
ER8	13.1	52%	13.1	52%	13.4	54%	0	1	Negligible
ER9	12.1	49%	12.1	49%	12.4	50%	0	1	Negligible
ER10	13.5	54%	13.6	54%	14.0	56%	0	2	Negligible
ER11	12.3	49%	12.3	49%	13.0	50%	0	1	Negligible
PR1	-	-	9.5	38%	9.5	38%	-	-	-
PR2	-	-	9.5	38%	9.5	38%	-	-	-
PR3	-	-	9.5	38%	9.5	38%	-	-	-
PR4	-	-	9.5	38%	9.5	38%	-	-	-

*As recommended in the EPUK-IAQM guidance, percentages have been rounded to whole numbers. Changes less than 0.5% i.e. 0%, will be described as negligible.

**Impacts are determined in accordance with EPUK-IAQM guidance.

5.2.2 Summary

Overall, the model predicts that air quality will be good with or without the proposed and other committed developments, with pollutant concentrations at all but one existing receptor (ER10) being ‘well below’ the relevant long term objective concentrations under the ‘cumulative’ scenario, and concentrations at E10 only marginally exceeding this criterion and comfortably within the objective concentration.

The cumulative impact of the proposed and other committed developments on NO_2, PM_{10} and $PM_{2.5}$ concentrations at sensitive receptors including within the Witney Air Quality Management Area, is negligible, with the exception of the impact on annual mean nitrogen dioxide concentrations being ‘slight’ at receptor ER7 and ‘moderate’ at ER10.

The contribution of the proposed development to the ‘moderate’ impact at ER10 is ‘negligible’, and this impact is overwhelmingly due to the other committed developments, and would be expected whether consent for the proposed development is granted or not.

The model predicts that air quality at the proposed development site will be good and future occupants are not predicted to be exposed to poor air quality exceeding the UK AQS objectives.

6 MITIGATION MEASURES & RESIDUAL IMPACTS

6.1 Construction Phase

The dust emitting activities outlined in Section 5.1 can be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated.

It is recommended that an appropriate selection of best practice mitigation measures are implemented to minimise the impact of construction traffic moving to and from site on local air quality where practicable. Such measures may include:

- Considering mechanisms to minimise the number of vehicle movements taking place to and from the site;
- Minimising on-site parking;
- Providing secure cycle parking and encouraging the use of public transport; and
- Considering enforcing requirements for non-road mobile machinery (NRMM) to comply with the NO_x, particulate matter and carbon monoxide emissions standards specified in the EU Directive 97/68/EC and subsequent amendments as a minimum, where they have net power of between 37kW and 560kW. The emissions standards vary depending on the net power the engine produces.

A dust management plan (DMP) or a dust and air quality-related contribution to a construction environmental management plan (CEMP) should be prepared incorporating the mitigation measures recommended at Appendix C of this document.

With implementation of the proposed construction phase mitigation measures, the residual impacts are considered to be negligible.

6.2 Operational Phase

Air quality at the proposed development site is likely to be good and exposure mitigation measures are not considered necessary.

The cumulative impact of increased road traffic exhaust emissions generated by the proposed development and other committed developments was assessed as ‘negligible’ for most pollutants and receptors, but one ‘moderate’ impact on annual mean NO_2 concentrations at an existing receptor in the Witney AQMA was predicted, though the pollutant concentration predicted is substantially within the objective level.

Best practice measures will be used to minimise the impact of the development on local air quality, including:

- The preparation of a travel plan to promote and encourage sustainable transport options (public transport, cycling and walking); and
- Provision of electric vehicle charge points/infrastructure at each property; and

- Consideration should be given to electric domestic space and water heating where practicable, but as a minimum all gas-fired boilers to be ‘low NOx’ (<40mgNOx /kWh).

7 CONCLUSIONS

An air quality assessment for a proposed development on the Land South of Burford Road, Minster Lovell has been undertaken with reference to existing air quality in the area and relevant air quality legislation, policy, and guidance.

Construction phase impacts were assessed following the IAQM construction dust guidance. Mitigation measures are recommended to reduce the risk of dust and particulate matter being generated and re-suspended. With implementation of the appropriate measures, no significant impacts are anticipated during the construction phase.

