Albion Land (2013)

Catalyst Bicester

Air Quality Assessment

July 2019

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1	19th June 2019	First Issue
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Contents Page

Figures

Appendices

Executive Summary

WYG have conducted an air quality assessment for the proposed commercial and leisure development at Bicester Gateway.

The potential effects during the construction phase include fugitive dust emissions from site activities, such as demolition, earthworks, construction and trackout.

During the construction phase, the potential effects from construction on air quality will be managed through best practice mitigation measures. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

The impacts during the operational phase take into account the exhaust emissions from additional road traffic generated due to the proposed development. The assessment of the effects associated with both the committed and proposed developments with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure is determined to be 'negligible' for all existing receptors.

Following the adoption of the recommended mitigation measures during the construction phase, the development is not considered to be contrary to any of the national, regional or local planning policies.

Based on the assessment undertaken and data, methodology and assumptions used within this assessment it is concluded that the site is suitable for the proposed development.

1. Introduction

Albion Land (2013) have commissioned WYG to prepare an Air Quality Assessment for the proposed commercial and leisure development at Bicester Gateway.

1.1 Site Location and Context

The proposed development site is located to the south of Bicester at the approximate United Kingdom National Grid Reference is 457538, 221077. It is bounded to the north by a garden centre, to the south by Wendlebury Farm, to the east by open land, and to the west by A41 Oxford Road. Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

The following assessment stages have been undertaken as part of this assessment:

- Baseline evaluation;
- Assessment of potential air quality impacts during the construction phase;
- Assessment of potential air quality impacts during the operational phase; and,
- Identification of mitigation measures (as required).

The results of the assessment are detailed in the following sections of this report.

The construction phase assessment considers the potential effects of dust and particulate emissions from site activities and materials movement based on a qualitative risk assessment method based on the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' document, published in 2014.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) and less than 2.5 µm ($PM_{2.5}$) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and impact description of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).

2. Policy and Legislative Context

2.1 Documents Consulted

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised February 2019;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, March 2014;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG16, Defra, 2018;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07 - Air Quality, Highways Agency, 2007;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, IAQM, June 2019; and,
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.go.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/); and,
- Cherwell District Council (http://www.cherwell.gov.uk).

Site Specific Reference Documents

- 2018 Air Quality Annual Status Report for Cherwell District Council; and,
- Cherwell District Council Local Plan Core Strategy , Re-adopted December 2016.

2.2 Air Quality Legislative Framework

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values 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.

UK Legislation

The Air Quality Standards Regulations (Amendment 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (Las) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set

of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments.

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in Table 2.1 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 2.1 Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m^3 by end of 2004 (max 35 exceedances a year)	24-hour mean	1st January 2005	50µg/m^3 by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40µg/m^3 by end of 2004	Annual mean	1st January 2005	40µg/m^3	1st January 2005	
$PM_{2.5}$	UK	25µg/m^3	Annual Mean	31st December 2010	25µg/m^3	1st January 2010	Retain Existing
NO_2	UK	200µg/m^3 not to be exceeded more than 18 times a year	1-Hour Mean	31st December 2005	200µg/m^3 not to be exceeded more than 18 times a year	1st January 2010	Retain Existing
	UK	40µg/m^3	Annual Mean	31st December 2005	40µg/m^3	1st January 2010	

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

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 assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Planning and Policy Guidance

National Policy

The National Planning Policy Framework (NPPF), revised February 2019, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPS 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 or 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 or 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'*

The Planning Practice Guidance (PPG) web-based resource was launched by the Ministry for Communities and Local Government (MHCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance:

> *'When deciding whether air quality is relevant to a planning application, local planning authorities should consider whether the development would:*
>
> *Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
>
> *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area.*
>
> *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*
>
> *Give rise to potentially significant impact (such as dust) during construction for nearby sensitive locations.*

Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.'

Local Policy

Cherwell District Council adopted their Local Plan Core Strategy in July 2015. This outlines the Council's broad planning strategy. Following a review of policies within the development core strategy, the following statements were identified as being relevant to the proposed development from an air quality perspective:

"Policy ESD 10: Protection and Enhancement of Biodiversity and Natural Environment;

Protection and enhancement of biodiversity and the natural environment will be achieved by the following:

…

- *Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution."*

3. Assessment Methodology

The potential environmental effects of the operational phase of the proposed development are identified as far as current knowledge of the site and development is known. The impact description of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017.

The methodology used to determine the potential air quality effects of the construction phase of the proposed development has been derived from the IAQM 'Guidance on the Assessment of the Impacts of Dust from Demolition and Construction' document and is summarised in Section 5.

3.1 Determining Impact Description of the Air Quality Effects

The impact description of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The EPUK/IAQM guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
4. The effects can be adverse when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
5. The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,
6. Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 3.1 Impact Description of Effects Matrix

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance. The Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as 'Negligible'.

4. Baseline Conditions

4.1 Air Quality Review

This section provides a review of the existing air quality in the vicinity of the proposed development site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the proposed development site has been defined from a number of sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, Cherwell District Council (CDC) have conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO_2 are above the relevant AQOs at a number of locations of relevant public exposure within the Council. CDC has designated four Air Quality Management Areas (AQMAs) that are described below:

- Cherwell District Air Quality Management Area No.1: The designated area incorporates Hennef Way between the junctions with Ermont Way and Concorde Avenue;
- Cherwell District Air Quality Management Area No.2: The designated area incorporates sections of Oxford Road, Bloxham Road, South Bar, High Street, Horsefair, North Bar, Warwick Road and Southam Road, Banbury;
- Cherwell District Air Quality Management Area No.3: The designated area incorporates a section of Bicester Road, Kidlington to the north of its junction with Water Eaton Lane; and,
- Cherwell District Air Quality Management Area No.4: The designated area incorporates sections of Kings End, Queens Avenue, Field Street, St Johns Street, Bicester.

The closest AQMA to the proposed development site, is the Cherwell District AQMA No.4, which is situated approximately 1 km north of the proposed development site. Therefore, receptors within the AQMA have been included within the detailed modelling assessment.

Air Quality Monitoring

Monitoring of air quality within CDC is conducted through non-continuous monitoring methods. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the proposed development site.

