P/2019/00129
Received
20/3/2019

Mercer Major Partners LLP

Fauld Industrial Estate, Tutbury

Air Quality Assessment

March 2019

Executive Park, Avalon Way, Anstey, Leicester, LE7 7GR
Tel: +44 (0)116 234 8143
Email: daniel.clampin@wyg.com

Document Control

Project:	Fauld Industrial Estate, Tutbury		
Client:	Mercer Major Partners LLP		
Job Number:	A112616		
File Origin:	O:\Acoustics Air Quality and Noise\Active Projects		
Document Checking:			
Prepared by:	Hannah Pearson *Environmental Consultant*	Initialled:	HP
Checked by:	Daniel Clampin *Principal Environmental Consultant*	Initialled:	DC
Verified by:	Nigel Mann *Director*	Initialled:	NM
Point of Contact:	Daniel Clampin Telephone: 0116 234 8143 Email: daniel.clampin@wyg.com		

Issue	Date	Status
1	20th March 2019	First Issue
2		
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Executive Summary

WYG have undertaken an Air Quality Assessment for the proposed commercial development at Fauld Industrial Estate, Tutbury.

The potential effects during the construction phase include fugitive dust emissions from site activities, such as demolition, earthworks, construction and trackout. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

The potential effects from construction on air quality will be managed through site-specific mitigation measures detailed within this assessment. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

An air quality dispersion model has been created and verified to local monitoring data. This model has been used to predict concentrations of Nitrogen Dioxide (NO_2,) and Particulate Matter (PM_{10} and $PM_{2.5}$) in the earliest opening year, both with and without the development.

The assessment of the significance of the effects associated with the proposed development 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

Mercer Major Partners LLP commissioned WYG to prepare an Air Quality Assessment to support an application for the proposed commercial development at Fauld Industrial Estate, Tutbury.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is 419158, 328677. The Site is bounded to the north, south and east by Fauld Industrial Estate, and to the west by open farmland.

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 10µm (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 significance of the changes have been referenced to non-statutory guidance issued by Institute of Air Quality Management (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;
- 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;
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, IAQM, October 2018;
- Monitoring Particulate Matter in Ambient Air around Waste Facilities: Technical Guidance note (Monitoring) M17, Environment Agency, July 2013;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017; 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/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and,
- East Staffordshire Borough Council (http://www.eaststaffsbc.gov.uk/).

Site Specific Reference Documents

- 2017 Air Quality Annual Status Report for Staffordshire East Council (April 2018); and,
- East Staffordshire Borough Council Local Plan, Adopted October 2015.

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 NPPF states that:

> *'Planning policies and decision should sustain and contribute towards compliance with relevant limit values or national objectives for pollutant, 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 Department for Communities and Local Government (DCLG) 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

East Staffordshire Borough Council adopted their Local Plan in October 2015. This outlines the Council's broad planning strategy. Following a review of policies within the local plan document, the following policies were regarded as relevant to Air Quality:

"DETAILED POLICY 7: Pollution and Contamination

Development proposals will only be granted planning permission where they will not give rise to or be likely to suffer from, land instability and/or unacceptable levels of pollution in respect of noise or light, or contamination of ground, air or water.

New development proposals within the affected coal mining areas will need to take account of coal mining legacy issues and include appropriate mitigation or remedial measures."

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 allows. The significance 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 Significance of the Air Quality Effects

The significance 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 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 significance 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 percentage of the Air Quality Assessment Level (AQAL), 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 AQAL 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 AQAL;
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 AQAL will have higher severity compared to a relatively large change at a receptor which is significantly below the AQAL;
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 significance 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 significance 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 AQAL.

Table 3.1 Significance of Effects Matrix

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQAL			
	1	2-5	6-10	>10
≤75% of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109 of AQAL	Moderate	Moderate	Substantial	Substantial
≥110 of AQAL	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, East Staffordshire Borough Council (ESBC) 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. ESBC has two designated Air Quality Management Areas (AQMAs) as outlined below;

- Burton-Upon-Trent AQMA No.1: An area of Burton-Upon-Trent along Derby Rd, Derby St, part of Princess Way Roundabout, Horninglow St, Horninglow Rd, Bridge St, Wellington St, part of Borough Rd, part of Wellington St roundabout, part of Waterloo St and part of Byrkley St; and,
- Burton-Upon-Trent AQMA No.2: An area encompassing St Peters Bridge roundabout and part of St Peters St in Stapenhill in Burton-upon-Trent.

The proposed development has potential to direct traffic through the Burton-Upon-Trent AQMA No.1, therefore receptors within the AQMA have been included within the modelling assessment.

Air Quality Monitoring

Monitoring of air quality within ESBC is undertaken through continuous and 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.

Continuous Monitoring

ESBC operated one automatic monitoring station during 2016. This station is located approximately 6.9 km south east from the proposed site boundary.

The most recently available automatic monitoring data from ESBC is from 2016, which is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO_2 Concentrations

Site ID	Location	Site Type	Distance to nearest Kerbside (m)	Height (m)	NO_2 Annual Mean Concentration 2016 (µg/m^3)
CM1	Derby Turn	Roadside	5.0	1.8	51.0

As indicated in Table 4.1, location CM1 monitored concentrations of NO_2 above the relevant AQO (40 µg/m^3 annual mean) in 2016.

Non - Continuous Monitoring

EBSC operated a network of passive diffusion tubes during 2016. The closest diffusion tube monitoring location is located approximately 1.8 km south west from the proposed site boundary.

