REC
Resource & Environmental Consultants Ltd

Air Quality Assessment
Milton Park Local Development Order

REC Report: 33071p2r2
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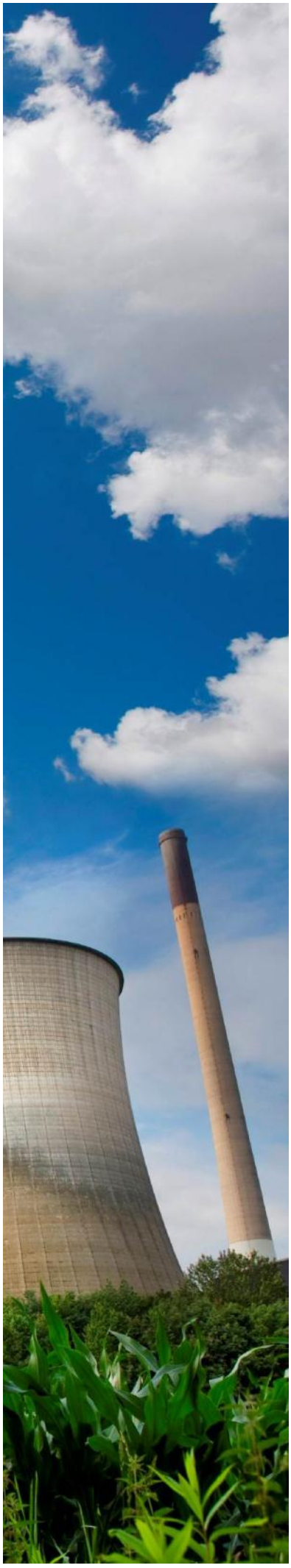
On Behalf of Vale of White Horse District Council and MEPC



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REPORT ISSUE

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EXECUTIVE SUMMARY

Resource and Environmental Consultants Ltd has been instructed by Terence O'Rourke on behalf of Vale of White Horse District Council and MEPC to undertake an Air Quality Assessment for Milton Park, Oxford. The Milton Park Local Development Order is a partnership between Vale of White Horse District Council as the local planning authority, and MEPC Milton Park as the landowner. Terence O'Rourke Ltd has been instructed by MEPC to help coordinate the Local Development Order process.

The purpose of the Milton Park Local Development Order is to enable a vibrant business area, promoting employment-generating uses at the business park, to maximise the success of the Science Vale UK Enterprise Zone and give greater confidence to business to invest in Milton Park. It is being prepared in accordance with the Town and Country Planning (Development Management Procedure) (England) Order (2010).

The Milton Park Local Development Order will simplify planning control to give greater flexibility for businesses to develop new premises and facilities or adapt existing premises, whilst maintaining a successful and diverse mix of employment generating uses. Development will only be permitted where the local authority is satisfied that it is in accordance with the permitted uses and development parameters set out in the Order. Development proposals not in accordance with the provisions of the Order will be determined by a planning application.

The Local Development Order has been designed to be effective for a period of 15 years to reflect the typical timescale of business leases and give greater certainty for potential investors.

Atmospheric emissions associated with any future development have the potential to cause impacts at sensitive receptors. An assessment was therefore undertaken to consider baseline conditions in the vicinity of the site and determine suitable parameters for inclusion within the Local Development Order.

Baseline air quality conditions were identified in the vicinity of the site and potential impacts as a result of construction phase dust impacts and operational phase road vehicle exhaust emission impacts considered.

Based on the assessment results, the following parameters were defined for inclusion within the Local Development Order:

> "The potential risk of dust impacts associated with each individual development should be determined as high, medium or low in accordance with the criteria outlined in the following Table.

Construction Dust - Risk Rating

Risk	Criteria
High	• Total site area greater than 10,000m^2 • More than 10 heavy earth moving vehicles active at any one time • More than 100,000 tonnes of material moved • Total building volume greater than 100,000m^3

Risk	Criteria
	• More than 100 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	• Total site area 2,500m^2 to 10,000m^2 • 5 to 10 heavy earth moving vehicles active at any one time • Total material moved 20,000 tonnes to 100,000 tonnes • Total building volume 25,000m^3 to 100,000m^3 • 25 to 100 HDV trips per day • Unpaved road length 50m to 100m
Low	• Total site area less than 2,500m^2 • Less than 5 heavy earth moving vehicles active at any one time • Total material moved less than 10,000 tonnes • Earthworks during wetter months • Total building volume less than 25,000m^3 • Less than 25 HDV trips per day • Unpaved road length less than 50m

Dependant on the determined dust risk rating site, specific mitigation measures to reduce potential dust impacts should be identified in accordance with the Greater London Authority 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition' document. These should then be implemented throughout the construction phase."

"For any individual development that exceeds the following floorspace the number of daily vehicle movements to be generated by the development should be calculated:

- B1 - 6,100m^2;
- B2 - 13,300m^2; or,
- B8 - 31,500m^2.

An Air Quality Assessment is required in the event that the results of the calculation indicate traffic flows exceed either of the following criteria:

- Total daily generated trips exceed 1,000; or,
- Daily Heavy Duty Vehicle generated trips exceed 200.

The Air Quality Assessment should predict annual mean nitrogen dioxide concentrations at sensitive receptor locations both with and without the development in place and determine the significance of impact in accordance with the Environmental Protection UK 'Development Control: Planning for Air Quality (2010 update)' guidance. Should the assessment indicate impacts of negligible or slight adverse significance then the development should be permitted. If other impacts are predicted then appropriate mitigation should be included within the scheme design to reduce effects to an acceptable level."

It is considered the implementation of the above parameters will control air quality impacts associated with the Local Development Order to an acceptable level.

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1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd has been instructed by MEPC Milton Park to undertake an Air Quality Assessment for Milton Park, Oxford. The Milton Park Local Development Order (LDO) is a partnership between Vale of White Horse District Council (VoWHDC) as the local planning authority, and MEPC Milton Park as the landowner. Terence O'Rourke Ltd has been instructed by MEPC to help coordinate the LDO process.

The purpose of the Milton Park LDO is to enable a vibrant business area, promoting employment-generating uses at the business park, to maximise the success of the Science Vale UK Enterprise Zone and give greater confidence to business to invest in Milton Park. It is being prepared in accordance with the Town and Country Planning (Development Management Procedure) (England) Order (2010).

The Milton Park LDO will simplify planning control to give greater flexibility for businesses to develop new premises and facilities or adapt existing premises, whilst maintaining a successful and diverse mix of employment generating uses. Development will only be permitted where the local authority is satisfied that it is in accordance with the permitted uses and development parameters set out in the Order. Development proposals not in accordance with the provisions of the Order will be determined by a planning application.

The LDO has been designed to be effective for a period of 15 years to reflect the typical timescale of business leases and give greater certainty for potential investors.

Atmospheric emissions associated with any future development have the potential to cause air quality impacts at sensitive receptors. An assessment was therefore undertaken to consider baseline conditions in the vicinity of the site and determine suitable parameters for inclusion within the LDO.

1.2 Site Location and Context

Milton Park is located between Didcot and Abingdon by the junction of the A34 and A4130, at National Grid Reference (NGR): 449095, 191816. Reference should be made to Figure 1 for a location plan.

Any future development may result in air quality impacts as a result of the following:

- Construction phase - fugitive dust emissions; and,
- Operational phase - road vehicle exhaust emissions.

These have the potential to cause increases in ambient pollution levels within the vicinity of the site. Baseline conditions have therefore been defined within this report and relevant parameters identified in order to ensure atmospheric emissions associated with any future development do not result in air quality impacts at sensitive locations.

1.3 Limitations

This report has been produced in accordance with REC's standard terms of engagement. REC has prepared this report solely for the use of the Client and those parties with whom a

warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 AIR QUALITY LEGISLATION AND POLICY

2.1 European Legislation

European Union (EU) air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidated previous legislation which was designed to deal with specific pollutants in a consistent manner and provided new air quality objectives for particulate matter with an aerodynamic diameter of less than 2.5µm ($PM_{2.5}$). The consolidated Directives include:

- Directive 99/30/EC - the First Air Quality "Daughter" Directive - sets ambient Air Quality Limit Values (AQLVs) for nitrogen dioxide (NO_2), oxides of nitrogen (NO_x), sulphur dioxide, lead and particulate matter with an aerodynamic diameter of less than 10µm (PM_{10});
- Directive 2000/69/EC - the Second Air Quality "Daughter" Directive - sets ambient AQLVs for benzene and carbon monoxide; and,
- Directive 2002/3/EC - the Third Air Quality "Daughter" Directive - seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC - sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

2.2 UK Legislation

The Air Quality Regulations (2010) came into force on 11th June 2010 and transpose the EU Directive 2008/50/EC into UK law. AQLVs were published in these regulations for 7 pollutants, as well as Target Values for an additional 5 pollutants. Table 1 presents the AQLVs for pollutants considered within this assessment.

Table 1 Air Quality Limit Values

Pollutant	Air Quality Limit Value	
	Concentration (µg/m^3)	Averaging Period
NO_2	40	Annual mean
	200	1-hour mean; not to be exceeded more than 18 times a year
PM_{10}	40	Annual mean
	50	24-hour mean; not to be exceeded more than 35 times a year

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.

2.3 Local Air Quality Management

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 considering present and likely future air quality against the AQOs. If it is predicted that levels at sensitive locations where members of the public are regularly present for the relevant averaging period are likely to be exceeded, the LA is required to declare an AQMA. For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.4 Dust

The main requirements with respect to dust control from industrial or trade premises not regulated under the Environmental Permitting (England and Wales) Regulations (2010) 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."

Enforcement of the Act, in regard to nuisance, is currently under the jurisdiction of the local Environmental Health Department, whose officers are deemed to provide an independent evaluation of nuisance. If the LA is satisfied that a statutory nuisance exists, or is likely to occur or happen again, it must serve an Abatement Notice under Part III of the Environmental Protection Act (1990). Enforcement can insist that there be no dust beyond the boundary of the works. The only defence is to show that the process to which the nuisance has been attributed and its operation are being controlled according to best practice measures.

2.5 National Planning Policy

The National Planning Policy Framework (NPPF)[2] was published on 27th March 2012 and sets out the Government's core policies and principles with respect to land use planning, including air quality. The document includes the following considerations which are relevant to this assessment:

> "The planning system should contribute to and enhance the natural and local environment by: […]
>
> Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA, 2007.
[2] National Planning Policy Framework, Department for Communities and Local Government, 2012.

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

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

2.6 Local Planning Policy

VoWHDC's planning and development policy is governed by the Local Plan[3]. The VoWHDC Local Plan was formally adopted in 2006 and sets out the spatial vision, objectives, development strategy and a series of key policies that will guide the scale, location and type of development in the district until such time when it will be superseded by a Core Strategy. As such, the policies contained within the Local Plan provide the current basis for the determination of planning applications within VoWHDC's area of jurisdiction.