The principal air quality impact once the proposed development is complete and occupied is likely to be exhaust emissions from increased traffic on local roads. An assessment of operational phase impacts has been undertaken using the ADMS-Roads atmospheric dispersion model.

Concentrations of the key pollutants (NO_2, PM_{10} and $PM_{2.5}$) were predicted at relevant receptor locations for the base year and for 2024 without and with the proposed development.

Air quality at the proposed development site is likely to be good, with all pollutants assessed 'well below' the relevant air quality objective concentrations, and exposure mitigation measures are not considered necessary.

The cumulative impact of increased road traffic exhaust emissions generated by the proposed development and other committed developments was assessed as 'negligible' for most pollutants and receptors, but one 'slight' and one 'moderate' impact on annual mean NO_2 concentrations at an existing receptor in the Witney AQMA were predicted, though in both cases the pollutant concentrations predicted are substantially within the objective levels.

The contribution of the proposed development to the single 'moderate' impact is 'negligible', and this impact is overwhelmingly due to the other committed developments, and would therefore be likely whether consent for the proposed development is granted or not.

Overall, the impact of the proposed development on local air quality, including within the Witney AQMA is considered unlikely to be significant.

Nevertheless, best practice measures will be used to mitigate and minimise the impact of the development on local air quality, including:

- Travel plan to promote and encourage sustainable transport options (public transport, cycling and walking); and
- Provision of electric vehicle charge points/infrastructure at each property; and

- Consideration should be given to electric domestic space and water heating where practicable, but as a minimum all gas-fired boilers to be ‘low NOx’ (<40mgNOx /kWh).

Based on the results of the assessment, and with the mitigation measures proposed, it is judged that the proposed development meets relevant national and local planning policies and will not result in a significant adverse impact on local air quality.

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APPENDIX A
CONSTRUCTION DUST ASSESSMENT METHODOLOGY

This appendix contains the construction dust assessment methodology used in the assessment.

To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM construction dust guidance. The assessment follows the steps recommended in the guidance.

Step 1: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

- a 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor':
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Step 2A: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total building volume >50,000m^3, potentially dusty construction material, on-site crushing and screening, demolition activities >20m above ground level;
- **Medium**: Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10m – 20m above ground level; and
- **Small**: Total building volume <20,000m^3, construction material with low potential for dust release, demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total site area >10,000m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100,000 tonnes;
- **Medium**: Total site area 2,500 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8m in height, total material moved 20,000 – 100,000 tonnes; and

- **Small**: Total site area < 2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: Total building volume >100,000m^3, on site concrete batching;
- **Medium**: Total building volume 25,000 – 100,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- **Small**: Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: >50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium**: 10 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and
- **Small**: <10 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and
- Site-specific factors, such as whether here are natural shelters such as trees, to reduce the risk of wind-blown dust.

Table A1 has been used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of the Area Surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	• Users can reasonably expect enjoyment of a high level of amenity. • The appearance, aesthetics or value of their property would be diminished by soiling. • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) • Examples include residential properties, hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.	• Locations with an international or national designation *and* the designated features may be affected by dust soiling. • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • Examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home. • The appearance, aesthetics or value of their property could be diminished by soiling. • The 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. • Examples include parks and places of work.	• Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. • Locations with a national designation where the features may be affected by dust deposition. • Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
Low	• The enjoyment of amenity would not reasonably be expected. • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations with a local designation where the features may be affected by dust deposition. • Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A2 to A4 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the IAQM construction dust guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A2: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distances from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table A3: Sensitivity of the area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

Receptor Sensitivity	Distances from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

<u>Step 2C</u>: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A5 to A7 indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table A6: Risk of Dust Impacts from Earthworks/Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table A7: Risk of Dust Impacts from Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

APPENDIX B – OPERATIONAL PHASE IMPACT SIGNIFICANCE CRITERIA

This appendix contains the significance criteria used in the assessment for the operational impact assessment from the 2017 EPUK-IAQM guidance.

To assess the impacts of a development on the surrounding area, the EPUK-IAQM 2017 guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table B1 presents the suggested framework, provided within the EPUK/IAQM guidance, for describing the impacts.