Non - Continuous Monitoring

CDC operated a network of passive diffusion tubes during 2017. The closest diffusion tube monitoring location is located approximately 1.2 km north from the proposed site boundary.

The most recently available diffusion tube data from CDC is from 2017, which is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO_2 Concentrations

Site ID	X	Y	Location	Site Type	Distance to Kerb (m)	Inlet Height (m)	NO_2 Annual Mean Concentration 2017 (µg/m^3)
KES*	458006	222404	Kings End South	Roadside	1.5	2.0	41.7
QA*	458028	222471	Queens Avenue (x3)	Kerbside	1.0	2.0	39.5
FS*	458214	222836	Field Street	Kerbside	1.0	2.0	33.5
NS*	458274	222935	North Street	Kerbside	1.0	2.0	36.5
SJ*	458310	222720	St Johns (2014)	Kerbside	1.0	2.0	37.8
C	458419	222334	Causeway	Kerbside	0.5	2.0	18.3
MS	458539	222381	Market Square (2014)	Roadside	1.5	2.0	24.7
LR	458721	222115	London Road (2016)	Kerbside	2.0	2.0	26.3
VR	457619	222535	Villiers Road	Urban Background	N/A	2.0	17.9
SD	456937	223586	Shakespeare Drive (2016)	Roadside	4.0	2.0	24.0
AR	454301	227498	Ardley (B430)	Kerbside	2.0	2.0	27.2
*In AQMA							

As indicated in Table 4.1, all diffusion tubes except KES monitored NO_2 concentrations below the relevant AQO (40 µg/m^3 annual mean) in 2017.

4.2 Meteorology

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS model calculates the dispersion of pollutants on an hourly basis using a year of local metrological data. The meteorological data used in the assessment is derived from 2017 Benson Meteorological Station. This is the nearest meteorological station, which is considered representative of the development site, with all the complete parameters necessary for the ADMS model. Reference should be made to Figure 2 for an illustration of the prevalent wind conditions at the Benson Meteorological Station site.

4.3 Emission Sources

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO_2, PM_{10} and $PM_{2.5}$.

The assessment has therefore modelled all roads within the immediate vicinity of the proposed development site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to Figure 1 for a graphical representation of the traffic data utilised

within the ADMS Roads 4.1 model.

It should be noted that the pollutant contribution of minor roads and rail sources that are not included within the dispersion model is considered to be accounted for via the use of background air quality levels.

4.4 Sensitive Receptors

Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

Table 4.2 Modelled Existing Sensitive Receptor Locations

Discrete Sensitive Receptor		Receptor Height (m)
R1	Haydock Road	1.5
R2	Newton Close	1.5
R3	56 Kings End	1.5
R4	49 Kings End	1.5
R5	22 Kings End	1.5
R6	St Marys RC Primary School	1.5
R7	Fane House	1.5
R8	67 North Street	1.5
R9	16 St John's Street	1.5
R10	Wendlebury Road	1.5

4.5 Ecological Receptors

Air quality impacts associated with the proposed re-development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site as a result of additional Nitrogen Oxide emissions resulting in deposition. As traffic is the main additional source of pollution from the development and this is a large component of traffic emissions this has been considered further. Ammonia, Sulphur Dioxide and Hydrogen Fluoride have all been screened out as these pollutants are a negligible part of traffic emissions.

The IAQM guidance on the assessment of air quality impacts on designated nature conservation sites (2019) document outlines the types of designated nature sites that require consideration are detailed:

- Sites of Special Scientific Interest (SSSIs);
- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar Sites;
- Areas of Special Scientific Interest (ASSIs);
- National Nature Reserves (NNRs);
- Local Nature Reserves (LNRs);

- Local Wildlife Sites (LWSs); and,
- Areas of Ancient Woodland (AW).

The Conservation of Habitats and Species Regulations (2017) additionally requires competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas).

A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. Following a search on MAGIC the following sites were identified.

Table 4.3 Ecological Receptors

Site	Location		Designation	Distance from site (km)
	x	y		
Wendlebury Meads and Mandsmoor Closes	456312	217617	SSSI	3.2
Arncott Bridge Meadows	460794	218573	SSSI	3.6
Weston Fen	452700	219405	SSSI	4.8
Bure Park	460893	222633	Local Nature Reserve	2.3

As the above identified sites are all greater than 2 km from the proposed development site and the roads closest to these receptor sites are below the screening threshold of 1,000 AADT it is considered that the effect of the development on the above receptors will not be significant and further assessment has been screened out.

The project ecologist has been contacted and we are awaiting a response to confirm that there are no sensitive species or other designated sites not identified on MAGIC to confirm that the above approach is appropriate.

5. Assessment of Air Quality Impacts - Construction Phase

5.1 Pollutant Sources

The main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months) or from construction materials. The main potential effects of dust and particulate matter are:

- Visual - dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Construction activities can give rise to short-term elevated dust/PM_{10} concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

5.2 Particulate Matter (PM_{10})

The UK Air Quality Standards seek to control the health implications of respirable PM_{10}. However, the majority of particles released from construction will be greater than this in size.

Construction works on site have the potential to elevate localised PM_{10} concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

5.3 Dust

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Although there is no formal standards or criteria for nuisance caused by deposited particles, the IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites' (October 2018) and the Environment Agency Technical Guidance Note (TGN) M17 states that dust is usually compared with a 'complaints likely' guideline of 200mg/m^2/day. Therefore, a deposition rate of 200mg/m^2/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures will be taken to minimise the emissions of dust as part of good site practice.

Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in the following sections.

5.4 Methodology

The construction phase assessment utilises the IAQM Guidance on the Assessment of Dust from Demolition and Construction document published in February 2014.

Four construction processes are considered; these are demolition, earthworks, construction and trackout. For each of these phases, the impact description of the potential dust impacts is derived following the determination of a dust emission magnitude and the distance of activities to the nearest sensitive receptor, therefore assessing worst case impacts. A full explanation of the methodology is contained in Appendix A.

5.5 Assessment Results

Based on the methodology detailed in Appendix A, the scale of the anticipated works has determined the potential dust emission magnitude for each process, as presented in the Table 5.1 below.