A review of the Local Plan indicated the following policy in relation to air quality that is relevant to this assessment:

> "Policy DC10
>
> Development will not be permitted if it would unacceptably harm the amenities of neighbouring properties and the wider environment in terms of:
>
> i) Loss of privacy, daylight or sunlight;
> ii) Dominance or visual intrusion;
> iii) Noise or vibration;
> iv) Smell, dust, heat, gases or other emissions;
> v) Pollution, contamination or the use of or storage of hazardous substances; and,
> vi) External lighting."

This policy has been considered throughout this report by assessing potential air quality impacts as a result of the proposed LDO and defining suitable parameters to prevent adverse impacts from future development.

[3] Vale of White Horse District Council Local Plan 2011, Vale of White Horse District Council, 2006.

3.0 METHODOLOGY

Any development associated with the LDO has the potential to cause air quality impacts during the construction and operational phases. These have been assessed in accordance with the following methodology.

3.1 Construction Phase Assessment

There is the potential for fugitive dust emissions to occur as a result of construction phase activities. The significance of effects will depend on the scale and nature of the individual developments covered by the LDO, as well as the distance to sensitive receptor locations. An overarching assessment using the principles of the methodology outlined within the Institute of Air Quality Management (IAQM) document 'Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance'[4] has therefore been undertaken in order to define suitable parameters for inclusion within the LDO.

3.2 Operational Phase Assessment

The development has the potential to impact on existing air quality as a result of road traffic exhaust emissions, such as NO_2 and PM_{10}, associated with vehicles travelling to and from the site. Potential impacts have been defined by predicting pollutant concentrations at sensitive locations using dispersion modelling for the following scenarios:

- 2030 (LDO completion year) do-minimum (predicted traffic flows in the anticipated LDO completion year should the development not proceed); and,
- 2030 (LDO completion year) do-something (predicted traffic flows in the anticipated LDO completion year should the development be completed).

Dispersion modelling was undertaken using ADMS-Roads based on traffic data provided by Halcrow Group Ltd, the Transport Engineers for the project. Reference should be made to Appendix II for assessment input data.

Receptors potentially sensitive to operational traffic exhaust emissions were identified within 200m of the affected highway network in accordance with the guidance provided within the Design Manual for Roads and Bridges (DMRB)[5] on the likely limits of pollutant dispersion from road sources. LAQM.TG(09)[6] provides the following examples of where annual mean AQLVs should apply:

- Residential properties;
- Schools;
- Hospitals; and,
- Care homes.

These were considered during the selection of receptor locations.

The sensitivity of each receptor was defined based on air quality conditions should the

[4] Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, Institute of Air Quality Management, 2011.
[5] Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.
[6] Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

development proceed and the criteria contained within Table 2. These are based upon the guidance provided within the Environmental Protection UK (EPUK) Development Control: Planning for Air Quality (2010 update)[7].

Table 2 Operational Traffic Exhaust Emissions - Receptor Sensitivity

Sensitivity	Description
Very high	Pollutant levels above environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean greater than 40µg/m^3
High	Pollutant levels between 90% and 100% of environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean 36 - 40µg/m^3
Medium	Pollutant levels between 75% and 90% of environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean 30 - 36µg/m^3
Low	Pollutant levels below 75% of environmental assessment criteria e.g. • NO_2 or PM_{10} annual mean below 30µg/m^3

The magnitude of change in pollutant concentrations was defined based on the criteria outlined in Table 3.

Table 3 Operational Traffic Exhaust Emissions - Magnitude of Change

Magnitude of Change	Change in Pollutant Level as Proportion of Assessment Criteria (%)
Large	Greater than 10
Medium	5 - 10
Small	1 - 5
Imperceptible	Less than 1

Impact significance was defined based on the interaction between the sensitivity of the affected receptor and the magnitude of change, as outlined in Table 4.

Table 4 Operational Traffic Exhaust Emissions - Significance of Impact

Sensitivity	Magnitude of Change			
	Imperceptible	Small	Medium	Large
Very high	Negligible	Slight	Moderate	Substantial
High	Negligible	Slight	Moderate	Moderate
Medium	Negligible	Negligible	Slight	Slight
Low	Negligible	Negligible	Negligible	Slight

[7] Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.

It should be noted that the criteria shown in Table 2 and Table 3 and the matrix shown in Table 4 are adapted from the EPUK Development Control: Planning for Air Quality (2010 update)[8] guidance document with sensitivity descriptors included to allow comparisons of various air quality impacts.

Following the prediction of impacts at discrete receptor locations the EPUK[9] document 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:

- Number of properties affected by significant air quality impacts and a judgement on the overall balance;
- Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant;
- The magnitude of changes and the descriptions of the impacts at the receptors;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced; and,
- The extent to which an objective or limit value is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3.

These factors were considered and an overall significance determined for the impact of operational phase road traffic emissions. It should be noted that 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 EPUK[10] guidance suggests the provision of details of the assessor's qualifications and experience. These are provided in Appendix III.

8 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.
9 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.
10 Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.

4.0 BASELINE

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

4.1 Local Air Quality Management

As required by the Environment Act (1995), VoWHDC has undertaken Review and Assessment of air quality within their area of jurisdiction. This process has indicated that annual mean concentrations of NO_2 are above the AQLV within the district. As such, two AQMAs have been declared, the closest of which to the proposed site is described as:

> "Abingdon AQMA - An area encompassing properties along the main road system in the centre of Abingdon. This includes part or all of Stert Street, Bridge Street, High Street, Stratton Way, Vineyard, West St Helens Street, Ock Street and Bath Street."

The development is located approximately 5.1km south of the AQMA. Due to the distance between the sites, it is not considered likely that the proposals would impact upon the AQMA. As such, it has not been considered further in the context of this assessment.

VoWHDC has concluded that concentrations of all other pollutants considered within the AQS are currently below the relevant AQLVs and, as such, no further AQMAs have been designated within the district.

4.2 Air Quality Monitoring

Monitoring of pollutant concentrations is undertaken by VoWHDC using continuous and periodic methods throughout their area of jurisdiction. A review of the most recent LAQM report[11] indicated the closest continuous monitor to the proposed development is 39 Stert Street, Abingdon at NGR: 449796, 197165. This is approximately 5.3km north of the site boundary at an urban background location within the Abingdon AQMA. Recent monitoring results are shown in Table 5.

Table 5 Automatic NO_2 Monitoring Results

Site	Annual Mean NO_2 Concentration (µg/m^3)			
	2008	2009	2010	2011
Abingdon	36.0	35.0	31.5	29.0

As shown in Table 5, the annual mean AQLV for NO_2 was not exceeded at the Abingdon monitoring site during recent years. Due to the distance between the automatic monitoring site and the proposed development, it is not considered likely that similar pollutant concentrations would be experienced at the two locations. As such, this data has not been considered further in the context of this assessment.

VoWHDC utilise passive diffusion tubes to monitor NO_2 concentrations throughout the district. There are no diffusion tubes in the proximity of the proposed development, with

[11] 2012 Air Quality Screening Assessment, Vale of White Horse District Council, 2012.

locations being confined to Abingdon, Botley, Faringdon and Wantage. However, VoWHDC also operate five background sites across the district. Recent monitoring results are shown in Table 6.

Table 6 VoWHDC Diffusion Tube NO_2 Monitoring Results

Site	NGR (m)		Annual Mean Concentration (µg/m^3)			
	X	Y	2008	2009	2010	2011
Langley Road	449583	198916	21.0	21.8	20.9	21.4
Turner Road	448900	196189	15.1	17.6	17.7	18.1
Hutchcombe Road	447711	205634	16.4	17.0	18.8	14.4
Folly View Road	428682	194571	13.4	12.8	13.6	13.2
Hampden Road	440409	188319	11.9	12.3	12.7	12.9

As shown in Table 6, the annual mean AQLV for NO_2 was not exceeded at any of the monitoring site during recent years, with background concentrations being relatively low. Due to the distance between the diffusion tubes and the proposed development, it is not considered likely that similar pollutant concentrations would be experienced at the relevant locations. As such, this data has not been considered further in the context of this assessment.

Milton Park lies close to the border of VoWHDC and South Oxfordshire District Council (SODC). As such, any development may impact upon air quality in SODC's area of jurisdiction and monitored pollutant concentrations in this area have also been considered.

SODC utilise passive diffusion tubes to monitor NO_2 concentrations in the vicinity of the site. A review of the most recent LAQM report[12] has identified nine diffusion tubes in Didcot, to the south-east of Milton Park. Recent monitoring results are shown in Table 7. Exceedences of the relevant AQLV are shown in **bold** text.

Table 7 SODC Diffusion Tube NO_2 Monitoring Results

Site	NGR (m)		Annual Mean NO_2 Concentration (µg/m^3)		
	X	Y	2008	2009	2010
20 Wantage Road	451780	189920	35.1	30.6	34.2
100 Park Road	451653	189384	25.2	24.7	26.4
96 Broadway	452908	190031	39.2	37.7	**42.0**
55 Broadway	453099	190031	**40.6**	38.0	38.9
Lune Close	453500	190384	25.0	23.8	24.3
Marsh Cottages	453533	190002	-	-	34.0

[12] 2010 Air Quality Progress Report, South Oxford District Council, 2010.

Site	NGR (m)		Annual Mean NO_2 Concentration ($\mu g/m^3$)		
	X	Y	2008	2009	2010
35/37 Broadway	453202	190047	-	-	31.1
77 Broadway	453020	190002	-	-	36.5
110 Broadway	452866	189981	-	-	39.3

As shown in Table 7, exceedences of the relevant AQLV were recorded at two sites on Broadway, Didcot in recent years. Comparison with the monitored results at Lune Close, an urban background site, indicates the elevated concentrations are likely to result from relatively high traffic flows on the local highway network.

4.3 Background Pollutant Concentrations

Predictions of 2010 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: 448500, 191500. Data for this location was downloaded from the DEFRA website[13] for the purpose of this assessment and is summarised in Table 8.

Table 8 Predicted Background Pollutant Concentrations

Pollutant	Predicted Background Concentration 2010 ($\mu g/m^3$)
NO_x	46.98
NO_2	27.02
PM_{10}	20.76

As shown in Table 8, background concentrations in the vicinity of the site are predicted to be below the AQLVs. Predicted 2010 background concentrations have been utilised in preference to more recent years as this is currently the only data set available from DEFRA.

4.4 Sensitive Receptors

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.

4.4.1 Dust Receptors

Receptors sensitive to potential dust impacts during earthworks and construction were identified from a desk-top study of the area up to 350m from the site boundary. This indicated residential properties to the north-west and south-west. Milton Park itself is commercial in nature and as such would not be considered sensitive to dust impacts.

[13] http://laqm.defra.gov.uk/maps/maps2010.html.