Table B1: Impact Descriptors for Individual Receptors

Long term average concentration at receptors in assessment year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes

AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy Objectives.

Where the % change in concentrations is <0.5%, the change is described as ‘negligible’ regardless of the concentration.

Where concentrations increase the impact is described as adverse, and where it decrease as beneficial.

The EPUK/IAQM guidance notes that the criteria in Table C1 should be used to describe impacts at individual receptors and should only be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, taking into account several factors, including:

- 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.

The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the severity of impacts.

APPENDIX C
CONSTRUCTION DUST MITIGATION MEASURES

Site-specific mitigation measures are divided into general measures, applicable to all sites and measures specific to demolition, earthworks, construction and trackout. Depending on the level of risk assigned to each site, different mitigation is assigned. The method of assigning mitigation measures as detailed in the IAQM guidance has been used.

For those mitigation measures that are general, the highest risk has been applied. In this case, the 'medium risk' site mitigation measures have been applied, as determined by the dust risk assessment in Section 5. There are two categories of mitigation measure – 'highly recommended' and 'desirable', which are indicated according to the dust risk level identified in Table 5.3. Desirable measures are presented in *italics*.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of people 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.

Dust Management

- Develop and implement a DMP, which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/ or visual inspections.

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 local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site and the action taken to resolve the situation in the log book.

Monitoring

- *Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.*
- Carry out regular site inspections to monitor compliance with the dust management plan, record inspection results, and make an inspection log available to the local authority when asked.

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences.

Preparing and maintaining the site

- 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 the site is 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 on site. If they are being re-used on-site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles/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.
- *Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).*
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- *Implement a Travel plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).*

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires or burning of waste material.

Specific to Demolition

- *Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).*
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can provide fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Specific to 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.*

Specific to Construction

- *Avoid scabbling (roughening of concrete surfaces) if possible.*
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- *Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.*
- *For similar supplies of fine powder material ensure bags are sealed after use and stored appropriately to prevent dust.*

Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid any dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

- 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 10 m from the receptors where possible.

APPENDIX D
ROAD TRAFFIC DATA

This appendix contains the traffic data used in the dispersion modelling assessment. The data was provided by the traffic consultants. Included are traffic flow data in AADT and the percentage Heavy Duty Vehicles (HDV), the speed included for each road link and the diurnal profile used. Reduced speeds were used at junctions, roundabout, roads with traffic light and pedestrian lane.

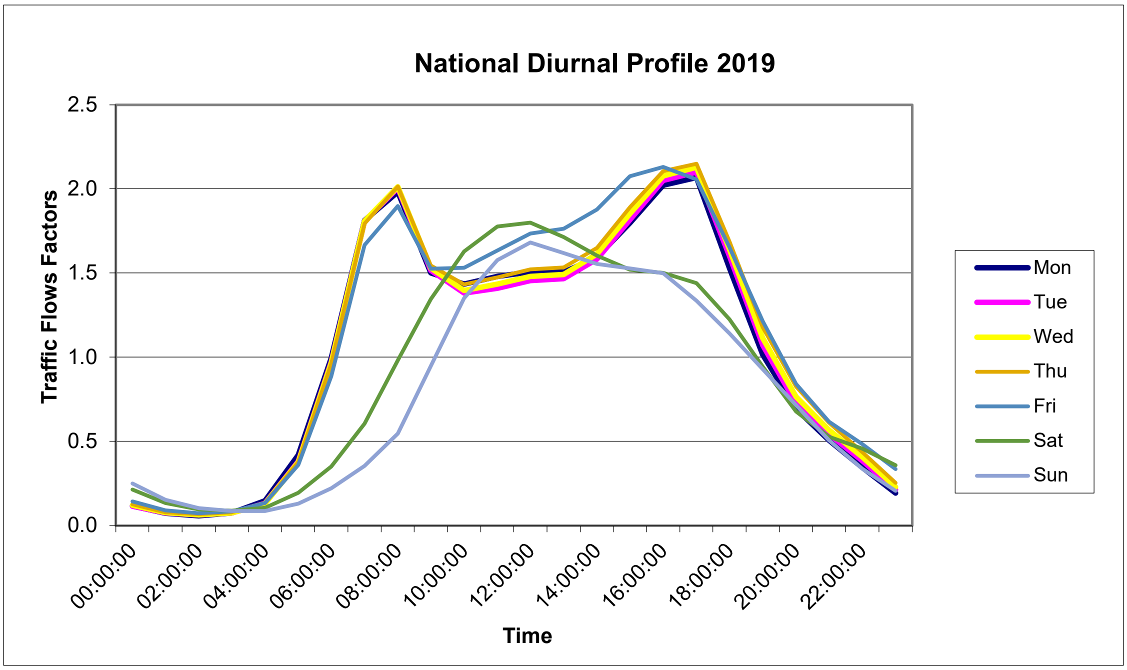
Table D1 24-hour Traffic Flow (AADT) and Speed Data used in the Dispersion Modelling Assessment