Table 5.1 Dust Emission Magnitude

Construction Process	Dust Emission Magnitude
Demolition	N/A
Earthworks	Medium
Construction	Medium
Trackout	Medium

The sensitivity of the surrounding area to each construction process has been determined following stage 2B of the IAQM guidance. The assessment has determined the area sensitivities as shown in the Table 5.2.

Table 5.2 Sensitivity of the Area

Source	Area Sensitivity		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Low	Low	N/A
Construction	Low	Low	N/A
Trackout	Low	Low	N/A

The dust emission magnitude determined in Table 5.1 has been combined with the sensitivity of the area determined in Table 5.2, to determine the risk of impacts prior to the implementation of appropriate mitigation measures. The potential impact description of dust emissions associated with the construction phase, without mitigation, is presented overleaf.

Table 5.3 Impact Description of Construction Activities without Mitigation

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Low	Low	N/A
Construction	Low	Low	N/A
Trackout	Low	Low	N/A

Appropriate mitigation measures are detailed and presented in Section 7. Following the adoption of these measures, the subsequent impact description of the construction phase is not predicted to be significant.

6. Assessment of Air Quality Impacts - Operational Phase

In the context of the proposed development, transportation is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at receptors.

The operational phase assessment therefore consists of the quantified predictions of the change in NO_2, PM_{10} and $PM_{2.5}$ for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads.

The model has included the provided traffic data, as contained within the supporting Transport Statement (TS). The operational phase assessment has been undertaken with an assumed worst-case operational opening year of 2026. The assessment scenarios are therefore:

- 2017 Baseline = Existing baseline conditions;
- 2026 "Do Minimum" = Baseline conditions with Committed Development; and,
- 2026 "Do Something" = Baseline conditions + Committed Development + Proposed Development.

6.1 Existing and Predicted Traffic Flows

Baseline 2017 traffic data and projected 2026 'do minimum' and 'do something' traffic data have been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT).

David Tucker Associates Transport Consultants have provided traffic data, for all links in Table 6.1 for the 2017 Baseline, and 2026 'do minimum' and 'do something' scenarios.

Emission factors for the 2017 baseline and 2026 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit (EFT) Version 9.0 (May 2019).

To provide a worst-case assessment, traffic from Scenario 4 as provided by David Tucker Associates has been used for the air quality assessment. This scenario assumes the worst-case traffic flows from the proposed development in 2026.

Where unavailable, traffic speeds have been estimated based on site observations and national speed limits. A 50m 20km/hr slow down phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in Figure 1. Detailed traffic figures are provided in Table 6.1.

Table 6.1 Traffic Data

Link	Speed (km/h)	2017 Baseline		2026			
		AADT	HGV %	Do Minimum		Do Something	
				AADT	%HGV	AADT	%HGV
Pingle Drive	48	5,064	2.0	5,976	2.0	5,976	2.00
Oxford Road South	48	21,728	2.0	25,639	2.0	26,383	1.94
Kings End	48	15,413	2.0	18,187	2.0	18,744	1.94
Oxford Road South	48	20,279	2.0	23,929	2.0	24,673	1.94
Middleton Stoney Road	48	10,026	2.0	11,831	2.0	12,018	1.97
A41 North	80	23,451	2.0	27,672	2.0	28,450	1.95
Unamed Road East	48	1,758	2.0	2,075	2.0	4,518	1.49
A41 South	80	25,329	2.0	29,888	2.0	30,608	2.00
Vendee Drive North	48	9,727	2.0	11,478	2.0	12,424	1.85
A41 North	80	25,442	2.0	30,021	2.0	30,021	2.00
Wendlebury Road Slip	48	1,159	2.0	1,368	2.0	1,368	2.00
A41 South	80	24,569	2.0	28,991	2.0	28,991	2.00
Wendlebury Road	48	2,532	2.0	2,988	2.0	3,708	1.61
B4199	80	9,747	2.0	11,501	2.0	12,058	1.91
St John's Street	48	8,700	2.0	10,266	2.0	10,540	1.95
Queens Avenue	48	7,575	2.0	8,939	2.0	9,222	1.94
Banbury Road	48	2,773	2.0	3,272	2.0	3,272	2.00
Buckingham Road	48	7,337	2.0	8,658	2.0	8,658	2.00
B4100 South	48	2,754	2.0	3,250	2.0	3,250	2.00

6.2 Background Concentrations

Defra Published Background Concentrations for 2017

Background concentrations below were obtained from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In May 2019, Defra issued revised 2017 based background maps for nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$. The mapped background concentrations are summarised in Table 6.2.

Table 6.2 Published Background Air Quality Levels (µg/m³)

Receptor Location	2017			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
Diffusion Tube Monitoring Locations				
FS	13.59	18.97	15.43	10.48
S	13.59	18.97	15.43	10.48
SJ	13.59	18.97	15.43	10.48
QA	13.59	18.97	15.43	10.48
KES	13.59	18.97	15.43	10.48
Modelled Receptor Locations				
R1	13.32	18.43	16.37	10.19
R2	12.31	16.95	15.46	10.33
R3	12.31	16.95	15.46	10.33

Receptor Location	2017			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
R4	13.59	18.97	15.43	10.48
R5	13.59	18.97	15.43	10.48
R6	13.59	18.97	15.43	10.48
R7	13.59	18.97	15.43	10.48
R8	13.59	18.97	15.43	10.48
R9	13.59	18.97	15.43	10.48
R10	13.75	19.09	15.31	9.93

Local Authority Monitoring Background

In areas where it has been considered that the Defra published background maps are unrepresentative of local air quality background contributions, alternate background data have been utilised where appropriate. Where considered more representative, LA NO_2 monitoring data diffusion tubes have been used. Table 6.3 below shows the data used to represent the background air quality conditions at existing receptor locations within the detailed modelling assessment.

As the Defra background maps have predicted unrepresentatively low NO_2 and NO_x background concentrations at the closest monitoring locations, background NO_x and NO_2 concentrations have been considered individually across the model area for receptors where similar background contributions are expected based on the LA monitored NO_2 at diffusion tubes shown in Table 6.3. As these diffusion tubes monitor roadside NO_2, to determine the likely background NO_2 for each area, the unadjusted baseline ADMS model output NO_2 for each monitoring location has been subtracted from the monitored NO_2. A review of the potential background contributions (monitored results less modelled traffic contribution) in each area has been undertaken to determine the most appropriate background levels (accounting for variation in monitored levels due to micro-siting and local non-traffic sources).