Reference should be made to Figure 2 for a graphical representation of potential dust receptor locations.

The sensitivity of the receiving environment to dust emissions was determined based on the IAQM guidance[14], as summarised in Table 9.

Table 9 Construction Dust - Receptor Sensitivity

Sensitivity	Examples	
	Human Receptors	**Ecological Receptors**
Very high	• Very densely populated area • More than 100 dwellings within 20m • Local PM_{10} concentrations exceed the AQLV • Contaminated buildings present • Very sensitive receptors (e.g. oncology units) • Works continuing in one area of the site for more than one year	• European designated site
High	• Densely populated area • 10 to 100 dwellings within 20m of site • Local PM_{10} concentrations close to the AQLV (e.g. annual mean 36 - 40µg/m^3) • Commercially sensitive horticultural land within 20m	• Nationally designated site
Medium	• Suburban or edge of town area • Less than 10 receptors within 20m • Local PM_{10} concentrations below the AQLV (e.g. annual mean 30 - 36µg/m^3)	• Locally designated site
Low	• Rural or industrial area • No receptors within 20m • Local PM_{10} concentrations well below the AQLV (less than 75%) • Wooded area between site and receptors	• No designations

Based on the criteria shown in Table 9 the sensitivity of the receiving environment to potential dust impacts was considered to be **medium**. This was because the site is situated in an out of town location, predicted background PM_{10} concentrations are well below the AQLV and there are no ecological designations within the assessment area.

4.4.2 Road Vehicle Exhaust Emission Sensitive Receptors

Receptors sensitive to potential road vehicle exhaust emission impacts were identified from a desk-top study and are summarised in Table 10.

[14] Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, Institute of Air Quality Management, 2011.

Table 10 Road Vehicle Exhaust Emission Sensitive Receptors

Receptor		NGR (m)	
		X	Y
R1	Residential – Pembroke Lane, Milton	448422	192008
R2	Residential – MacKenzie Avenue, Milton	448725	190952
R3	Residential – Trenchard Avenue, Milton	448343	191197
R4	Residential – Mendip Heights, Milton	451423	190907
R5	Residential – High Street, Milton	448608	192311
R6	Residential – Harwell Road, Sutton Courtney	449968	192698
R7	Residential – Great Western Drive, Didcot	452231	190622
R8	Residential – Great Western Drive, Didcot	451981	190712
R9	Residential – Foxhall Manor Park, Didcot	451542	191138
R10	Residential – Foxhall Manor Park, Didcot	451842	191033
R11	Residential – Trenchard Avenue, Milton	448502	191114
R12	School – Milton C of E Primary School	448299	191002
R13	School – Sutton Courtney All Saints School	449832	192555

The sensitive receptors identified in Table 10 represent worst-case locations. However, this is not an exhaustive list and there may be other locations within the vicinity of the site that may experience air quality impacts as a result of the proposed development that have not been individually identified above. Reference should be made to Figure 4 for a graphical representation of road vehicle exhaust emission sensitive receptor locations.

Receptor sensitivity was defined based upon the methodology outlined in Table 2 and predicted pollutant concentrations for the first potential development opening year of 2013. These are detailed within Table 11.

Table 11 Road Vehicle Exhaust Emission Receptor Sensitivity

Receptor	NO_2		PM_{10}	
	Predicted Annual Mean Concentration ($\mu g/m^3$)	Sensitivity	Predicted Annual Mean Concentration ($\mu g/m^3$)	Sensitivity
R1	28.24	Low	20.30	Low
R2	28.78	Low	20.47	Low
R3	30.52	Medium	20.80	Low
R4	28.61	Low	20.34	Low

Receptor	NO_2		PM_{10}	
	Predicted Annual Mean Concentration ($\mu g/m^3$)	**Sensitivity**	**Predicted Annual Mean Concentration ($\mu g/m^3$)**	**Sensitivity**
R5	27.84	Low	20.20	Low
R6	27.72	Low	20.19	Low
R7	28.67	Low	20.37	Low
R8	29.25	Low	20.33	Low
R9	34.74	Medium	21.26	Low
R10	28.46	Low	20.33	Low
R11	29.91	Low	20.71	Low
R12	26.85	Low	20.05	Low
R13	26.06	Low	19.89	Low

As indicated in Table 11, receptor sensitivity to changes in annual mean NO_2 concentrations was defined as **medium** at two locations and **low** at eleven. Sensitivity to changes in annual mean PM_{10} concentrations was defined as **low** at all receptor locations.

5.0 ASSESSMENT

There is the potential for air quality impacts as a result of the construction and operation of any development associated with the LDO. These are assessed in the following Sections.

5.1 Construction Phase

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

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.

As indicated in Table 8, background PM_{10} concentrations at the development site are low and a significant increase in emissions would be required to result in AQLV exceedences. The desk-study undertaken to inform the baseline identified sensitive receptors to the north-west and south-west of the site, and defined the receiving environment as **medium** sensitivity.

The significance of air quality impacts associated with fugitive dust emissions during the construction phase will depend on the scale and nature of each individual development permitted under the LDO. In order to protect residents it is proposed that each proposal is defined as a **low**, **medium** or **high** risk site, in accordance with the criteria outlined in Table 12, which has been adapted from the IAQM[15] guidance.

Table 12 Construction Dust - Risk Rating

Risk	Criteria
High	• Total site area greater than 10,000m^2 • More than 10 heavy earth moving vehicles active at any one time • More than 100,000 tonnes of material moved • Total building volume greater than 100,000m^3 • More than 100 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	• Total site area 2,500m^2 to 10,000m^2 • 5 to 10 heavy earth moving vehicles active at any one time • Total material moved 20,000 tonnes to 100,000 tonnes • Total building volume 25,000m^3 to 100,000m^3 • 25 to 100 HDV trips per day • Unpaved road length 50m to 100m

[15] Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance, Institute of Air Quality Management, 2011.

Risk	Criteria
Low	• Total site area less than 2,500m^2 • Less than 5 heavy earth moving vehicles active at any one time • Total material moved less than 10,000 tonnes • Earthworks during wetter months • Total building volume less than 25,000m^3 • Less than 25 HDV trips per day • Unpaved road length less than 50m

Dependant on the determined dust risk rating site, specific mitigation measures to reduce potential dust impacts should be identified in accordance with the Greater London Authority 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition'[16]. This provides suitable control measures for **low**, **medium** or **high** risk sites and is considered to represent best practice measures for the mitigation of construction dust impacts.

Based on the implementation of the relevant mitigation measures, the residual significance of potential impacts from dust generating activities associated with any future development is considered to be **negligible** at all sensitive receptor locations in the vicinity of the site.

5.2 Operational Phase Assessment

Additional vehicle movements associated with the operation of any development associated with the LDO will generate exhaust emissions, such as NO_2 and PM_{10}, on the local and regional road networks. An assessment of operational phase road vehicle exhaust emissions was therefore undertaken using dispersion modelling in order to quantify potential changes in pollutant concentrations at sensitive locations in the vicinity of the site.

The assessment considered the following scenarios:

- 2030 Do-minimum; and,
- 2030 Do-something.

The "do-minimum" (i.e. without development) scenario was representative of baseline traffic data for 2030. The "do-something" scenario was representative of baseline traffic data for 2030 in addition to predicted operational traffic associated with the LDO.

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

5.2.1 Nitrogen Dioxide

Annual mean NO_2 concentrations were predicted at sensitive receptor locations for each scenario and are summarised in Table 13.

[16] Best Practice Guidance: Control of Dust and Emissions from Construction and Demolition, Greater London Authority, 2006.

Table 13 Predicted Annual Mean NO_2 Concentrations

Sensitive Receptor		Predicted Annual Mean NO_2 Concentration ($\mu g/m^3$)		
		Do-minimum	Do-something	Change
R1	Residential – Pembroke Lane, Milton	28.24	28.24	0.00
R2	Residential – MacKenzie Avenue, Milton	28.74	28.78	0.04
R3	Residential – Trenchard Avenue, Milton	30.53	30.52	-0.01
R4	Residential – Mendip Heights, Milton	28.55	28.61	0.06
R5	Residential – High Street, Milton	27.84	27.84	0.00
R6	Residential – Harwell Road, Sutton Courtney	27.72	27.72	0.00
R7	Residential – Great Western Drive, Didcot	28.75	28.67	-0.08
R8	Residential – Great Western Drive, Didcot	29.28	29.25	-0.03
R9	Residential – Foxhall Manor Park, Didcot	34.80	34.74	-0.06
R10	Residential – Foxhall Manor Park, Didcot	28.44	28.46	0.02
R11	Residential – Trenchard Avenue, Milton	29.88	29.91	0.03
R12	School – Milton C of E Primary School	26.86	26.85	-0.01
R13	School – Sutton Courtney All Saints School	26.06	26.06	0.00

As indicated in Table 13, predicted annual mean NO_2 concentrations were below the relevant AQLV at all sensitive receptors for both scenarios considered.

It is noted that concentrations were predicted to both increase and decrease at various receptor locations. The following explanation was offered by Halcrow Group Ltd, the Transport Engineers for the project, to clarify the results:

> "Our [transport] modelling work shows that the LDO development increases the demand at some locations but reduces demand at others. This is because there are a number of constraints on the network and therefore traffic redistributes around the network to accommodate the LDO development traffic."

Predicted impacts on annual mean NO_2 concentrations at the sensitive receptor locations are summarised in Table 14.

Table 14 Predicted NO_2 Impacts

Sensitive Receptor		Magnitude of Change	Significance of Impact
R1	Residential – Pembroke Lane, Milton	Imperceptible	Negligible
R2	Residential – MacKenzie Avenue, Milton	Imperceptible	Negligible

Sensitive Receptor		Magnitude of Change	Significance of Impact
R3	Residential – Trenchard Avenue, Milton	Imperceptible	Negligible
R4	Residential – Mendip Heights, Milton	Imperceptible	Negligible
R5	Residential – High Street, Milton	Imperceptible	Negligible
R6	Residential – Harwell Road, Sutton Courtney	Imperceptible	Negligible
R7	Residential – Great Western Drive, Didcot	Imperceptible	Negligible
R8	Residential – Great Western Drive, Didcot	Imperceptible	Negligible
R9	Residential – Foxhall Manor Park, Didcot	Imperceptible	Negligible
R10	Residential – Foxhall Manor Park, Didcot	Imperceptible	Negligible
R11	Residential – Trenchard Avenue, Milton	Imperceptible	Negligible
R12	School – Milton C of E Primary School	Imperceptible	Negligible
R13	School – Sutton Courtney All Saints School	Imperceptible	Negligible

As indicated in Table 14, predicted impacts on annual mean NO_2 concentrations as a result of the LDO were **negligible** at all locations.

5.2.2 Particulate Matter

Annual mean PM_{10} concentrations were predicted for each scenario and are summarised in Table 15.