The most recently available diffusion tube data from EBSC is from 2016, which is presented in Table 4.2.

Table 4.2 Monitored Annual Mean NO_2 Concentrations

Site ID	Location	Site Type	Distance to nearest Kerbside (m)	NO_2 Annual Mean Concentration 2016 (µg/m^3)
DT3	Horninglow Croft	Roadside	5.0	31.4
DT10	Brookside-Winshill	Urban Background	N/A	15.0
DT12	Horninglow Road – Shakespeare Road Junction	Roadside	1.8	36.4
DT15	Horninglow Road North – appr Morleys Hill Junction	Roadside	1.2	25.4
DT31	Rolleston Road – near junction Horninglow Road	Roadside	1.4	28.9
DT40	Shobnall Road – near Marstons	Roadside	1.5	34.4
DT41	Forest Road	Roadside	1.0	26.7

As indicated in Table 4.2, all diffusion tubes monitored concentrations of NO_2 below the relevant AQO (40 µg/m^3 annual mean) in 2016.

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 meteorological data. The 2016 meteorological data used in the assessment is derived from East Midlands Airport 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 East Midlands Airport Meteorological Station site.

4.3 Existing 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. Reference should be made to Figure 1 for a graphical representation of the roads included 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 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. The existing receptor locations are summarised in Table 4.3 and the spatial locations of all of the receptors are illustrated in Figure 1.

Table 4.3 Modelled Existing Sensitive Receptor Locations

Discrete Sensitive Receptor		Modelled Height (m)
R1	Fauld Lodge	1.5
R2	Coton Lane	1.5
R3	Warren Cottage	1.5
R4	Shobnall Primary School	1.5
R5*	172 Horninglow Road	1.5
R6	2 Horninglow Croft	1.5
R7	Outwoods Primary School	1.5
R8	133 Horninglow Road North	1.5
R9	34 Fiddlers Lane	1.5
R10	The Sycamores	1.5
R11	Richard Wakefield C of E Primary School	1.5
R12	27 Castle Street	1.5
*Receptor in AQMA		

4.5 Ecological Receptors

Air quality impacts associated with the proposed development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2017) require 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 within a 1km radius of the site boundary, no ecologically sensitive receptors were identified.

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 significance 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 significance of dust emissions associated with the construction phase, without mitigation, is presented below.

Table 5.3 Impact Significance 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 significance 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 to 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.

In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2023. The assessment scenarios are therefore:

- 2016 Baseline = Existing baseline conditions;
- 2023 "Do Minimum" = Baseline conditions + committed development flows; and,
- 2023 "Do Something" = Baseline conditions + committed development flows + proposed development flows.

6.1 Existing and Predicted Traffic Flows

Baseline 2016 data and projected 2023 'do minimum' and 'do something' traffic data has been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT). Baseline 2016 data were downloaded from the Department for Transport Website.

To calculate 2023 'do minimum' flows, a TEMPRO factor of 1.07 was applied to the 2016 baseline traffic data.

For the 2023 'do something' scenario, the trips associated with the proposed development provided by WYG Transport Consultants have been added onto the 2023 'do minimum' traffic flows.

It is assumed the average vehicle speeds on the local road network in an opening year of 2023 will be broadly the same as the ones in 2016 as well.

Emission factors for the 2016 baseline and 2023 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 8.0.1 (December 2017).

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 the Table 6.1.

Table 6.1 Traffic Data

Link	Speed (km/h)	2016		2023			
				Do Minimum		Do Something	
		AADT	HGV %	AADT	%HGV	AADT	%HGV
Fauld Lane East	48	1,962	3.16	2,099	3.16	2,526	2.63
Fauld Lane West	48	1,962	3.16	2,099	3.16	2,282	2.91
A511 North	48	9,400	3.88	10,058	3.88	10,272	3.80
A511 South	48	9,522	3.62	10,189	3.62	10,403	3.55
A515 Station Road North	48	7,476	8.68	7,999	8.68	8,091	8.58
A515 Station Road South	48	3,874	8.80	4,145	8.80	4,237	8.61
Forest Road	48	4,857	5.29	5,197	5.29	5,253	5.23
A511 Horninglow Road	48	10,264	2.29	10,982	2.29	11,094	2.27
A38	64	43,540	12.37	46,588	12.37	46,644	12.36

6.2 Background Concentrations

Defra Published Background Concentrations for 2016

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 November 2017, Defra issued revised 2015 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	2016			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
Monitoring Locations				
DT3*	19.09	27.55	15.52	10.43
DT12*	19.09	27.55	15.52	10.43
DT15*	12.42	16.90	13.20	9.15
DT31	15.77	22.03	14.26	9.73
DT40	16.60	23.53	13.90	9.63
DT41	13.65	18.75	14.37	9.81
Modelled Receptor Locations				
R1	8.68	11.49	12.67	8.57
R2	7.69	10.09	12.11	8.34
R3	7.89	10.36	12.27	8.65
R4	13.65	18.75	14.37	9.81
R5*	19.09	27.55	15.52	10.43
R6	19.09	27.55	15.52	10.43
R7	12.42	16.90	13.20	9.15
R8	12.42	16.90	13.20	9.15
R9	9.30	12.35	13.17	8.99
R10	9.78	13.05	13.08	9.14
R11	9.78	13.05	13.08	9.14

Receptor Location	2016			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
R12	13.65	18.93	13.28	9.35
*In AQMA				

Local Authority Monitoring Background

The Defra predicted background concentrations outlined in Table 6.2, are potentially under predicting NO_2 concentrations at all monitoring locations. 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).