Table 6.3 Roadside Modelled Contribution at Tubes

Tube	Monitored NO_2 (µg/m³)	Modelled Traffic Contribution NO_2 (µg/m³)	Non-Traffic NO_2 (µg/m³)
FS	33.50	33.96	1.36
S	36.50	36.31	-0.53
SJ	37.80	38.14	0.91
QA	39.50	39.64	0.36
KES	41.70	41.10	-1.43

To calculate the background NO_x for each location, the following guidance has been utilised.

As the Environment Agency Air Quality Modelling and Assessment Unit (AQMAU) Document states that the *Case Specific Scenarios* approach should be used within an assessment.

> "*Operators are asked to justify their use of percentages lower than 35%, for short-term and 70% for long-term in their application reports.*"

For the long-term:

- NO_x to NO_2 = 70%
- NO_2/NO_x = 70%
- Therefore, $NO_x = NO_2/0.7 = 1.43$

Therefore, for locations where background monitoring data is considered more representative, a factor of 1.43 has been applied to the NO_2 to produce the NO_x value.

Existing receptor backgrounds have been based on the background concentrations of their co-located diffusion tube where applicable. Existing receptors R1, R2, R3, R6 and R10 backgrounds have been based on reported Defra backgrounds due to no representative diffusion tubes being located close to the receptor locations. The backgrounds utilised in the modelling assessment are detailed in Table 6.4 below.

Table 6.4 Background Concentrations Used

Receptor location	Background Source	Background Concentration Utilised	
		NO_2	NO_x
Diffusion Tube Monitoring Locations			
FS	Model Contribution	30.00	42.00
S	Model Contribution	32.00	46.00
SJ	Model Contribution	27.00	38.00
QA	Model Contribution	31.00	44.00
KES	Model Contribution	31.00	45.00
Receptor Locations			
R1	Defra	13.32	18.43
R2	Defra	12.31	16.95
R3	Defra	12.31	16.95
R4	KES	31.00	45.00
R5	QA	31.00	44.00
R6	Defra	13.59	18.97
R7	FS	30.00	42.00
R8	NS	32.00	46.00
R9	SJ	27.00	38.00
R10	Defra	13.75	19.09

6.3 Model Verification

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Section 7 of the TG16 guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_X at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_X emissions. These are converted into predicted roadside contribution NO_2 exposure at the relevant receptor locations based on the updated approach to deriving NO_2 from NO_X for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_X to NO_2 worksheet in the online LAQM tools website hosted by Defra. Table 6.5 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6.5 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
FS	33.50	33.96	1.36
S	36.50	36.31	-0.53
SJ	37.80	38.14	0.91
QA	39.50	39.64	0.36
KES	41.70	41.10	-1.43

The final model produced data at the monitoring locations to within 10% of the monitoring results, as the requirement by TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 0.99[1]. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

6.4 Summary of Model Inputs

Table 6.6 Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), NO_2, Ozone (O_3) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	**Benson Meteorological Station**, hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	**1m** representing a typical surface roughness for **Cities, Woodlands**.
Latitude	Allows the location of the model area to be set	United Kingdom = **51.6**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Cities and Large Towns = **30m.**
Elevation of Road	Allows the height of the road link above ground level to be specified.	All road links were set at ground level = **0m**.
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link

[1] This was achieved by applying a model correction factor of 1.44 to roadside predicted NO_X concentrations before converting to NO_2

Parameter	Description	Input Value
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	**Urban (Not London)** settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a "street canyon".	No canyons were utilised.
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EfT database of traffic emission factors.	The **EFT** Version **9.0 (May 2019)** dataset was used.
Year	Predicted EfT emissions rates depend on the year of emission.	**2017** data for verification and baseline operational phase assessment **2026** data for the operational phase assessment.
Site Plan	**Source:** Cornish Architects	**Drawing Title:** Application 1 Site Location Plan | **Drawing No.** 18022-TP-101 | **Date:** 14/04/2019

6.5 ADMS Modelling Results

Traffic Assessment

The ADMS Model has predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

For the operational year of 2026, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the EFT 2026 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors

- 2017 Baseline = Existing baseline conditions;
- 2026 "Do Minimum" = Baseline conditions with Committed Development; and,
- 2026 "Do Something" = Baseline conditions + Committed Development + Proposed Development (Scenario 4).

Assessment Results

Nitrogen Dioxide

Table 6.7 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.7 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2026	Do Something 2026	Development Contribution
R1	Haydock Road	18.09	16.02	16.10	0.08
R2	Newton Close	19.26	16.19	16.29	0.10
R3	56 Kings End	21.62	17.51	17.65	0.14
R4	49 Kings End	39.23	35.65	35.78	0.13
R5	22 Kings End	38.32	35.07	35.18	0.11
R6	St Marys RC Primary School	14.53	14.11	14.13	0.02
R7	Fane House	34.13	32.27	32.31	0.04
R8	67 North Street	35.34	33.82	33.83	0.01
R9	16 St John's Street	39.95	34.20	34.39	0.19
R10	Wendlebury Road	15.24	14.59	14.64	0.05
Annual Mean AQO: 40 µg/m³					

All modelled receptors are predicted to be below the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.7, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development, is 0.19 µg/m³ at St John's Street (R9).

All proposed receptors predict NO_2 concentrations of below 60 µg/m³ in all scenarios. Therefore, it is unlikely for any exceedances of the short-term NO_2 AQO to occur as outlined in LAQM TG16 technical guidance.

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.8.

Table 6.8 Impact Description of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.08	0.20	0%	≤75% of AQAL	Negligible
R2	0.10	0.25	0%	≤75% of AQAL	Negligible
R3	0.14	0.35	0%	≤75% of AQAL	Negligible
R4	0.13	0.32	0%	76-94% of AQAL	Negligible
R5	0.11	0.27	0%	76-94% of AQAL	Negligible
R6	0.02	0.05	0%	≤75% of AQAL	Negligible
R7	0.04	0.10	0%	76-94% of AQAL	Negligible
R8	0.01	0.02	0%	76-94% of AQAL	Negligible
R9	0.19	0.47	0%	76-94% of AQAL	Negligible
R10	0.05	0.12	0%	≤75% of AQAL	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors, is determined to be 'negligible' at all receptors, based on the methodology outlined in Section 3.