Table 15 Predicted Annual Mean PM_{10} Concentrations

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		Do-minimum	Do-something	Change
R1	Residential – Pembroke Lane, Milton	20.29	20.30	0.00
R2	Residential – MacKenzie Avenue, Milton	20.47	20.47	0.01
R3	Residential – Trenchard Avenue, Milton	20.80	20.80	-0.00
R4	Residential – Mendip Heights, Milton	20.34	20.34	0.00
R5	Residential – High Street, Milton	20.20	20.20	0.00
R6	Residential – Harwell Road, Sutton Courtney	20.19	20.19	0.00
R7	Residential – Great Western Drive, Didcot	20.38	20.37	-0.01
R8	Residential – Great Western Drive, Didcot	20.33	20.33	-0.00
R9	Residential – Foxhall Manor Park, Didcot	21.26	21.26	0.00

Sensitive Receptor		Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$)		
		Do-minimum	Do-something	Change
R10	Residential – Foxhall Manor Park, Didcot	20.32	20.33	0.01
R11	Residential – Trenchard Avenue, Milton	20.70	20.71	0.00
R12	School – Milton C of E Primary School	20.05	20.05	-0.00
R13	School – Sutton Courtney All Saints School	19.89	19.89	-0.00

As indicated in Table 15, predicted concentrations of PM_{10} were below the relevant AQLV at all sensitive receptors for both scenarios considered.

Predicted impacts on annual mean PM_{10} concentrations at the sensitive receptor locations are summarised in Table 16.

Table 16 Predicted PM_{10} Impacts

Sensitive Receptor		Magnitude of Change	Significance of Impact
R1	Residential – Pembroke Lane, Milton	Imperceptible	Negligible
R2	Residential – MacKenzie Avenue, Milton	Imperceptible	Negligible
R3	Residential – Trenchard Avenue, Milton	Imperceptible	Negligible
R4	Residential – Mendip Heights, Milton	Imperceptible	Negligible
R5	Residential – High Street, Milton	Imperceptible	Negligible
R6	Residential – Harwell Road, Sutton Courtney	Imperceptible	Negligible
R7	Residential – Great Western Drive, Didcot	Imperceptible	Negligible
R8	Residential – Great Western Drive, Didcot	Imperceptible	Negligible
R9	Residential – Foxhall Manor Park, Didcot	Imperceptible	Negligible
R10	Residential – Foxhall Manor Park, Didcot	Imperceptible	Negligible
R11	Residential – Trenchard Avenue, Milton	Imperceptible	Negligible
R12	School – Milton C of E Primary School	Imperceptible	Negligible
R13	School – Sutton Courtney All Saints School	Imperceptible	Negligible

As indicated in Table 16, impacts on annual mean PM_{10} concentrations as a result of the LDO were predicted to be **negligible** at all receptor locations.

5.2.3 Overall Impact Significance

The overall significance of potential impacts associated with the LDO was determined as

negligible. This was based on the predicted impacts at discrete receptor locations and the considerations outlined in Section 3.2. Further justification is provided in Table 17.

Table 17 Overall Road Traffic Exhaust Emission Impact Significance

Guidance	Comment
Number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance	Air quality impacts were predicted to be negligible at all receptor locations. These represent worst-case locations and therefore it is unlikely that any other sensitive receptors would be significantly affected by the proposed development
Where new exposure is introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant	Development associated with the LDO will not result in any new relevant exposure to poor air quality due to its commercial nature
The magnitude of changes and the descriptions of the impacts at the receptors	Imperceptible changes in annual mean NO_2 and PM_{10} concentrations were predicted at all receptor locations
Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased	Exceedences of the AQLV were not predicted at any receptor location for either scenario modelled
Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced	Exceedences of the AQLV were not predicted at any receptor location for either scenario modelled
The extent to which an objective or limit value is exceeded e.g. an annual mean NO_2 concentration of 41µg/m^3 should attract less significance than an annual mean of 51µg/m^3	Exceedences of the AQLV were not predicted at any receptor location for either scenario modelled

Based on the results of the dispersion modelling, the LDO is not predicted to cause significant air quality impacts as a result of road vehicle exhaust emissions associated with the proposals.

5.2.4 Individual Development Considerations

The assessment considered the implementation of all developments associated with the LDO. Although significant air quality impacts as a result of road vehicle exhaust emissions were not predicted, any singular large scale development permitted by the LDO may potentially affect pollution levels on an individual basis. As such, it is considered a further Air Quality Assessment should be undertaken of any individual scheme that is predicted to result in additional vehicle trips that exceed the following criteria:

- Daily Annual Average Daily Traffic (AADT) flows change by 1,000 or more; or,
- Daily Heavy Duty Vehicle (HDV) flows change by 200 or more.

These are based on guidance provided within the DMRB[17] on potential changes in traffic flows that are likely to significantly affect air quality and are therefore considered suitable for this application.

The Air Quality Assessment should predict annual mean NO_2 concentrations at sensitive receptor locations both with and without the development in place and determine the significance of impact in accordance with the EPUK[18] guidance. Should the assessment indicate impacts of negligible or slight adverse significance then the development should be permitted. If more significant impacts are predicted then appropriate mitigation should be included within the scheme design to reduce effects to an acceptable level.

The inclusion of this requirement within the LDO parameters is considered to provide robust protection for local air quality in the vicinity of the site.

5.3 Local Development Order Parameters

Based on the assessment results, the following parameters are proposed for inclusion within the LDO to control potential construction phase dust impacts:

> "The potential risk of dust impacts associated with each individual development should be determined as high, medium or low in accordance with the criteria outlined in the following Table.

Construction Dust - Risk Rating

Risk	Criteria
High	• Total site area greater than 10,000m^2 • More than 10 heavy earth moving vehicles active at any one time • More than 100,000 tonnes of material moved • Total building volume greater than 100,000m^3 • More than 100 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	• Total site area 2,500m^2 to 10,000m^2 • 5 to 10 heavy earth moving vehicles active at any one time • Total material moved 20,000 tonnes to 100,000 tonnes • Total building volume 25,000m^3 to 100,000m^3 • 25 to 100 HDV trips per day • Unpaved road length 50m to 100m
Low	• Total site area less than 2,500m^2 • Less than 5 heavy earth moving vehicles active at any one time • Total material moved less than 10,000 tonnes • Earthworks during wetter months • Total building volume less than 25,000m^3

[17] Design Manual for Roads and Bridges Volume 11, Section 3, Part 1, HA207/07, Highways Agency, 2007.
[18] Development Control: Planning for Air Quality (2010 update), Environmental Protection UK, 2010.

Risk	Criteria
	• Less than 25 HDV trips per day • Unpaved road length less than 50m

Dependant on the determined dust risk rating site, specific mitigation measures to reduce potential dust impacts should be identified in accordance with the Greater London Authority 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition' document. These should then be implemented throughout the construction phase."

It is considered the construction of any future development in accordance with the above parameters should control dust impacts at sensitive locations to an acceptable level.

The following parameter is proposed to control potential air quality impacts associated with operational phase road vehicle exhaust emissions:

"For any individual development that exceeds the following floorspace the number of daily vehicle movements to be generated by the development should be calculated:

- B1 - 6,100m^2;
- B2 - 13,300m^2; or,
- B8 - 31,500m^2.

An Air Quality Assessment is required in the event that the results of the calculation indicate traffic flows exceed either of the following criteria:

- Total daily generated trips exceed 1,000; or,
- Daily Heavy Duty Vehicle generated trips exceed 200.

The Air Quality Assessment should predict annual mean nitrogen dioxide concentrations at sensitive receptor locations both with and without the development in place and determine the significance of impact in accordance with the Environmental Protection UK 'Development Control: Planning for Air Quality (2010 update)' guidance. Should the assessment indicate impacts of negligible or slight adverse significance then the development should be permitted. If other impacts are predicted then appropriate mitigation should be included within the scheme design to reduce effects to an acceptable level."

It is considered the assessment of any future development in accordance with the above parameters should control changes in pollution levels at sensitive locations as a result of traffic to an acceptable level.

6.0 CONCLUSION

REC Ltd has been instructed by MEPC Milton Park to undertake an Air Quality Assessment for Milton Park, Oxford. The Milton Park LDO is a partnership between VoWHDC as the local planning authority, and MEPC Milton Park as the landowner. Terence O'Rourke Ltd has been instructed by MEPC to help coordinate the LDO process.

Atmospheric emissions associated with any future development have the potential to cause impacts at sensitive receptors. An assessment was therefore undertaken to consider baseline conditions in the vicinity of the site and determine suitable parameters for inclusion within the LDO.

Baseline air quality conditions were identified in the vicinity of the site and potential impacts as a result of construction phase dust impacts and operational phase road vehicle exhaust emission impacts considered.

Based on the assessment results, the following parameters were defined for inclusion within the LDO:

"The potential risk of dust impacts associated with each individual development should be determined as high, medium or low in accordance with the criteria outlined in the following Table.

Construction Dust - Risk Rating

Risk	Criteria
High	• Total site area greater than 10,000m^2 • More than 10 heavy earth moving vehicles active at any one time • More than 100,000 tonnes of material moved • Total building volume greater than 100,000m^3 • More than 100 Heavy Duty Vehicle (HDV) trips per day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length greater than 100m
Medium	• Total site area 2,500m^2 to 10,000m^2 • 5 to 10 heavy earth moving vehicles active at any one time • Total material moved 20,000 tonnes to 100,000 tonnes • Total building volume 25,000m^3 to 100,000m^3 • 25 to 100 HDV trips per day • Unpaved road length 50m to 100m
Low	• Total site area less than 2,500m^2 • Less than 5 heavy earth moving vehicles active at any one time • Total material moved less than 10,000 tonnes • Earthworks during wetter months • Total building volume less than 25,000m^3 • Less than 25 HDV trips per day • Unpaved road length less than 50m

Dependant on the determined dust risk rating site, specific mitigation measures to reduce potential dust impacts should be identified in accordance with the Greater London Authority 'Best Practice Guidance: The Control of Dust and Emissions from Construction and Demolition' document. These should then be implemented throughout the construction phase."

"For any individual development that exceeds the following floorspace the number of daily vehicle movements to be generated by the development should be calculated:

- B1 - 6,100m^2;
- B2 - 13,300m^2; or,
- B8 - 31,500m^2.

An Air Quality Assessment is required in the event that the results of the calculation indicate traffic flows exceed either of the following criteria:

- Total daily generated trips exceed 1,000; or,
- Daily Heavy Duty Vehicle generated trips exceed 200.