Figure D1 Diurnal Profile Included in the Dispersion Modelling Assessment

Table D1: 24-hour Traffic Flow (AADT) and Speed Data used in the Dispersion Modelling Assessment

Ref	Road Link	Average Speed (kph)	(S1) 2019 Base year		(S2) 2024 Without Development		(S3) 2024 With Development		(S4) 2024 With Committed and Proposed Development	
			Total AADT	HDV%	Total AADT	HDV%	Total AADT	HDV%	Total AADT	HDV%
1	B407 Burford Road East	64	4966	2.16	5115	2.16	5779	2.16	5779	2.16
2	B407 Burford Road West	96	4966	2.16	5115	2.16	5157	2.16	5157	2.16
3	B407 East of Brize Norton Road	64	10219	4.09	10525	4.09	10892	4.09	10892	4.09
4	Brize Norton Road	48	5880	3.30	6056	3.30	6352	3.30	6352	3.30
5	A4095 Mill Street	48	10293	1.27	10601	1.27	10706	1.27	14707	1.27
6	A4095 Bridge Street	48	25028	3.95	25777	3.95	25882	3.95	28678	3.95
7	A4095 Woodgreen	48	14148	3.40	14571	3.40	14677	3.40	19118	3.40
8	High Street	48	14095	5.63	14490	5.63	14703	5.63	14734	5.63
9	B4022 Newland	48	8479	5.66	8717	5.70	8738	5.70	8738	5.70
10	B4022 West End	48	6094	1.94	6265	1.90	6287	1.90	6287	1.90

Figure D1 Diurnal Profile Included in the Dispersion Modelling Assessment



APPENDIX E
MODELLING OF OPERATIONAL PHASE – VERIFICATION METHODOLOGY

The dispersion model results were verified following the relevant guidance in LAQM TG.16. Predicted results from a dispersion model may differ from measured concentrations for a variety of reasons, these are identified in LAQM TG.16 to include:

- Estimates of background concentrations;
- Meteorological data uncertainties;
- Uncertainties in source data for example, traffic flow data, stack emissions and emission factors;
- Model input parameters such as roughness length, minimum Monin-Obukhov and overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

As discussed in section 3, NAS1, NAS2 and NAS3 were used for the dispersion model verification against traffic data. Tables E1- E2 present details of the monitoring location used and the dispersion model verification process.

Table E1: Monitoring Location used in Verification Process

Receptor ID	Receptor Location	Site Type	Grid Reference		Height (m)
			X	Y	
NAS1	25 Bridge Street, Witney	Roadside	435856.7	210308.6	2.29
NAS2	10 Bridge Street, Witney	Roadside	435810	210236.6	2.56
NAS3	20 Bridge Street, Witney	Roadside	435860.1	210293.4	2.33

Table E2: Modelled versus Monitored NO_x/NO_2

Site	Monitored total NO_2	Background NO_2	Monitored Road Contribution NO_x	Modelled road contribution NO_x	Ratio of Modelled and Measured Road NO_x
NAS1	44.8	8.89	75.14	18.16	4.1
NAS2	37.1	8.89	56.91	18.61	3.1
NAS3	41.9	8.89	68.12	20.45	3.3
Overall Adjustment Factor					3.49

An adjustment factor of **3.49** was obtained during the verification process and applied to the modelled road-NO_x component predicted at each receptor. The verified annual mean modelled road contribution NO_x concentrations have then been converted into annual mean road NO_2 by using the Defra NO_x to NO_2 spreadsheet; a comparison of monitored and model adjusted NO_2 is presented in Table E3. This shows that, following adjustment, the modelled NO_2 result is within +/- 25% of monitored NO_2 concentrations. In accordance with the LAQM TG.16 guidance, it is not considered that further verification is required.