Particulate Matter (PM_{10})

Table 6.9 presents a summary of the predicted change in annual mean PM_{10} concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.9 Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		Baseline 2017	Do Minimum 2026	Do Something 2026	Development Contribution
R1	Haydock Road	17.25	17.32	17.34	0.02
R2	Newton Close	16.57	16.65	16.68	0.03
R3	56 Kings End	16.87	16.97	17.01	0.04
R4	49 Kings End	17.01	17.13	17.18	0.05
R5	22 Kings End	16.60	16.68	16.71	0.03
R6	St Marys RC Primary School	15.59	15.60	15.60	<0.01
R7	Fane House	16.10	16.13	16.15	0.02
R8	67 North Street	15.95	15.98	15.98	<0.01
R9	16 St John's Street	17.39	17.49	17.55	0.06
R10	Wendlebury Road	15.58	15.60	15.62	0.02
Annual Mean AQO: 40 µg/m³					

As indicated in Table 6.9, the maximum predicted increase in the annual average exposure to PM_{10} at any existing receptors, due to changes in traffic movements associated with the development, is 0.06 µg/m³ at 16 St John's Street (R9).

All modelled receptor locations are predicted to be below the AQO for PM_{10} in both the 'do minimum' and 'do something' scenarios.

The impact description of changes in traffic flow associated with the development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.10.

Table 6.10 Impact Description of Effects at Key Receptors

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.02	0.06	0%	≤75% of AQAL	Negligible
R2	0.03	0.08	0%	≤75% of AQAL	Negligible
R3	0.04	0.10	0%	≤75% of AQAL	Negligible
R4	0.05	0.12	0%	≤75% of AQAL	Negligible

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change Due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R5	0.03	0.09	0%	≤75% of AQAL	Negligible
R6	<0.01	0.01	0%	≤75% of AQAL	Negligible
R7	0.02	0.03	0%	≤75% of AQAL	Negligible
R8	<0.01	0.01	0%	≤75% of AQAL	Negligible
R9	0.06	0.14	0%	≤75% of AQAL	Negligible
R10	0.02	0.04	0%	≤75% of AQAL	Negligible
[+]0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure, for existing receptors, is determined to be 'negligible' based on the methodology outlined in Section 3.

Particulate Matter ($PM_{2.5}$)

Table 6.11 presents a summary of the predicted change in annual mean $PM_{2.5}$ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.11 Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{2.5}$ (µg/m³)			
		Baseline 2017	**Do Minimum 2026**	**Do Something 2026**	**Development Contribution**
R1	Haydock Road	10.71	10.71	10.73	0.02
R2	Newton Close	11.00	10.99	11.01	0.02
R3	56 Kings End	11.18	11.17	11.19	0.02
R4	49 Kings End	11.42	11.42	11.45	0.03
R5	22 Kings End	11.19	11.18	11.20	0.02
R6	St Marys RC Primary School	10.57	10.57	10.57	<0.01
R7	Fane House	10.88	10.87	10.88	0.01
R8	67 North Street	10.80	10.79	10.79	<0.01
R9	16 St John's Street	11.68	11.64	11.67	0.03
R10	Wendlebury Road	10.09	10.09	10.10	0.01
Annual Mean AQO: 25 µg/m³					

As indicated in Table 6.11, the maximum predicted increase in the annual average exposure to $PM_{2.5}$ at any existing receptors due to changes in traffic movements associated with the development, is 0.03 µg/m³ at 49 Kings End (R4) and 16 St John's Street (R9).

All modelled receptor locations are predicted to be below the AQO for $PM_{2.5}$ in both the 'do minimum' and 'do something' scenarios.

The impact description of changes in traffic flow associated with the development with respect to annual mean $PM_{2.5}$ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.12.

Table 6.12 Impact Description of Effects at Key Receptors

Impact Description of $PM_{2.5}$ Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change Due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	0.02	0.05	0%	≤75% of AQAL	Negligible
R2	0.02	0.07	0%	≤75% of AQAL	Negligible
R3	0.02	0.09	0%	≤75% of AQAL	Negligible
R4	0.03	0.11	0%	≤75% of AQAL	Negligible
R5	0.02	0.08	0%	≤75% of AQAL	Negligible
R6	<0.01	0.01	0%	≤75% of AQAL	Negligible
R7	0.01	0.03	0%	≤75% of AQAL	Negligible
R8	<0.01	0.01	0%	≤75% of AQAL	Negligible
R9	0.03	0.13	0%	≤75% of AQAL	Negligible
R10	0.01	0.04	0%	≤75% of AQAL	Negligible
[+]0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean $PM_{2.5}$ exposure, for existing residential receptors, is determined to be 'negligible' based on the methodology outlined in Section 3.

7. Mitigation

7.1 Construction Phase

The dust risk categories have been determined in Section 5 for each of the four construction activities. The assessment has determined that the potential impact description of dust emissions associated with the construction phase of the proposed development is 'low risk' at the worst affected receptors.

Using the methodology described in Appendix A, appropriate site-specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction. The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout.

The mitigation measures for the proposed development are detailed in Table 7.1 and will be implemented throughout the duration of the construction phase.

Table 7.1 Construction Phase Mitigation Measures

Communications
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
Dust 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 offsite, and the action taken to resolve the situation in the log book.
Carry out regular site inspections to monitor compliance with the DMP, 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.
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.
Avoid site runoff of water or mud.
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.
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.
Avoid bonfires and burning of waste materials.
Earthworks
No action required.
Construction
No action required.
Trackout
No action required.

Following the implementation of the mitigation measures detailed in the tables above, the impact description of the construction phase is not considered to be significant.

8. Conclusions

WYG have conducted an air quality assessment for the proposed commercial and leisure development at Bicester Gateway.

Appropriate site-specific mitigation measures have been recommended based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to emissions from the construction phase will not be significant.

The 2026 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor is likely to be 0.19 µg/m^3 at 16 St John's Street (R9).