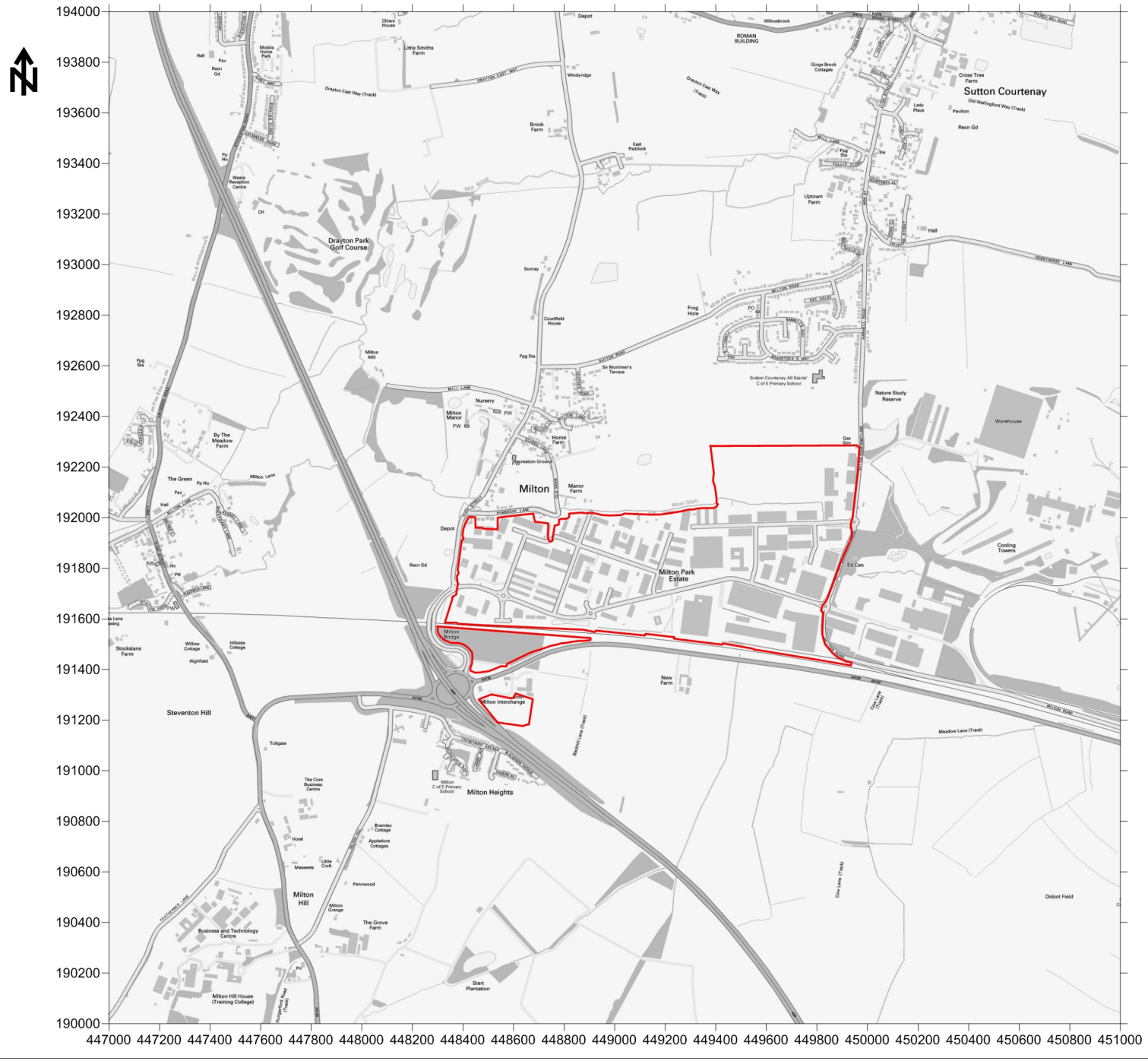
The Air Quality Assessment should predict annual mean nitrogen dioxide concentrations at sensitive receptor locations both with and without the development in place and determine the significance of impact in accordance with the Environmental Protection UK 'Development Control: Planning for Air Quality (2010 update)' guidance. Should the assessment indicate impacts of negligible or slight adverse significance then the development should be permitted. If other impacts are predicted then appropriate mitigation should be included within the scheme design to reduce effects to an acceptable level."

It is considered the implementation of the above parameters will control air quality impacts associated with the LDO to an acceptable level.

7.0 ABBREVIATIONS

AADT	Annual Average Daily Traffic
ADM	Atmospheric Dispersion Modelling
AQAP	Air Quality Action Plan
AQLV	Air Quality Limit Value
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Strategy
CERC	Cambridge Environmental Research Consultants
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
LA	Local Authority
LAQM	Local Air Quality Management
LDF	Local Development Framework
LDO	Local Development Order
LDV	Light Duty Vehicle
NGR	National Grid Reference
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National Planning Policy Framework
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5µm
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10µm
REC	Resource and Environmental Consultants
SODC	South Oxfordshire District Council
VoWHDC	Vale of White Horse District Council
z_0	Roughness length

APPENDIX I FIGURES



Legend

Site Boundary

Title

Figure 1 - Site Location Plan

Project

Air Quality Assessment
Milton Park Local Development Order

Project Number

33071

Client

MEPC

REC
Resource & Environmental Consultants Ltd
Resource and Environmental Consultants Ltd
Osprey House, Broadway, Manchester M50 2UE

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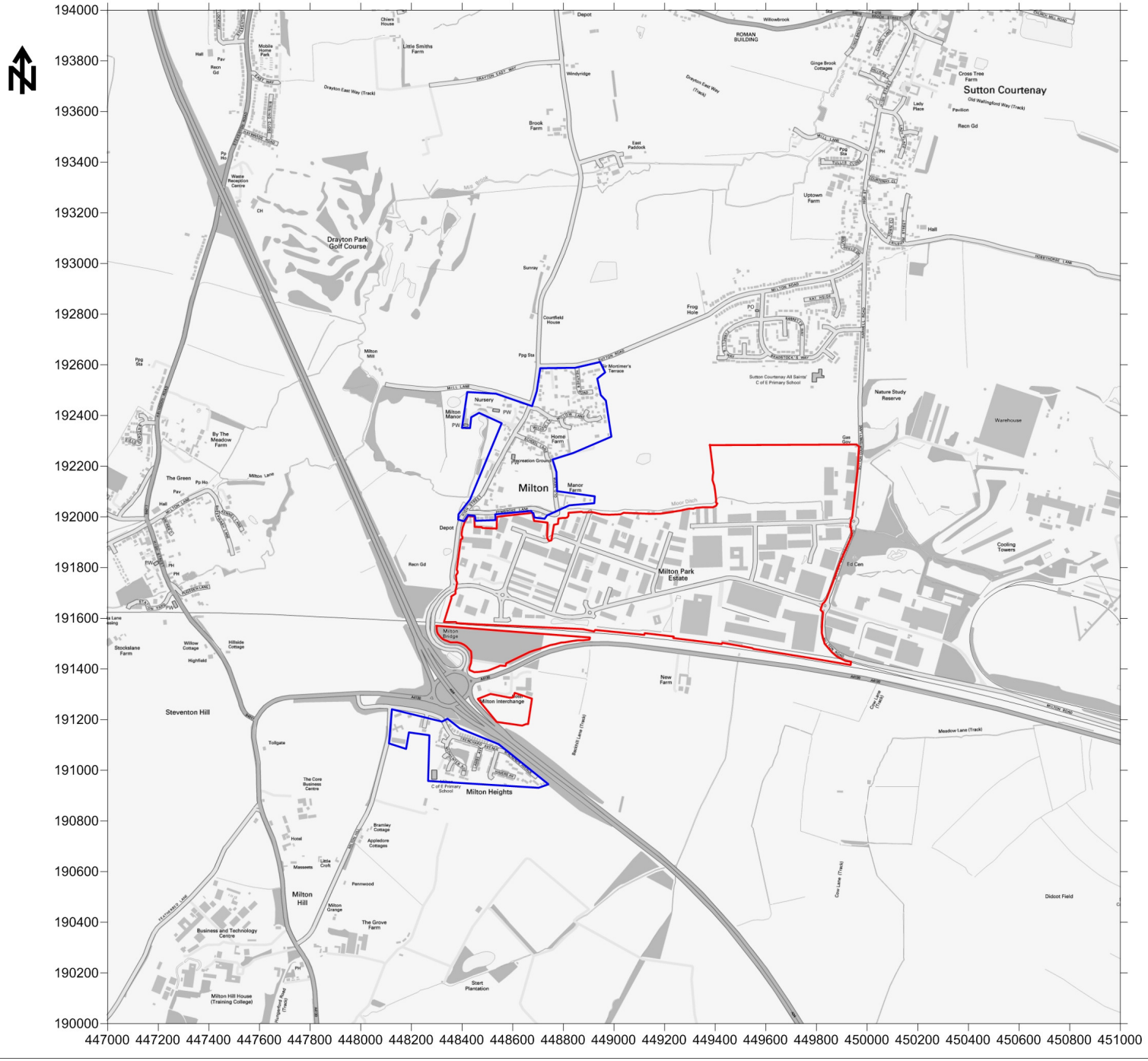