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 used where appropriate. Where considered more representative, LA NO_2 monitoring data diffusion tubes have been used.

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

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.

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)
DT3*	31.40	10.06	21.34
DT12*	36.40	6.16	30.24
DT15*	25.40	4.17	21.23
DT31	28.90	2.08	26.82
DT40	34.40	2.85	31.55

Tube	Monitored NO_2 (µg/m³)	Modelled Traffic Contribution NO_2 (µg/m³)	Non-Traffic NO_2 (µg/m³)
DT41	26.70	3.29	23.41
*In AQMA			

As outlined in Table 6.3, the background NO_2 concentrations at all LA monitoring locations are significantly greater than those predicted by Defra. Therefore the Defra background maps have been considered to be unrepresentative of background pollutant concentrations in the vicinity of the proposed development site.

The background concentrations used in the model verification, and the main body of the operational phase modelling assessment are outlined in Table 6.4 below.

Table 6.4 Background Concentrations Used in Modelling Assessment

Receptor location	Background Source	Background Concentration Utilised	
		NO_2	NO_x
Monitoring Locations			
DT3*	Model Contribution	21	31
DT12*	Model Contribution	30	43
DT15*	Model Contribution	21	30
DT31	Model Contribution	27	38
DT40	Model Contribution	32	45
DT41	Model Contribution	23	33
Modelled Receptors			
R1	DT10	15	21
R2	DT10	15	21
R3	DT10	15	21
R4	DT41	23	33
R5*	DT12	30	43
R6	DT3	21	31
R7	DT15	21	30
R8	DT15	21	30
R9	DT10	15	21
R10	DT10	15	21
R11	DT10	15	21
R12	DT10	15	21
*In AQMA			

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 background air quality data 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 (%)
DT3*	31.40	31.38	-0.05
DT12*	36.40	36.22	-0.50
DT15*	25.40	25.42	0.07
DT31	28.90	29.17	0.93
DT40	34.40	34.90	1.45
DT41	26.70	26.47	-0.87
*In AQMA			

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 1.00[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	**East Midlands Meteorological Station**, hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	**0.5m** representing a typical surface roughness for **Parkland, Open Suburbia.**
Latitude	Allows the location of the model area to be set	United Kingdom = **52.8**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Mixed Urban/Industrial = **30m.**

[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
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
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 used within the model
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 **8.0.1 (2017)** dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	**2016** data for verification and baseline operational phase assessment **2023** data for the operational phase assessment.

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.

Assessment Scenarios

For the operational year of 2023, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken under three scenarios:

- Scenario 1: Using the Emissions Factor Toolkit (EFT) 2023 emissions rates which take into account the rate of reduction in emission from road vehicles into the future.

In Scenario 1, for the operational year of 2023, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emission Factor Toolkit emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors.

- 2016 Baseline = Existing baseline conditions;
- 2023 "No development" = Baseline conditions + committed development emissions; and,
- 2023 "With development" = Baseline conditions + committed development emissions + proposed development emissions.

- Scenario 2: Using the Theoretical Style assessment with emission factors of the year of 2016 for the future 2023 'no and with' development scenarios. This scenario assumes no reduction in emissions rates from road vehicles from 2016 to 2023.

Scenario 2 is an additional theoretical scenario which uses emission factors for 2016 for the 'no development' and 'with development' based on a recent appeal decision (planning reference no.APP/D3830/A/14/22269877) that favoured the uncertainty of emissions forecasts. It should be noted that this is a theoretical scenario which assumes that the government (Defra) predictions for reduction in emissions over the forthcoming years will not occur. However, this should be not be considered as a 'more correct' scenario in accordance with the 2010 note [http://laqm.defra.gov.uk/laqm-faqs/faq5.html] which confirms that: *'There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast. This disparity in the historical data highlights the uncertainty of future year projections of both NO_x and NO_2, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections'*.

- 2023 'No development' Theoretical Scenario = Baseline + committed development (**using 2016 traffic emission factors**); and,
- 2023 'With development' Theoretical Scenario = Baseline + committed development + Proposed development (**using 2016 traffic emission factors**).

The Scenario 2 assessment results are presented in **Appendix B**.

Scenario 3 is included in **Appendix C** and uses the Defra background concentrations.

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/m^3)			
		Baseline 2016	Do Minimum 2023	Do Something 2023	Development Contribution
R1	Fauld Lodge	15.37	15.22	15.26	0.04
R2	Coton Lane	15.31	15.18	15.19	0.01
R3	Warren Cottage	17.11	16.05	16.07	0.02
R4	Shobnall Primary School	26.00	24.57	24.58	0.01
R5*	172 Horninglow Road	35.44	33.20	33.22	0.02
R6	2 Horninglow Croft	29.69	25.49	25.51	0.02
R7	Outwoods Primary School	21.87	21.50	21.51	0.01
R8	133 Horninglow Road North	23.86	22.70	22.72	0.02
R9	34 Fiddlers Lane	16.69	15.99	16.01	0.02
R10	The Sycamores	17.07	16.18	16.23	0.05

Receptor		NO_2 (µg/m³)			
		Baseline 2016	Do Minimum 2023	Do Something 2023	Development Contribution
R11	Richard Wakefield C of E Primary School	15.54	15.32	15.36	0.04
R12	27 Castle Street	15.85	15.50	15.59	0.09
Annual Mean AQO not to be exceeded		**40 µg/m³**			
***Receptor in AQMA**					

All modelled existing 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 NO_2 as a result of the proposed development at any modelled existing receptor is 0.09 µg/m³ at 27 Castle Street (R12).