All modelled receptors predict NO_2 concentrations of below 60 µg/m^3 in all scenarios. Therefore, it is unlikely for any exceedances of the short-term NO_2 AQO to occur as outlined in LAQM TG16 technical guidance.

For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be 0.06 µg/m^3 at 16 St John's Street (R9).

For $PM_{2.5}$, the maximum predicted increase in the annual average exposure is likely to be 0.03 µg/m^3 at 49 Kings End (R4) and 16 St John's Street (R9).

All modelled existing and proposed receptors are predicted to be below the respective AQOs for NO_2, PM_{10} and $PM_{2.5}$ in the 'do minimum' and 'do something' scenarios.

The impact description of exposure for NO_2, PM_{10} and $PM_{2.5}$ is determined to be 'negligible' at all receptors, based on the methodology outlined in section 3.

In conclusion, following the adoption of the recommended mitigation measures, the proposed development is not considered to be contrary to any of the national and local planning policies.

Figures

Figure 1 Air Quality Assessment Area

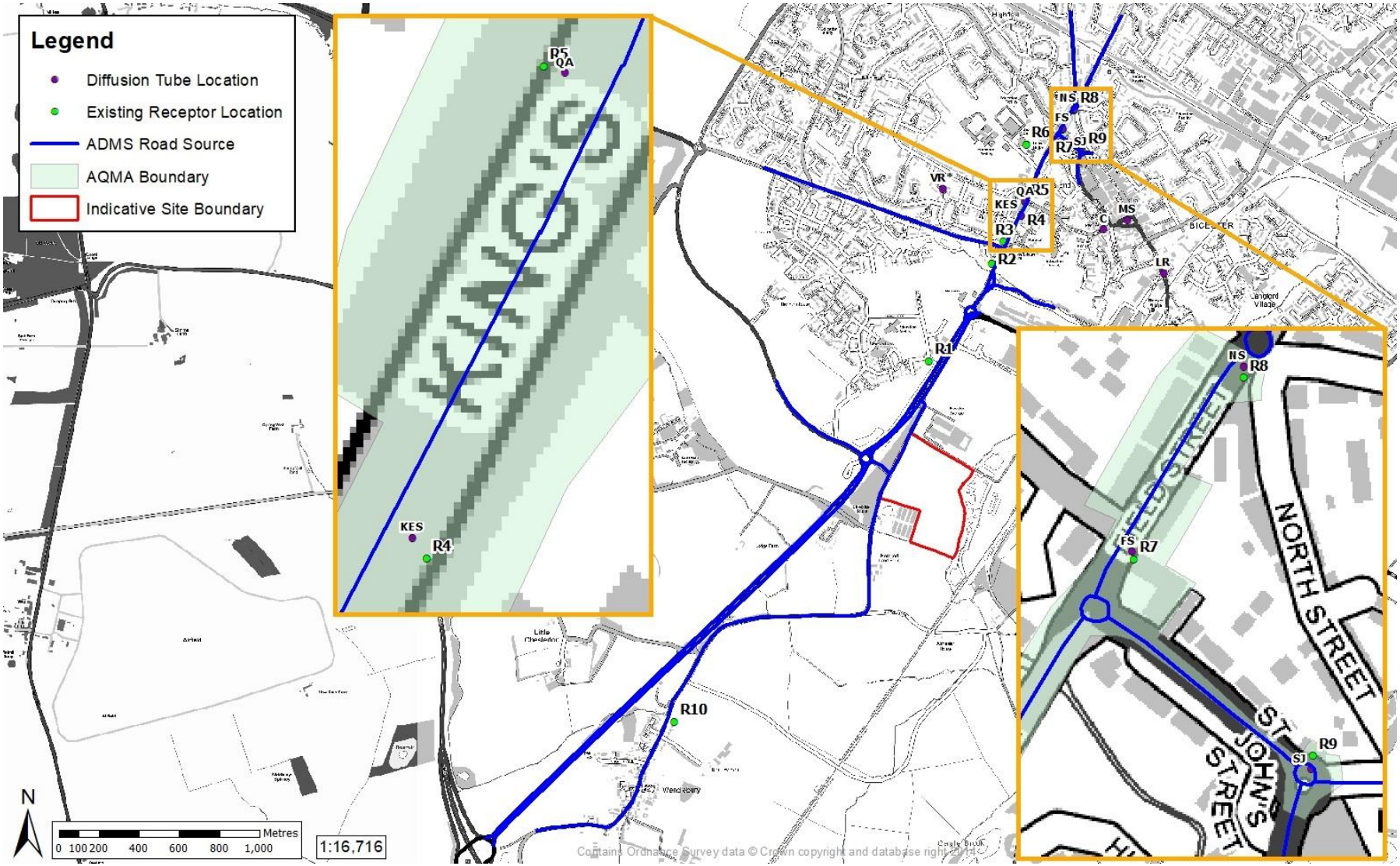


Figure 2 Benson 2017 Meteorological Station Wind Rose

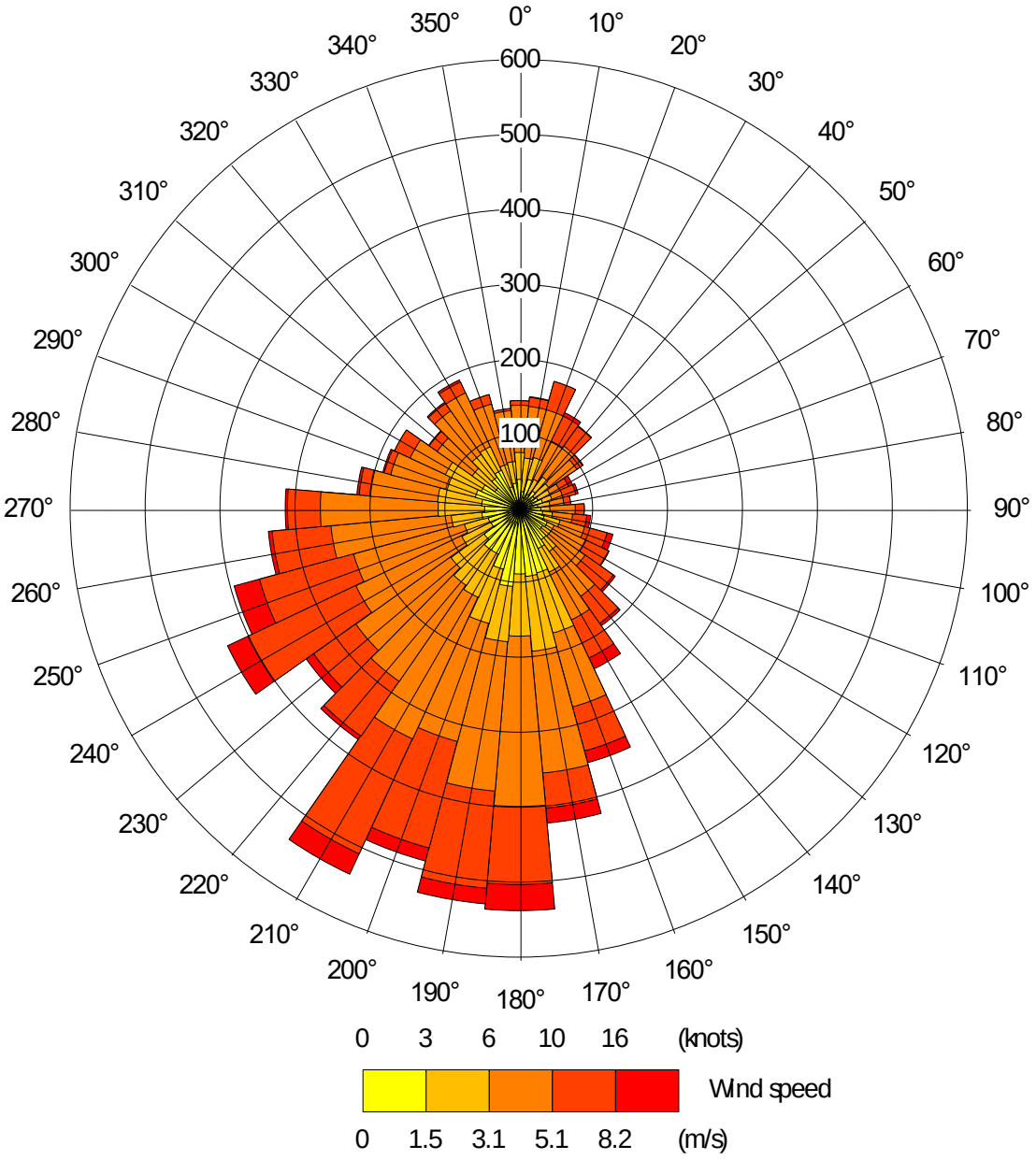
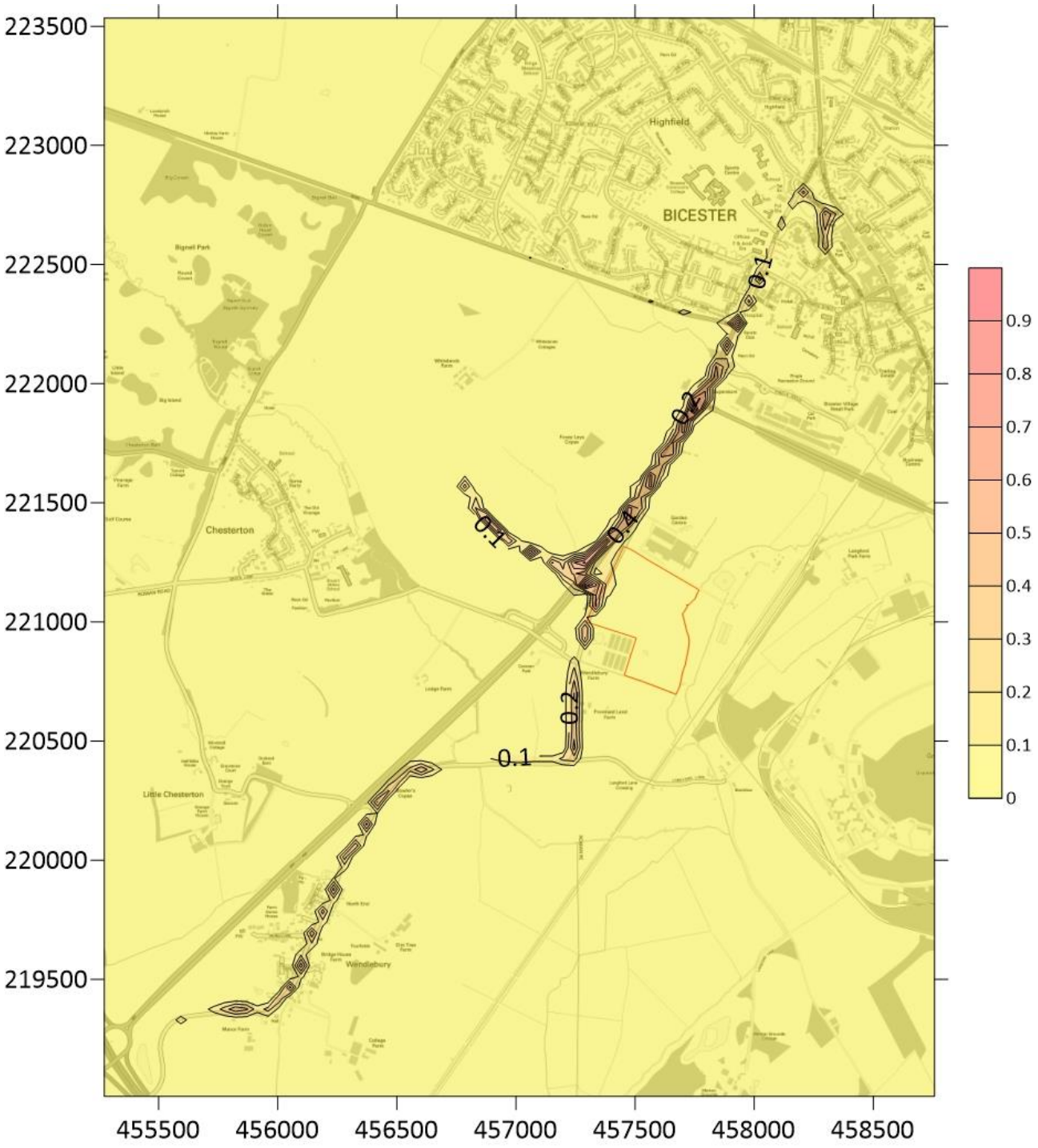


Figure 3 Predicted Development Contribution NO_2 Concentration Contour Plot



Appendix A Construction Phase Assessment Methodology

The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance[2].