Legend

Site Boundary

Residential Area Boundary

Title

Figure 2 - Dust Receptor Locations

Project

Air Quality Assessment
Milton Park Local Development Order

Project Number

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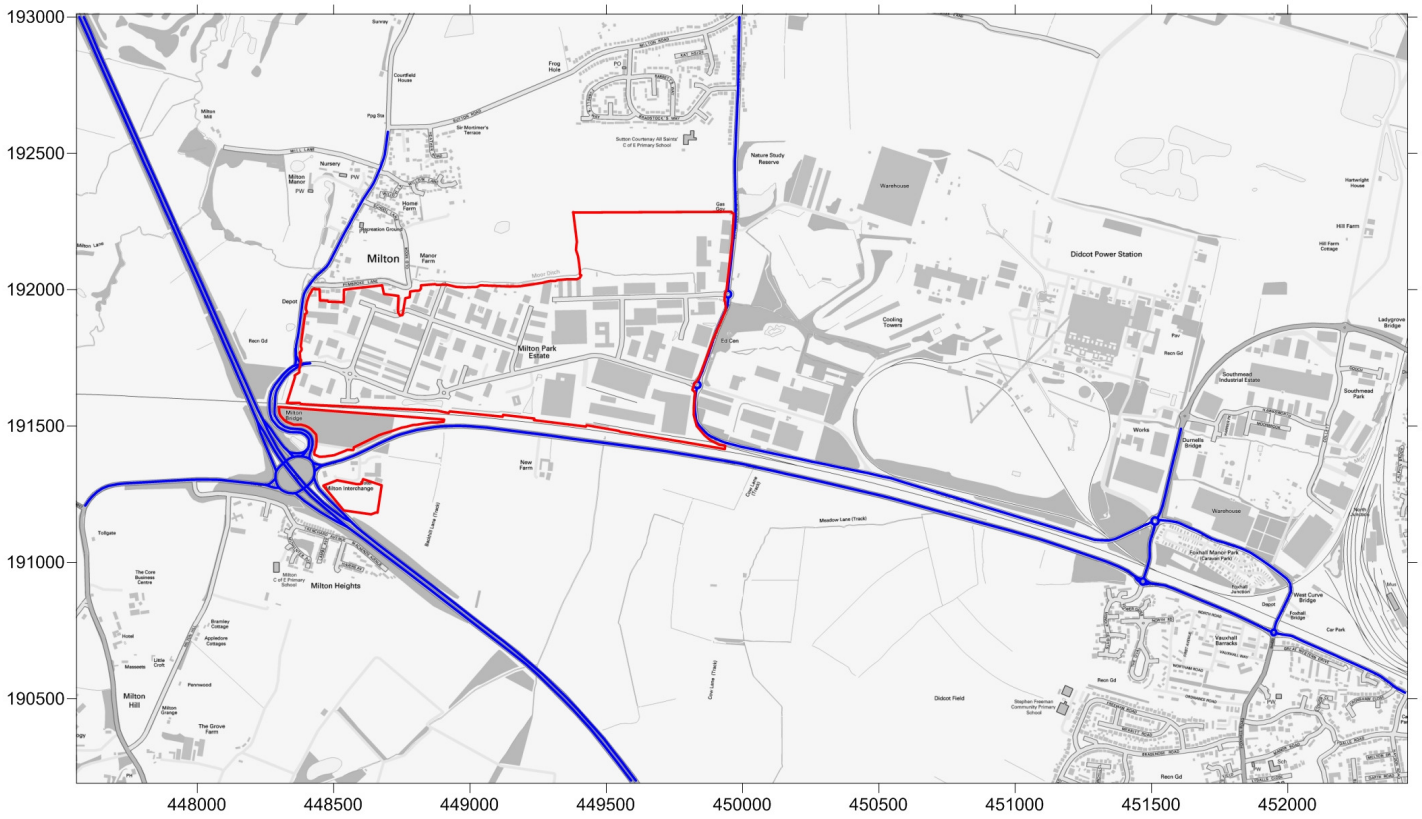

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Road Sources

Site Boundary

Title

Figure 3 - ADMS-Roads Inputs

Project

Air Quality Assessment
Milton Park Local Development Order

Project Number

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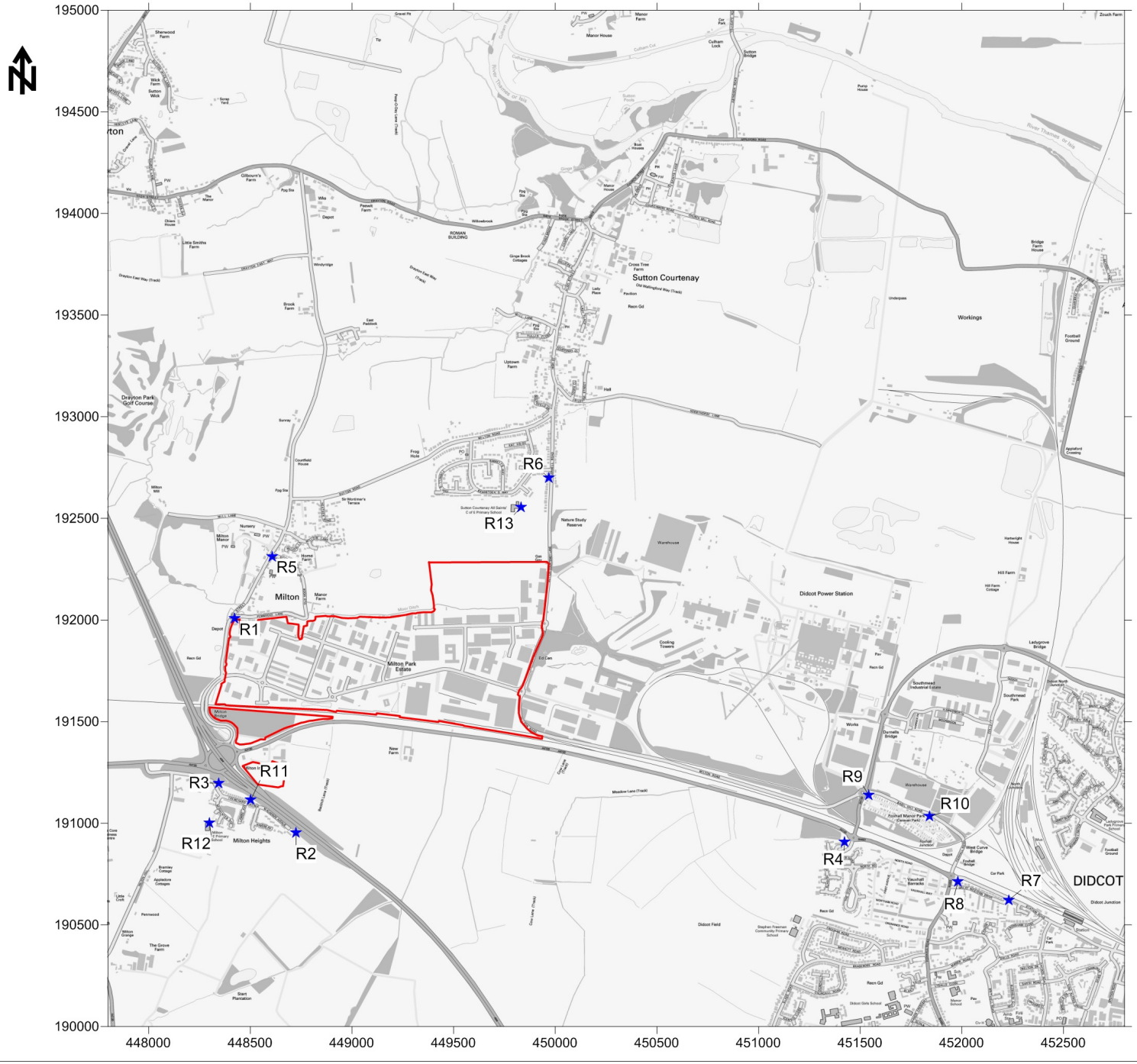

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Site Boundary

Sensitive Receptor

Title

Figure 4 - Road Traffic Emissions
Sensitive Receptor Locations

Project

Air Quality Assessment
Milton Park Local Development Order

Project Number

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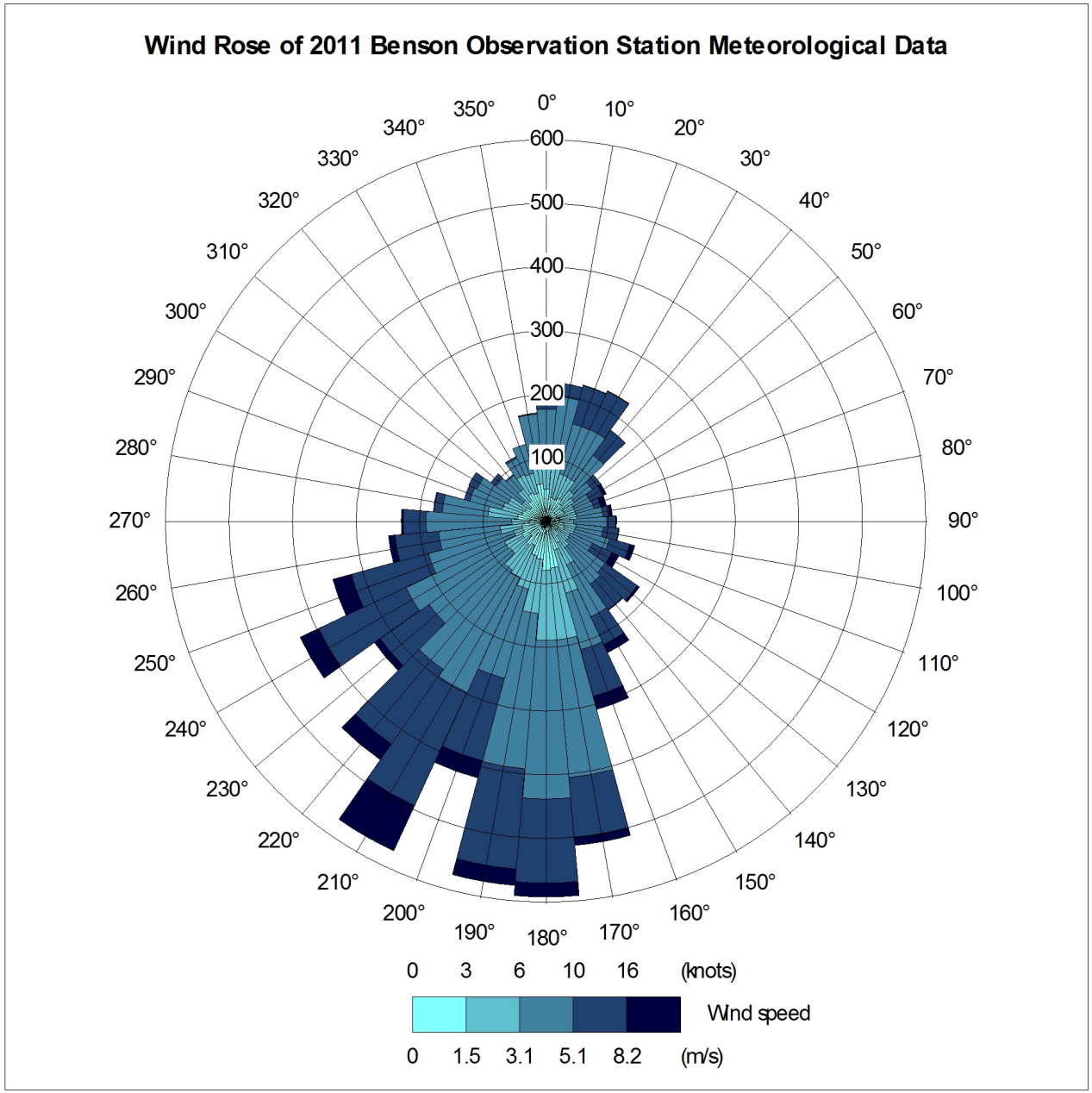

Legend

Title

Figure 5 - Wind Rose of 2011 Benson Observation Station Meteorological Data

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Air Quality Assessment
Milton Park Local Development Order

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APPENDIX II ASSESSMENT INPUT DATA

ASSESSMENT INPUTS

Additional vehicle trips associated with the development have the potential to result in air quality impacts as a result of increased traffic exhaust emissions. Dispersion modelling using ADMS-Roads was therefore undertaken to predict pollutant concentrations at sensitive locations both with and without the development in order to consider potential changes as a result of the proposals.

The dispersion 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; and,
- Monin-Obukhov length.

Assessment inputs are described in the following subsections.