All existing 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 significance 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 Significance of Effects at Key Receptors (NO_2)

NO_2 Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.04	0.10	0%	≤75% of AQAL	Negligible
R2	0.01	0.02	0%	≤75% of AQAL	Negligible
R3	0.02	0.05	0%	≤75% of AQAL	Negligible
R4	0.01	0.02	0%	≤75% of AQAL	Negligible
R5*	0.02	0.05	0%	76-94% of AQAL	Negligible
R6	0.02	0.05	0%	≤75% of AQAL	Negligible
R7	0.01	0.02	0%	≤75% of AQAL	Negligible
R8	0.02	0.05	0%	≤75% of AQAL	Negligible
R9	0.02	0.05	0%	≤75% of AQAL	Negligible
R10	0.05	0.12	0%	≤75% of AQAL	Negligible
R11	0.04	0.10	0%	≤75% of AQAL	Negligible
R12	0.09	0.22	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.					
*Receptor in AQMA					

The significance 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. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

Particulate Matter

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 2016	Do Minimum 2023	Do Something 2023	Development Contribution
R1	Fauld Lodge	12.73	12.72	12.73	0.01
R2	Coton Lane	12.16	12.15	12.16	0.01
R3	Warren Cottage	12.53	12.51	12.52	0.01
R4	Shobnall Primary School	14.86	14.84	14.84	<0.01
R5*	172 Horninglow Road	16.49	16.46	16.46	<0.01
R6	2 Horninglow Croft	17.01	16.93	16.94	0.01
R7	Outwoods Primary School	13.34	13.33	13.34	0.01
R8	133 Horninglow Road North	13.68	13.66	13.66	<0.01
R9	34 Fiddlers Lane	13.44	13.43	13.43	<0.01
R10	The Sycamores	13.37	13.36	13.37	0.01
R11	Richard Wakefield C of E Primary School	13.17	13.16	13.17	0.01
R12	27 Castle Street	13.42	13.41	13.44	0.03
Annual Mean AQO not to be exceeded		**40 µg/m³**			
***Receptor in AQMA**					

As indicated in Table 6.9, the maximum predicted increase PM_{10} as a result of the proposed development, is 0.03 µg/m³ at 27 Castle Street (R12).

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

The significance 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 Significance of Effects at Key Receptors (Particulate Matter)

PM_{10} Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.01	0.03	0%	≤75% of AQAL	Negligible
R2	0.01	0.01	0%	≤75% of AQAL	Negligible
R3	0.01	0.01	0%	≤75% of AQAL	Negligible
R4	<0.01	0.01	0%	≤75% of AQAL	Negligible
R5*	<0.01	0.02	0%	≤75% of AQAL	Negligible

PM_{10} Significance Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change Due to Development (% of AQO)**	**% Change in Concentration Relative to AQAL**	**% Annual Mean Concentration in Assessment Year**	**Significance**
R6	0.01	0.01	0%	≤75% of AQAL	Negligible
R7	0.01	0.01	0%	≤75% of AQAL	Negligible
R8	<0.01	0.01	0%	≤75% of AQAL	Negligible
R9	<0.01	0.01	0%	≤75% of AQAL	Negligible
R10	0.01	0.03	0%	≤75% of AQAL	Negligible
R11	0.01	0.03	0%	≤75% of AQAL	Negligible
R12	0.03	0.06	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.					
*Receptor in AQMA					

The significance 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 2016	**Do Minimum 2023**	**Do Something 2023**	**Development Contribution**
R1	Fauld Lodge	8.61	8.60	8.61	0.01
R2	Coton Lane	8.37	8.37	8.37	<0.01
R3	Warren Cottage	8.81	8.78	8.78	<0.01
R4	Shobnall Primary School	10.11	10.07	10.07	<0.01
R5*	172 Horninglow Road	11.01	10.95	10.95	<0.01
R6	2 Horninglow Croft	11.31	11.20	11.21	0.01
R7	Outwoods Primary School	9.24	9.23	9.23	<0.01
R8	133 Horninglow Road North	9.44	9.41	9.41	<0.01
R9	34 Fiddlers Lane	9.16	9.14	9.14	<0.01
R10	The Sycamores	9.32	9.30	9.30	<0.01
R11	Richard Wakefield C of E Primary School	9.19	9.19	9.19	<0.01
R12	27 Castle Street	9.43	9.42	9.43	0.01
Annual Mean AQO not to be exceeded		**25 µg/m³**			
***Receptor in AQMA**					

As indicated in Table 6.11, the maximum predicted increase in $PM_{2.5}$ at any existing receptor as a result of the proposed development it 0.01 µg/m^3 at Fauld Lodge (R1), 2 Horninglow Croft (R6) and 27 Castle Street (R12).