Step 1 – Screen the Requirement for a more Detailed Assessment

An assessment is required if there are sensitive receptors within 350m of the site boundary, within 50m of the route(s) used by construction vehicles on the surrounding road network, or within 500m from the site entrance. A detailed assessment is also required if there is an ecological receptor within 50m of the site boundary.

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude for the demolition phase has been determined based on the below criteria:

- *Large*: Total building volume >50 000m^3, potentially dusty construction (e.g. concrete), 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 10-20m above ground level; and,
- *Small*: Total building volume <20 000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude for the planned earthworks has been determined based on the below criteria:

- *Large:* Total site area >10 000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 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 500m^2 – 10 000m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m-8m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
- *Small*: Total site area <2 500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude for the construction phase has been determined based on the below criteria:

- *Large:* Total building volume >100 000m^3, on site concrete batching; sandblasting
- *Medium:* Total building volume 25 000m^3 – 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

The dust emission magnitude for trackout has been determined based on the below criteria:

- *Large:* >50 HGV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- *Medium:* 10-50 HGV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and,

[2] Institute of Air Quality Management 2014. *Guidance on the Assessment of dust from demolition and construction.*

- *Small:* <10 HGV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B – Defining the Sensitivity of the Area

Sensitivities of People to Dust Soiling Effects

- *High:*
  - Users can reasonably expect a enjoyment of a high level of amenity;
  - The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably expect to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; and,
  - Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.
- *Medium:*
  - Users can reasonably 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; and,
  - Indicative examples include parks and places of work.
- *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; and,
  - Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A1– Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance 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

Note – The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of People to the Health Effects of PM_{10}

- *High:*
  - 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);

- Indicative 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.

- *Medium:*
  - 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); and,
  - Indicative 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.

- *Low:*
  - Locations where human exposure is transient; and,
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A2- Sensitivity of the Area to Human Health Impacts

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

Note – The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of Receptors to Ecological Effects

- *High:*
  - 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; and,
  - Indicative 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:*

- 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; and,
- Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

- *Low:*
  - Locations with a local designation where the features may be affected by dust deposition; and,
  - Indicative example is a local Nature Reserve with dust sensitive features.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A3 – Sensitivity of the Area to Ecological Impacts

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

Note – The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Step 2C – Defining the Risk of Impacts

The risk of impacts with no mitigation is determined by combining the dust emission magnitude determined in Step 2A and the sensitivity of the area determined in Step 2B.

The following tables provide a method of assigning the level of risk for each activity.

Demolition

Table A4 – Risk of Dust Impacts, 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

Earthworks

Table A5 – Risk of Dust Impacts, Earthworks

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

Construction

Table A6 – Risk of Dust Impacts, Construction

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

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

Trackout

Table A7 – Risk of Dust Impacts, 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

Step 3 – Site Specific Mitigation

The dust risk categories for each of the four activities determined in Step 2C should be used to define the appropriate, site-specific mitigation measures to be adopted.

These mitigation measures are contained within section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction.

Appendix B Defra Background Concentration Assessment

Model Verification

Table B1 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m³		
	Monitored NO_2	Modelled NO_2	Difference (%)
FS	33.50	25.53	-23.80
S	36.50	26.66	-26.95
SJ	37.80	44.77	18.44
QA	39.50	38.73	-1.95
KES	41.70	42.59	2.13

The final model produced data at the monitoring locations to within 26.95% of the monitoring results. The percentage divergence exceeds the requirement of the TG16 guidance. This verification using Defra background map concentrations at the monitoring locations also gives a high primary adjustment factor of 4.1. This suggests that due to the unrepresentative Defra backgrounds, the road contributions of NO_x are being overestimated by four times their actual emissions.

The final verification model correlation coefficient (representing the model uncertainty) is 1.00[3]. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

Table B2 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2026	Do Something 2026	Development Contribution
R1	Haydock Road	26.64	20.99	21.20	0.21
R2	Newton Close	31.37	23.20	23.49	0.29
R3	56 Kings End	37.34	26.77	27.11	0.34
R4	49 Kings End	37.61	27.59	27.96	0.37
R5	22 Kings End	35.13	25.92	26.25	0.33
R6	St Marys RC Primary School	16.31	15.10	15.14	0.04
R7	Fane House	26.02	20.53	20.67	0.14
R8	67 North Street	23.81	19.24	19.28	0.04
R9	16 St John's Street	49.33	34.42	34.94	0.52
R10	Wendlebury Road	18.03	16.17	16.32	0.15
Annual Mean AQO		**40 µg/m³**			

As indicated in Table C2, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development, is 0.52 µg/m³ at 16 St John's Street (R9).

[3] This was achieved by applying a model correction factor of 4.10 to roadside predicted NO_X concentrations before converting to NO_2

All modelled existing receptors are predicted to be below the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios.

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table B3.

Table B3 Impact Description of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**% of AQO**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	0.21	0.51	1%	≤75% of AQAL	Negligible
R2	0.29	0.71	1%	≤75% of AQAL	Negligible
R3	0.34	0.86	1%	≤75% of AQAL	Negligible
R4	0.37	0.94	1%	≤75% of AQAL	Negligible
R5	0.33	0.81	1%	≤75% of AQAL	Negligible
R6	0.04	0.10	0%	≤75% of AQAL	Negligible
R7	0.14	0.36	0%	≤75% of AQAL	Negligible
R8	0.04	0.10	0%	≤75% of AQAL	Negligible
R9	0.52	1.29	1%	76-94% of AQAL	Negligible
R10	0.15	0.38	0%	≤75% of AQAL	Negligible
0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors is determined to be 'negligible' at all receptors, based on the methodology outlined in Section 3.

Appendix C Report Terms & Conditions

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