Dispersion Model

Dispersion modelling was undertaken using the ADMS-Roads dispersion model (version 3.1). 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.

Assessment Area

Reference should be made to Figure 3 for a graphical representation of ADMS-Roads inputs.

Traffic Flow Data

Traffic data for use in the assessment, including 2030 peak hour traffic flows and fleet composition as heavy duty vehicle (HDV) percentage, was provided by Halcrow Group Ltd, the Transport Engineers for the development. This was based on outputs from the Central Oxfordshire Transport Model. Annual Average Daily Traffic (AADT) flows were calculated from the data in accordance with the guidance outlined in the DMRB COBA manual[19], as advised by Halcrow Group Ltd. This allowed calculation of predicted traffic flows during 2030 with and without the LDO in place.

Vehicle speeds were estimated based on the free flow potential of each link and local speed limits. Road widths were estimated from aerial photography and UK highway design standards. A summary of the traffic data used in the assessment is summarised in Table All.1.

[19] The COBA Manual, Design Manual for Roads and Bridges, Highways Agency, 2004.

Table AII.1 Traffic Data

Road Link		24-hour AADT Flow		HDV Proportion of Fleet (%)	
		Do-minimum	Do-something	Do-minimum	Do-something
L1	A4130 – west of A34 junction	22,736	22,882	0.58	0.58
L2	A4130 west roundabout exit	7,554	7,303	0.00	0.00
L3	A4130 west roundabout approach	15,181	15,579	0.87	0.85
L4	Milton Interchange	54,686	54,000	3.52	3.56
L5	A34 south northbound exit	806	907	0.00	0.00
L6	A34 northbound	46,903	46,936	6.43	6.64
L7	A34 southbound	23,409	23,351	4.35	4.36
L8	A34 south southbound slip road	233	291	0.00	0.00
L9	A34 north northbound slip road	18,927	18,596	6.48	6.60
L10	A34 north southbound exit	16,165	15,225	2.55	0.00
L11	A34 exit roundabout approach	8,171	7,936	0.00	0.00
L12	A34 – Milton Park link	7,994	7,289	5.15	5.65
L13	Milton Interchange – Milton Park link	12,374	13,079	3.56	3.37
L14	Milton Park – Milton Interchange approach	8,288	8,700	5.67	5.41
L15	A4130 east roundabout exit	12,903	12,668	0.23	0.23
L16	A4130 east roundabout approach	14,685	14,802	4.55	4.52
L17	A34 south northbound	22,437	22,814	6.17	6.40
L18	A34 south southbound	23,409	23,351	4.35	4.36
L19	A34 north northbound	46,903	46,936	6.43	6.64
L20	A34 north southbound	40,442	39,678	3.63	3.70
L21	Milton Park northbound	12,374	13,079	3.56	3.37
L22	Milton Park southbound	8,288	8,700	5.67	5.41
L23	Milton Park – High Street junction	3,351	3,674	8.77	8.80
L24	High Street – Milton Park junction	676	353	4.35	0.00
L25	High Street slow down phase	4,027	4,027	8.03	8.03
L26	High Street	4,027	4,027	8.03	8.03

Road Link		24-hour AADT Flow		HDV Proportion of Fleet (%)	
		Do-minimum	Do-something	Do-minimum	Do-something
L27	A4130 east – hotel access	27,588	27,469	2.53	2.54
L28	A4130 east	27,588	27,469	2.53	2.54
L29	A4130 east roundabout slow down phase	27,588	27,469	2.53	2.54
L30	A4130 east roundabout exit	11,457	11,486	5.58	5.82
L31	A4130 east roundabout approach	9,699	10,111	0.00	0.00
L32	A4130/Mendip Heights roundabout	39,687	40,263	3.09	3.13
L33	B4493 Mendip Heights roundabout approach	8,375	8,230	8.33	8.13
L34	B4493 Mendip Heights roundabout exit	7,201	7,201	0.41	0.41
L35	B4493 slow down phase	15,576	15,430	4.67	4.52
L36	A4130 north – Mendip Heights roundabout junction	14,909	14,899	3.18	3.18
L37	B4493	15,576	15,430	4.67	4.52
L38	B4493 – Foxhall Road roundabout junction	15,576	15,430	4.67	4.52
L39	Station Road – Foxhall Road roundabout junction	14,884	14,649	4.89	4.97
L40	Foxhall Road roundabout	26,134	26,212	4.63	4.51
L41	Foxhall Road – roundabout junction	10,559	10,781	4.96	4.86
L42	Station Road	14,884	14,649	4.63	4.51
L43	Foxhall Road/Basil Hill Road	10,559	10,781	4.96	4.86
L44	Basil Hill Road – Milton Road roundabout junction	10,559	10,781	4.96	4.86
L45	A4130 north – Milton Road roundabout junction south	14,909	14,899	3.18	3.18
L46	A4130 north, south of Milton Road roundabout	14,909	14,899	3.18	3.18
L47	Milton Road – roundabout junction	21,572	21,627	4.38	4.11
L48	Milton Road roundabout	36,480	36,527	3.88	3.73
L49	A4130 north Milton Road roundabout junction north	22,793	22,566	5.62	5.38

Road Link		24-hour AADT Flow		HDV Proportion of Fleet (%)	
		Do-minimum	Do-something	Do-minimum	Do-something
L50	A4130 north, north of Milton Road roundabout	22,793	22,566	5.62	5.38
L51	Milton Road east	21,572	21,627	4.38	4.11
L52	Milton Road – Didcot Power Station entrance	21,572	21,627	4.38	4.11
L53	Milton Road west	21,572	21,627	4.38	4.11
L54	Milton Road – Milton Park roundabout junction	21,572	21,627	4.38	4.11
L55	Milton Park roundabout	21,572	21,627	4.38	4.11
L56	Sutton Courtney Road south – Milton Park roundabout junction	7,633	7,669	5.33	5.31
L57	Sutton Courtney Road south	7,633	7,669	5.33	5.31
L58	Sutton Courtney Road south roundabout junction	7,633	7,669	5.33	5.31
L59	Sutton Courtney Road roundabout	7,633	7,669	5.33	5.31
L60	Sutton Courtney Road north roundabout junction	7,633	7,669	5.33	5.31
L61	Sutton Courtney Road north	7,633	7,669	5.33	5.31

A summary of the road input data is provided in Table AII.2.

Table AII.2 Road Input Data

Road Link		Road Width (m)	Mean Vehicle Speed (km/h)	
			LDV	HDV
L1	A4130 – west of A34 junction	8.9	95	80
L2	A4130 west roundabout exit	7.6	55	55
L3	A4130 west roundabout approach	12.8	25	25
L4	Milton Interchange	10.7	40	40
L5	A34 south northbound exit	6.2	40	40
L6	A34 northbound	7.8	110	95
L7	A34 southbound	7.8	110	95

Road Link		Road Width (m)	Mean Vehicle Speed (km/h)	
			LDV	HDV
L8	A34 south southbound slip road	6.4	70	60
L9	A34 north northbound slip road	6.2	70	60
L10	A34 north southbound exit	6.4	40	40
L11	A34 exit roundabout approach	7.8	25	25
L12	A34 – Milton Park link	5.1	40	40
L13	Milton Interchange – Milton Park link	3.5	40	40
L14	Milton Park – Milton Interchange approach	10.6	25	25
L15	A4130 east roundabout exit	7.7	40	40
L16	A4130 east roundabout approach	11.4	25	25
L17	A34 south northbound	7.3	110	95
L18	A34 south southbound	7.3	110	95
L19	A34 north northbound	7.3	110	95
L20	A34 north southbound	7.3	110	95
L21	Milton Park northbound	4.9	45	45
L22	Milton Park southbound	7.8	45	45
L23	Milton Park – High Street junction	7.2	25	25
L24	High Street – Milton Park junction	5.9	15	15
L25	High Street slow down phase	7.8	20	20
L26	High Street	5.7	45	45
L27	A4130 east – hotel access	19.1	95	80
L28	A4130 east	7.6	95	80
L29	A4130 east roundabout slow down phase	12.9	60	60
L30	A4130 east roundabout exit	6.7	40	40
L31	A4130 east roundabout approach	8.7	20	20
L32	A4130/Mendip Heights roundabout	8.3	25	25
L33	B4493 Mendip Heights roundabout approach	6.9	20	20
L34	B4493 Mendip Heights roundabout exit	6.2	40	40
L35	B4493 slow down phase	7.9	60	60

Road Link		Road Width (m)	Mean Vehicle Speed (km/h)	
			LDV	HDV
L36	A4130 north – Mendip Heights roundabout junction	7.3	20	20
L37	B4493	6.8	95	80
L38	B4493 – Foxhall Road roundabout junction	8.8	20	20
L39	Station Road – Foxhall Road roundabout junction	8.9	20	20
L40	Foxhall Road roundabout	9	25	25
L41	Foxhall Road – roundabout junction	6.6	20	20
L42	Station Road	5.6	45	45
L43	Foxhall Road/Basil Hill Road	7.3	45	45
L44	Basil Hill Road – Milton Road roundabout junction	9	20	20
L45	A4130 north – Milton Road roundabout junction south	10.9	20	20
L46	A4130 north, south of Milton Road roundabout	8.5	45	45
L47	Milton Road – roundabout junction	8	20	20
L48	Milton Road roundabout	8.3	25	25
L49	A4130 north Milton Road roundabout junction north	7.3	20	20
L50	A4130 north, north of Milton Road roundabout	7.3	45	45
L51	Milton Road east	6.8	45	45
L52	Milton Road – Didcot Power Station entrance	11	45	45
L53	Milton Road west	7	45	45
L54	Milton Road – Milton Park roundabout junction	12.3	20	20
L55	Milton Park roundabout	7.9	25	25
L56	Sutton Courtney Road south – Milton Park roundabout junction	10.7	20	20
L57	Sutton Courtney Road south	6.2	45	45
L58	Sutton Courtney Road south roundabout junction	10.2	20	20
L59	Sutton Courtney Road roundabout	9.2	25	25
L60	Sutton Courtney Road north roundabout junction	9.7	20	20
L61	Sutton Courtney Road north	7.6	45	45

Emission Factors

Emission factors for each link were calculated using the relevant traffic flows and the Emissions Factor Toolkit (version 5.1.2) released in June 2012, which incorporates updated COPERT4v8.1 vehicle emissions factors for NO_x and vehicle fleet information.

The assessment considered 2013 emission factors in preference to 2030. This was because various elements of the LDO will be completed during the period 2013 to 2030, and as vehicle emissions are predicted to reduce in future years, assessment in the first potential year of opening provided maximum predicted pollutant concentrations.

Meteorological Data

Meteorological data used in this assessment was taken from Benson meteorological station over the period 1st January 2011 to 31st December 2011 (inclusive). Benson observation station is located at NGR: 463349, 191152, which is approximately 14.5km east of the site. DEFRA guidance LAQM.TG(09)[20] recommends meteorological stations within 30km of an assessment area as being suitable for detailed modelling.