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

The significance 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 Significance of Effects at Key Receptors (Particulate Matter)

$PM_{2.5}$ Significance Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change Due to Development (% of AQO)**	**% Change in Concentration Relative to AQAL**	**% Annual Mean Concentration in Assessment Year**	**Significance**
R1	0.01	0.02	0%	≤75% of AQAL	Negligible
R2	<0.01	0.01	0%	≤75% of AQAL	Negligible
R3	<0.01	0.01	0%	≤75% of AQAL	Negligible
R4	<0.01	0.01	0%	≤75% of AQAL	Negligible
R5*	<0.01	0.01	0%	≤75% of AQAL	Negligible
R6	0.01	0.01	0%	≤75% of AQAL	Negligible
R7	<0.01	0.00	0%	≤75% of AQAL	Negligible
R8	<0.01	0.01	0%	≤75% of AQAL	Negligible
R9	<0.01	0.01	0%	≤75% of AQAL	Negligible
R10	<0.01	0.03	0%	≤75% of AQAL	Negligible
R11	<0.01	0.02	0%	≤75% of AQAL	Negligible
R12	0.01	0.05	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.					
*Receptor in AQMA					

The significance 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 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 significance 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. They are categorised into 'highly recommended' and 'desirable' measures.

The mitigation measures for the proposed development are detailed in Table 7.1 below:

Table 7.1 Highly Recommended 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.

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

8. Conclusions

WYG have undertaken an Air Quality Assessment for the proposed commercial development at Fauld Industrial Park, Tutbury in accordance with the methodology and parameters described within this report.

Prior to the implementation of appropriate mitigation measures, the potential impact significance of dust emissions associated with the construction phase of the proposed development has potential as 'low' at some worst affected receptors without mitigation. However, 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 2023 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in NO_2 at any existing receptor as a result of the proposed development is 0.09 µg/m^3 at 27 Castle Street (R12).

The maximum predicted increase in PM_{10} at any existing receptor as a result of the proposed development is 0.03 µg/m^3 at 27 Castle Street (R12).

The maximum predicted increase in PM_{10} at any existing receptor as a result of the proposed development is 0.01 µg/m^3 at 27 Castle Street (R12).

The significance 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.

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

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.