Table E3: Difference between Monitored and Modelled Following Adjustment

Site	Adjustment factor for modelled road contribution	Adjusted modelled road contribution NO_x	Modelled total NO_2 (based on empirical NO_x/NO_2 relationship)	Monitored Total NO_2	% Difference [(modelled - monitored)/monitored] x100
NAS1	3.94	63.32	39.87	44.8	-11
NAS2	3.94	64.92	40.55	37.1	9
NAS3	3.94	71.33	43.23	41.9	3

Measured annual PM_{10} and $PM_{2.5}$ concentrations were not available therefore, as per the recommendations in LAQM.TG.16, the same factor was applied to the modelled PM_{10} and $PM_{2.5}$ concentrations.

Verified model results are shown in Appendix F.

APPENDIX F
MODEL RESULTS

Table F1: Predicted Pollutant Concentrations at Proposed Receptor Locations (2019 meteorological data, background concentrations included): S1, S2, S3 and S4

Receptor	Annual Mean NO_2 Concentrations (µg/m^3)				Annual Mean PM_{10} Concentrations (µg/m^3)				Number of days when 24 Hour PM_{10} Concentrations >50µg/m^3 (days)				Annual Mean $PM_{2.5}$ Concentrations (µg/m^3)			
	S1 2019	S2 2024	S3 2024	S4 2024	S1 2019	S2 2024	S3 2024	S4 2024	S1 2019	S2 2024	S3 2024	S4 2024	S1 2019	S2 2024	S3 2024	S4 2024
ER1	9.81	8.97	9.14	9.14	15.14	15.14	15.19	15	0	0	0	0	9.46	9.44	9.47	9.47
ER2	9.45	8.75	8.89	8.89	15.07	15.07	15.11	15	0	0	0	0	9.42	9.40	9.43	9.43
ER3	11.02	9.73	10.01	10.01	15.41	15.40	15.49	15	0	0	0	0	9.61	9.59	9.64	9.64
ER4	13.66	11.41	11.91	11.91	15.98	15.96	16.13	16	0	0	0	0	9.93	9.90	10.00	10.00
ER5	16.75	13.26	13.58	13.58	16.52	16.49	16.59	17	1	0	1	1	10.25	10.20	10.25	10.25
ER6	16.44	13.21	13.39	13.39	16.66	16.63	16.69	17	1	1	1	1	10.31	10.25	10.29	10.29
ER7	32.97	23.97	24.15	26.24	19.32	19.23	19.28	20	3	3	3	3	12.74	12.58	12.61	12.98
ER8	37.24	26.76	26.95	28.81	20.17	20.09	20.15	21	4	4	4	4	13.25	13.07	13.10	13.42
ER9	28.36	21.00	21.06	22.43	18.50	18.43	18.44	19	2	2	2	2	12.26	12.13	12.14	12.38
ER10	41.52	29.75	29.84	32.04	20.98	20.93	20.95	22	5	5	5	6	13.73	13.54	13.56	13.95
ER11	30.60	22.45	22.53	24.27	18.72	18.66	18.68	19	2	2	2	3	12.40	12.27	12.28	12.58
PR1	-	-	9.43	9.43	-	-	15.25	15	-	-	0	0	-	-	9.51	9.51
PR2	-	-	9.26	9.26	-	-	15.20	15	-	-	0	0	-	-	9.48	9.48
PR3	-	-	9.13	9.14	-	-	15.17	15	-	-	0	0	-	-	9.46	9.46
PR4	-	-	9.56	9.57	-	-	15.31	15	-	-	0	0	-	-	9.54	9.54
Air Quality Objective	**40**				**40**				**35 days**				**25**			