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 4 for a wind rose of utilised meteorological data.

Roughness Length

A roughness length (z_0) of 0.5m was used to describe the assessment area within the dispersion model. This value of z_0 is considered appropriate for the morphology of the assessment area 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 Monin-Obukhov length of 30m was used in this dispersion modelling study. This value is considered appropriate for the nature of the assessment area and is suggested within ADMS-Roads as being suitable for 'mixed urban/industrial'.

Background Concentrations

The background concentrations provided by DEFRA were used in the assessment to represent annual mean pollutant levels in the vicinity of the site. As the modelled area covered several grid squares, NGR: 448500, 191500 was used to represent background pollution levels throughout the assessment extents. This sector had the highest predicted concentrations and was used to provide a worst-case scenario.

In order to avoid 'double-counting' of road vehicle exhaust emissions, the 'primary A-road in' proportion of the relevant background concentrations was removed in accordance with the methodology outlined in DEFRA guidance LAQM.TG(09)[21].

[20] Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.
[21] Local Air Quality Management Technical Guidance LAQM.TG(09), DEFRA, 2009.

DEFRA have recently updated the background concentration maps and data is currently only available for 2010. The predicted 2010 NO_2 concentration was therefore adjusted to the future year in accordance with the methodology outlined in DEFRA guidance[22]. There is currently much uncertainty surrounding projection factors beyond 2017. As such, similarly to emission factors, 2013 background data was used in preference to 2030 to provide a robust assessment.

As with NO_2 concentrations, PM_{10} background concentrations were estimated for the year 2013. The following process was employed to provide an adjusted background PM_{10} concentration:

- Data from the 2008 based background maps was used to calculate a ratio between the 2013 and 2010 background concentration; and,
- The calculated ratio multiplied by the predicted 2010 background concentration from the 2010 based maps issued by DEFRA in April 2012 in order to obtain background data for 2013.

Background concentrations before and after adjustment are shown in Table AII.3

Table AII.3 Background Pollutant Concentrations

Pollutant	Predicted Annual Mean Background Concentration (µg/m^3)	
	Total Predicted Background 2010	Predicted Background without 'primary A-Road In' 2013
NO_x	46.98	-
NO_2	27.02	25.53
PM_{10}	20.76	19.78

NO_x to NO_2 Conversion

Predicted annual mean NO_x concentrations from the dispersion model were converted to NO_2 concentrations using the spreadsheet provided by DEFRA, which is the method detailed within LAQM.TG(09).

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.

These are limited as far as practicable through the selection of appropriate input data. However, it is common practice to verify predicted concentrations against local monitoring

[22] Local Air Quality Management, Note on Projecting NO_2 Concentrations, 2012.

data to determine results accuracy. This requires available monitoring records from a site within the assessment extents. The review of baseline air quality undertaken for the purpose of this assessment indicated that pollution monitoring is not currently undertaken within the dispersion modelling area. As such, suitable data for verification purposes was not available and all predicted concentrations are therefore unverified.

It is considered the use of unverified results has not significantly affected the outcomes of this assessment as the latest sources of input data were utilised where available, including the following:

- Traffic data provided by Halcrow Group Ltd;
- Emissions Factor Toolkit (version 5.1.2) released in June 2012, which incorporates updated NO_x emissions factors and vehicle fleet information; and,
- Revised 2010 based background maps issued by DEFRA in April 2012, which include updated ambient monitoring and meteorological data and incorporate new information on the age distribution of vehicles and emission factors.

Based on the above, the use of unverified results is considered to be valid in the context of this assessment.

APPENDIX III ASSESSOR'S CURRICULUM VITAE

Rachel Powis

Graduate Air Quality Consultant

BSc (Hons), MSc

KEY EXPERIENCE:

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

- Production of Air Quality Assessments to Department for Environment, Food and Rural Affairs (DEFRA), Environment Agency and Environmental Protection UK (EPUK) methodologies for clients from the residential, retail, infrastructure and commercial sectors.
- Detailed dispersion modelling of road vehicle emissions using ADMS-Roads. Studies have included impact assessment of ground level pollutant concentrations.
- Assessment of point source emissions using ADMS-4.
- Assessment of dust impacts from construction sites to the Institute of Air Quality Management (IAQM) methodology.
- Execution of field odour surveys and assessments in accordance with the Environment Agency methodology.
- Production of air quality mitigation strategies for developments throughout the UK.
- Defining baseline air quality conditions and identification of sensitive areas.

QUALIFICATIONS:

- Bachelor of Science
- Master of Science
- Associate IES
- Associate IAQM

PROJECTS SUMMARY:

Air Quality Assessment

Crematorium and Woodland Burial Site, Stoughton Estate, Leicestershire

Stage 1 Air Quality Assessment in support of a crematorium and woodland burial site in Leicestershire and site promotion in the Site Allocations DPD.

The assessment comprised of a screening assessment, including consideration of air quality impacts during construction and operational phases.

Air Quality Assessment

Mixed-use Development, Chiltern Leys, Stowmarket

Air Quality Assessment for inclusion in an Environmental Statement in support of the planning application for a proposed mixed-use development in Stowmarket, Suffolk.

The assessment included defining baseline air quality conditions and conducting an assessment of construction phase dust impacts to the recognised IAQM methodology.

Air Quality Assessment

Biomass Boiler, Littlehampton Academy, Littlehampton

Air Quality Assessment to discharge a planning condition for the installation of a biomass boiler at Littlehampton Academy, Sussex.

The assessment included a baseline assessment and operational phase assessment using ADMS-4dispersion modelling.

Air Quality Assessment

Residential Development, Warmingham Lane, Middlewich

Air Quality Assessment in support of the planning application for a residential development in Middlewich, Cheshire.

The assessment included dispersion modelling using ADMS-Roads to assess impacts associated with vehicle exhaust emissions.

Air Quality Assessment

Redevelopment and Gas Boiler Installation, Southwark Park Primary School, Southwark

Air Quality Assessment in support of the planning application for the redevelopment of Southwark Park Primary School. The site was located within the London Borough of Southwark AQMA and concerns had been raised in regards potential effects associated with the development.

The assessment included consideration of dust impacts during the construction phase to the IAQM methodology and quantification of operational impacts through dispersion modelling using ADMS-4.

Air Quality Assessment

Redevelopment and Provision of Residential Units, Wayland House, Stockwell

Air Quality Assessment in support of the planning application for the redevelopment of Wayland House, Stockwell. The site was located within the London Borough of Lambeth AQMA.

The assessment included detailed dispersion modelling using ADMS-Roads to assess the site for end-use suitability and construction phase assessment of dust impacts in accordance with IAQM methodology.

Air Quality Assessment

Mixed-use Development, Milton Park Didcot

Air Quality Assessment in support of a Local Development Order for a proposed mixed-use development on a site in Milton Park, Didcot, including employment and an Enterprise Zone.

The assessment included defining baseline air quality conditions and conducting an assessment of construction phase dust impacts to the recognised IAQM methodology.

JETHRO REDMORE

Manager - Air Quality Impact Group

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

KEY EXPERIENCE:

Jethro is a Chartered Environmentalist with specialist experience in the air quality and odour sector. His key capabilities include:

- Production and management of Air Quality and Odour Assessments to DEFRA, Environment Agency and EPUK methodologies for a wide-range of clients from the retail, residential, infrastructure, commercial and industrial sectors.
- Significant proportion of assessments produced as part of over-arching Environmental Statements (ES) for large developments throughout the UK.
- Detailed dispersion modelling of road vehicle and industrial emissions using ADMS-ROADS, ADMS-4, AERMOD-PRIME and BREEZE-ROADS. Studies have included impact assessment of ground level pollutant and odour concentrations and assessment of suitability of development sites for proposed end-use.
- Project management and co-ordination of EIAs and scoping reports for developments throughout the UK.
- Design and project management of pollutant monitoring campaigns to define baseline conditions and inform future assessment in accordance with DEFRA and Environment Agency guidance.
- Co-ordination and management of large-scale multi-disciplinary projects and submissions.
- Provision of expert advice to local government and international environmental bodies.

PROJECTS SUMMARY:

Residential Developments

Wood St Mill, Bury - residential development adjacent to scrap metal yard.

Church Way Doncaster - mixed use scheme adjacent to AQMA.

North Wharf Gardens, London - peer review of EIA undertaken for residential development.

Mill Street, Crewe - residential development in proximity of 2-AQMAs.

Wheatstone House, London - mixed use scheme in AQMA.

Elephant and Castle Leisure Centre - baseline AQA for redevelopment.

Carr Lodge, Doncaster - EIA for large residential development.

Poplar Business Park, Tower Hamlets – AQA for residential development.

Queensland Road, Highbury - residential scheme including CHP.

Bicester Ecotown - dispersion modelling of energy centre for EIA.

Castleford Growth Delivery Plan - baseline air quality constraints assessment for town redevelopment.

Temple Point Leeds - residential development adjacent to M1.

Bury Road, Bury - residential development in proximity of AQMA.

Commercial and Retail Developments

Pleasington Lakes, Blackburn - EIA for holiday village adjacent to M65.

Wakefield College - redevelopment of city centre campus in AQMA.

Pleckgate School, Blackburn - biomass boiler and odour assessment.

Deptford Terrace, Sunderland - AQA for mixed use development.

Pakeezah Gourmet, Bradford - AQA including DMRB for new food store.

Lidl, Honiton - Food store development close to AQMA.

Witton Park School, Blackburn - biomass boiler feasibility assessment.

Manchester Airport Cargo Shed - commercial development.

New Crown Wood School, Greenwich - biomass boiler emission assessment.

Basford West, Crewe - AQA of industrial and business park.

Farnworth Superstore - AQA in support of new food superstore.

Basford West, Crewe - mixed use development in proximity of AQMA.

Wild Rose Holiday Park, Cumbria - EIA for holiday park extension.

Coolmore Estates, Seaham - EIA in support of creative centre of excellence.

Morton District Shopping Centre, Carlisle - air quality EIA for commercial development.

Westwood Park, Wigan - air quality EIA for new business park.

Manchester Airport Apron Extension - EIA including aircraft emission modelling.

Preston East - EIA for employment park.

Industrial Developments

Blue Star Fibres, Grimsby - fibre manufacturing plant adjacent to SPA.

Maesgwyn Biomass Plant - AQA including ecological assessment.

Lynchford Lane Waste Transfer Station - biomass facility energy recovery plant.

Barnes Wallis Heat and Power, Cobham - biomass facility adjacent to AQMA.

Countrystyle Biomass Plant, Kent - EIA for biomass facility.

Beddington Heat and Power, London - biomass energy recovery plant.

Brook Bridge Poultry Farm - Ammonia dispersion modelling of quail farm.