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**

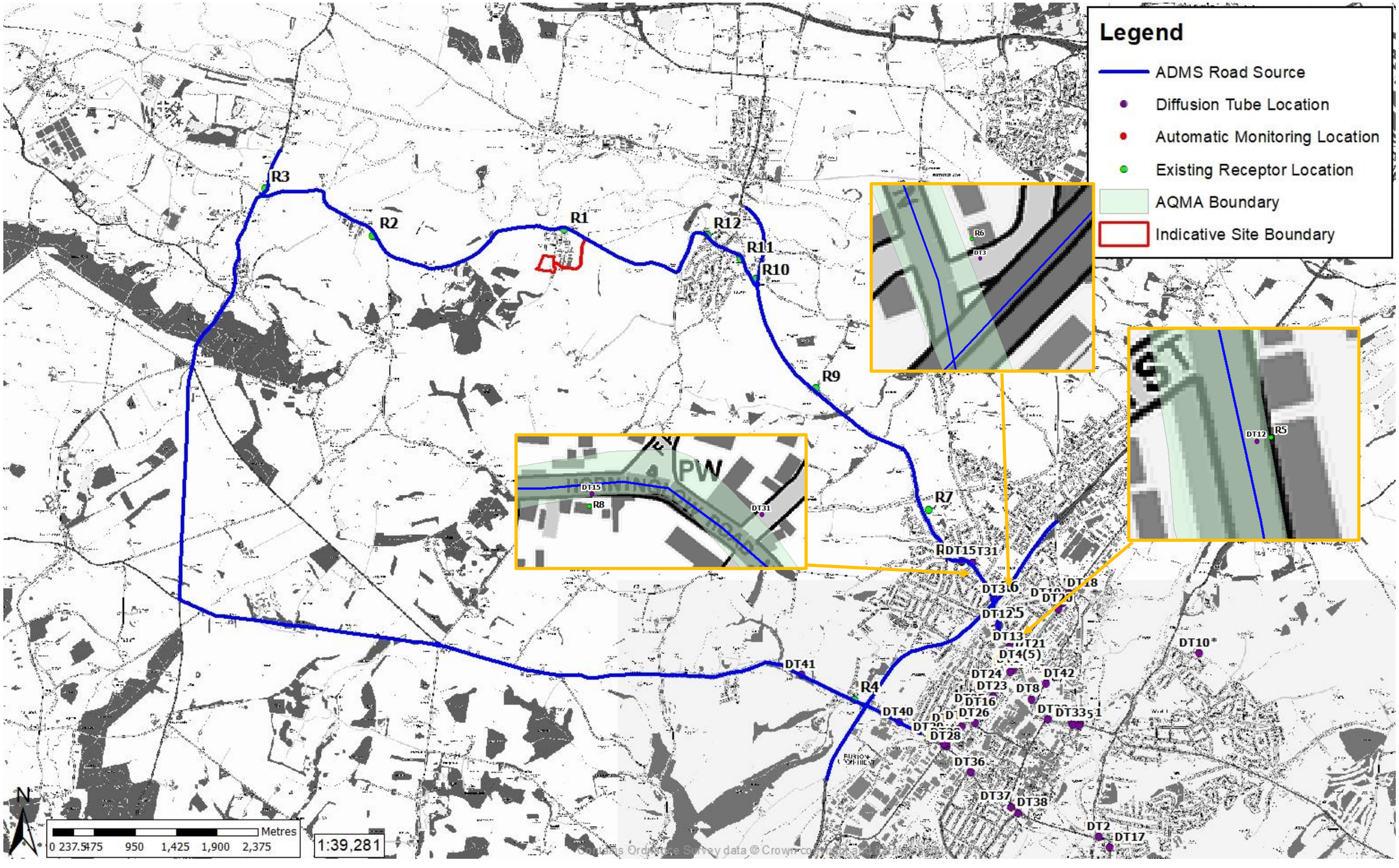


Figure 2 East Midlands 2016 Meteorological Station Wind Rose

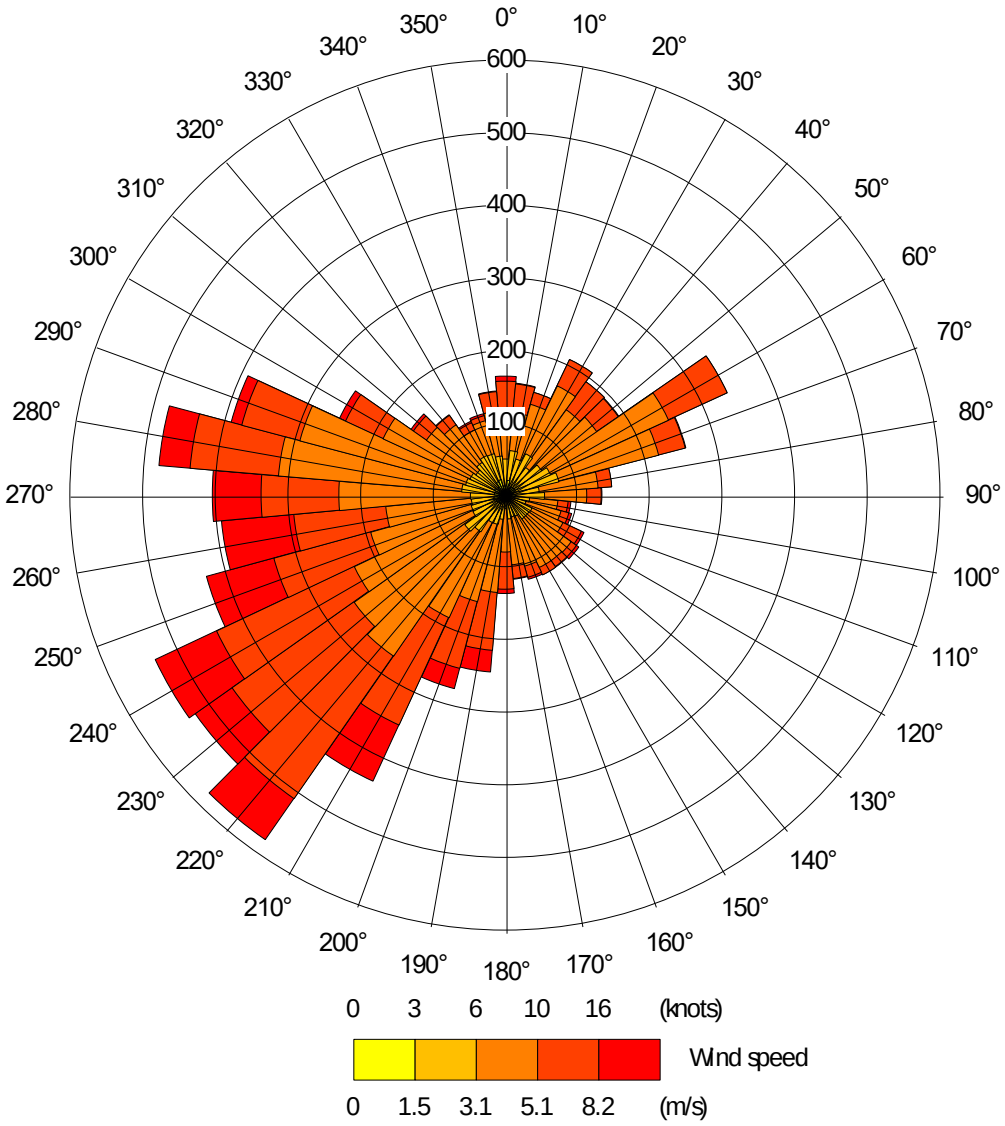
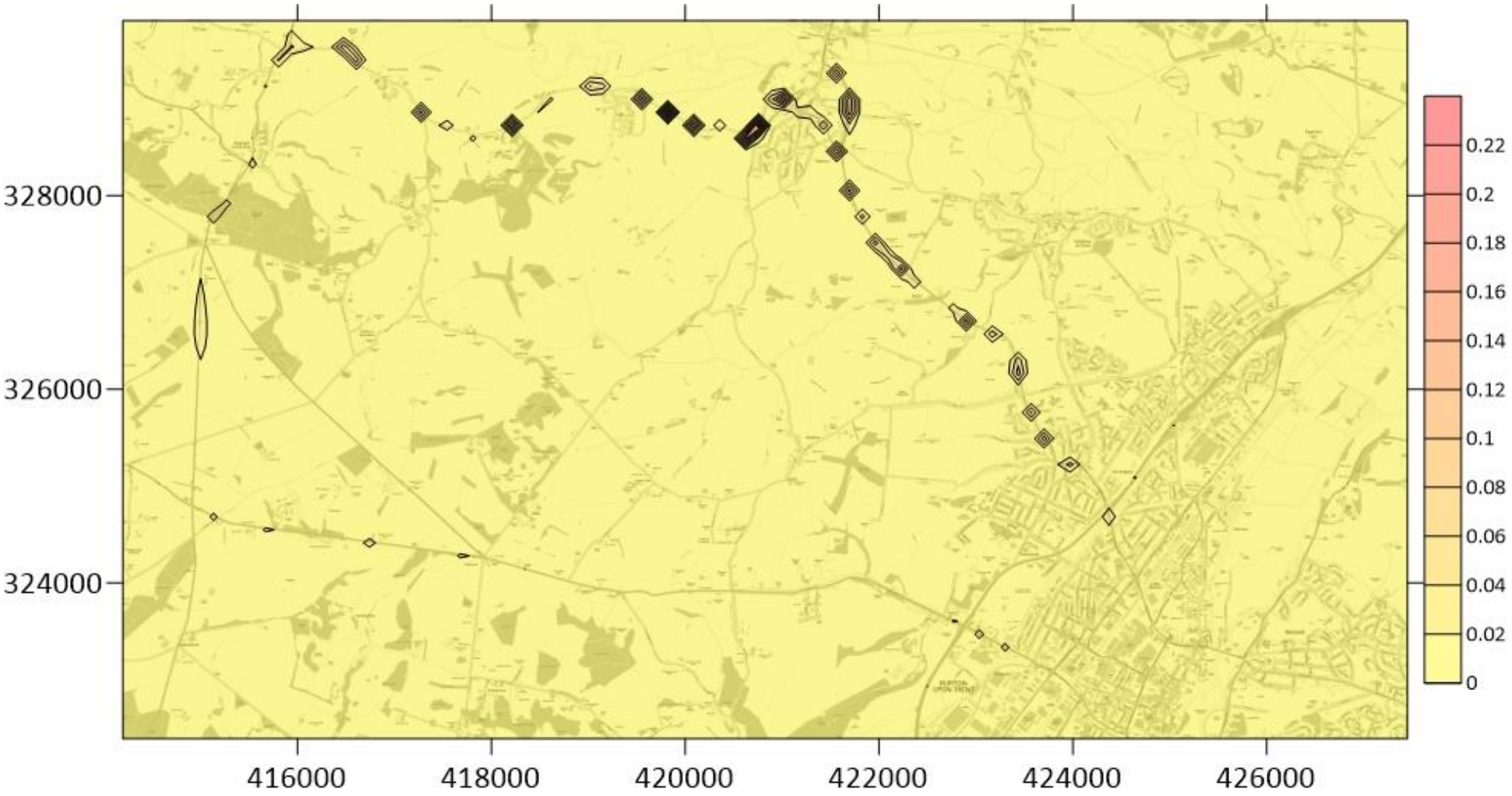


Figure 3 Predicted Environmental Concentration of NO_2 – Development Contribution



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 ·g/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 – 32 ·g/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 – 28 ·g/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 ·g/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
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 Theoretical Scenario Results

Scenario 2 (Theoretical Scenario) Results

Table B1 Theoretical Scenario NO_2 Results

Receptor		NO_2 Annual Mean Concentration (µg/m³)			
		Baseline 2016	Do Minimum 2023	Do Something 2023	Development Contribution (DS-DM)
R1	Fauld Lodge	15.37	15.40	15.46	0.06
R2	Coton Lane	15.31	15.33	15.35	0.02
R3	Warren Cottage	17.11	17.26	17.28	0.02
R4	Shobnall Primary School	26.00	26.23	26.24	0.01
R5*	172 Horninglow Road	35.44	35.84	35.88	0.04
R6	2 Horninglow Croft	29.69	30.31	30.34	0.03
R7	Outwoods Primary School	21.87	21.94	21.95	0.01
R8	133 Horninglow Road North	23.86	24.07	24.09	0.02
R9	34 Fiddlers Lane	16.69	16.82	16.85	0.03
R10	The Sycamores	17.07	17.22	17.30	0.08
R11	Richard Wakefield C of E Primary School	15.54	15.58	15.65	0.07
R12	27 Castle Street	15.85	15.92	16.06	0.14
Annual Mean AQO not to be exceeded		**40 µg/m³**			
***Receptor in AQMA**					

Table B2 Significance of Effects at Key Receptors (NO_2)

NO_2 Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.06	0.15	0%	≤75% of AQAL	Negligible
R2	0.02	0.05	0%	≤75% of AQAL	Negligible
R3	0.02	0.05	0%	≤75% of AQAL	Negligible
R4	0.01	0.02	0%	≤75% of AQAL	Negligible
R5*	0.04	0.10	0%	76-94% of AQAL	Negligible
R6	0.03	0.07	0%	76-94% of AQAL	Negligible
R7	0.01	0.02	0%	≤75% of AQAL	Negligible
R8	0.02	0.05	0%	≤75% of AQAL	Negligible
R9	0.03	0.07	0%	≤75% of AQAL	Negligible
R10	0.08	0.20	0%	≤75% of AQAL	Negligible
R11	0.07	0.17	0%	≤75% of AQAL	Negligible
R12	0.14	0.35	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.					
*Receptor in AQMA					

Table B3 Theoretical Scenario PM_{10} Results

Receptor		PM_{10} Annual Mean Concentration (µg/m³)			
		Baseline 2016	Do Minimum 2023	Do Something 2023	Development Contribution (DS-DM)
R1	Fauld Lodge	12.73	12.73	12.74	0.01
R2	Coton Lane	12.16	12.16	12.16	<0.01
R3	Warren Cottage	12.53	12.55	12.56	0.01
R4	Shobnall Primary School	14.86	14.90	14.90	<0.01
R5*	172 Horninglow Road	16.49	16.56	16.57	0.01
R6	2 Horninglow Croft	17.01	17.12	17.12	<0.01
R7	Outwoods Primary School	13.34	13.35	13.35	<0.01
R8	133 Horninglow Road North	13.68	13.71	13.72	0.01
R9	34 Fiddlers Lane	13.44	13.46	13.46	<0.01
R10	The Sycamores	13.37	13.39	13.41	0.02
R11	Richard Wakefield C of E Primary School	13.17	13.17	13.18	0.01
R12	27 Castle Street	13.42	13.43	13.46	0.03
Annual Mean AQO not to be exceeded		**40 µg/m³**			
***Receptor in AQMA**					

Table B4 Theoretical Scenario $PM_{2.5}$ Results

Receptor		$PM_{2.5}$ Annual Mean Concentration (µg/m³)			
		Baseline 2016	Do Minimum 2023	Do Something 2023	Development Contribution (DS-DM)
R1	Fauld Lodge	8.61	8.61	8.62	0.01
R2	Coton Lane	8.37	8.37	8.37	<0.01
R3	Warren Cottage	8.81	8.82	8.82	<0.01
R4	Shobnall Primary School	10.11	10.13	10.13	<0.01
R5*	172 Horninglow Road	11.01	11.05	11.05	<0.01
R6	2 Horninglow Croft	11.31	11.38	11.38	<0.01
R7	Outwoods Primary School	9.24	9.24	9.24	<0.01
R8	133 Horninglow Road North	9.44	9.46	9.46	<0.01
R9	34 Fiddlers Lane	9.16	9.17	9.17	<0.01
R10	The Sycamores	9.32	9.33	9.34	0.01
R11	Richard Wakefield C of E Primary School	9.19	9.20	9.20	<0.01
R12	27 Castle Street	9.43	9.43	9.45	0.02
Annual Mean AQO not to be exceeded		**25 µg/m³**			
***Receptor in AQMA**					

For Scenario 2, the assessment has determined that the maximum predicted increase in NO_2 as a result of the proposed development is 0.14 µg/m³ at 27 Castle Street (R12).

For Scenario 2, the assessment has determined that the maximum predicted increase in PM_{10} as a result of the proposed development is 0.03 µg/m³ at 27 Castle Street (R12).

For Scenario 2, the assessment has determined that the maximum predicted increase in $PM_{2.5}$ as a result of the proposed development is 0.02 µg/m^3 at 27 Castle Street (R12).

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.

Appendix C Defra Background Concentration Assessment

Model Verification

Table C1 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m³		
	Monitored NO_2	Modelled NO_2	Difference (%)
DT3*	31.40	41.56	32.35
DT12*	36.40	33.39	-8.27
DT15*	25.40	22.59	-11.08
DT31	28.90	20.87	-27.78
DT40	34.40	23.53	-31.61
DT41	26.70	21.69	-18.75
*In AQMA			

The final model produced data at the monitoring locations to within 32.35% 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 3.16. This suggests that due to the unrepresentative Defra backgrounds, the road contributions of NO_x are being over estimated 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 C2 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2016	Do Minimum 2023	Do Something 2023	Development Contribution
R1	Fauld Lodge	9.54	9.19	9.28	0.09
R2	Coton Lane	8.42	8.11	8.15	0.04
R3	Warren Cottage	12.76	10.34	10.37	0.03
R4	Shobnall Primary School	20.63	17.32	17.34	0.02
R5*	172 Horninglow Road	31.67	26.56	26.63	0.06
R6	2 Horninglow Croft	38.07	29.12	29.15	0.03
R7	Outwoods Primary School	14.46	13.59	13.61	0.02
R8	133 Horninglow Road North	19.03	16.38	16.41	0.03
R9	34 Fiddlers Lane	13.19	11.58	11.63	0.05
R10	The Sycamores	14.53	12.51	12.62	0.11
R11	Richard Wakefield C of E Primary School	11.04	10.52	10.61	0.09
R12	27 Castle Street	15.58	14.80	14.99	0.20
Annual Mean AQO not to be exceeded		**40 µg/m³**			
***Receptor in AQMA**					

[3] This was achieved by applying a model correction factor of 3.16 to roadside predicted NO_X concentrations before converting to NO_2

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 0.20 µg/m^3 at 27 Castle Street (R12).

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

The significance 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 C3.

Table C3 Significance of Effects at Key Receptors (NO_2)

NO_2 Significance Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**% of AQAL**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Significance**
R1	0.09	0.23	0%	≤75% of AQAL	Negligible
R2	0.04	0.10	0%	≤75% of AQAL	Negligible
R3	0.03	0.08	0%	≤75% of AQAL	Negligible
R4	0.02	0.05	0%	≤75% of AQAL	Negligible
R5	0.06	0.16	0%	≤75% of AQAL	Negligible
R6	0.03	0.08	0%	≤75% of AQAL	Negligible
R7	0.02	0.05	0%	≤75% of AQAL	Negligible
R8	0.03	0.08	0%	≤75% of AQAL	Negligible
R9	0.05	0.13	0%	≤75% of AQAL	Negligible
R10	0.11	0.28	0%	≤75% of AQAL	Negligible
R11	0.09	0.23	0%	≤75% of AQAL	Negligible
R12	0.20	0.49	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 significance 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 D EP Report Terms and Conditions

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