

Harworth Estates Investments Limited

Occupation Lane, Woodville

Air Quality Assessment

July 2019

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Executive Summary

WYG have undertaken an Air Quality Assessment for the proposed mixed-use development at land off Occupation Lane, Woodville.

Construction Phase

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

During the construction phase, site specific mitigation measures detailed within this assessment will be implemented. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

Operational Phase

An operational year assessment for 2024 traffic emissions has been undertaken to assess the effects of Proposed Development during two scenarios (25% and 50% diversion).

DM1 v DS1 (25% Diversion)

The maximum predicted annual average exposure to NO₂, PM₁₀ and PM_{2.5} at any proposed residential receptor is below the annual average AQO and therefore no additional mitigation is required.

The assessment of the impact description of the effects associated with the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposure, the impact description of the proposed development is determined 'negligible' for all identified existing sensitive receptors.

DM2 v DS2 (50% Diversion)

The maximum predicted annual average exposure to NO₂, PM₁₀ and PM_{2.5} at any proposed residential receptor is below the annual average AQO and therefore no additional mitigation is required.

The assessment of the impact description of the effects associated with the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposure, the impact description of the proposed development is determined 'negligible' for all identified existing sensitive receptors.

1. Introduction

Harworth Estates Investments Limited commissioned WYG Environment to prepare an Air Quality Assessment to support an application for the proposed mixed-use development at land off Occupation Lane, Woodville.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is approximately 431061, 318763. The Site is bounded to the north-east by Food Search Worldwide, to the east by Moira Road, to the south-east by Occupation Lane, to the south, west and north-west by existing commercial units.

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 (NO₂) and particulate matter with an aerodynamic diameter of less than 10 µm (PM₁₀) 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 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;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, IAQM, October 2018; and,
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.0), IAQM, June 2019.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.gov.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
- South Derbyshire District Council (<http://www.southderbyshire.gov.uk/>).

Site Specific Reference Documents

- South Derbyshire District Council, 2018 Air Quality Annual Status Report (Published May 2018);
- South Derbyshire District Council: Local Plan Part 1, Adopted 13th June 2016; and,
- South Derbyshire District Council: Local Plan Part 2, Adopted 2nd November 2017.

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 NO₂ and oxides of nitrogen, sulphur dioxide, lead and PM₁₀;
- **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 (Amendments 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	1 st January 2005	50µg/m ³ by end of 2004 (max 35 exceedances a year)	1 st January 2005	Retain Existing
	UK	40µg/m ³ by end of 2004	Annual Mean	1 st January 2005	40µg/m ³	1 st January 2005	
PM _{2.5}	UK	25µg/m ³	Annual Mean	31 st December 2010	25µg/m ³	1 st January 2010	Retain Existing
NO ₂	UK	200µg/m ³ not to be exceeded more than 18 times a year	1-Hour Mean	31 st December 2005	200µg/m ³ not to be exceeded more than 18 times a year	1 st January 2010	Retain Existing
	UK	40µg/m ³	Annual Mean	31 st December 2005	40µg/m ³	1 st 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 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 Housing, 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

The South Derbyshire District Council (SDDC) Local Plan Part 1 (adopted 13th June 2016) sets out and provided guidance for managing development and land use within the borough. SDDC's Local Plan Part 2 (adopted 2nd November 2017) sets out housing allocations and development management policies.

Following a review of the SDDC Local Plan Part 1, no policies relating to air quality within the borough were identified. Following a review of the SDDC Local Plan Part 2, the following policies have been identified:

"Policy BNE7 Trees, Woodland and Hedgerows

- A. Where development is proposed that could affect trees, woodland and/or hedgerows which are important in terms of their amenity, ecological, landscape or historic value, developers will be expected to demonstrate that:*
 - i. the layout and form of development have been informed by an appropriate arboricultural and/or hedgerow surveys; and*
 - ii. development would not suffer from undue shading either now or in the future; and*
 - iii. appropriate measures are secured to ensure adequate root protection and buffers around trees, woodland and hedgerows.*
- B. The felling of protected trees, groups of trees or woodland and/or removal of important hedgerows, will be considered in accordance with the relevant national guidance and regulations, taking account in particular of their amenity, ecological, landscape and historic*

value. Where protected trees and/or hedgerows are subject to felling or removal, a replacement of an appropriate number, species, size and in an appropriate location will normally be required.

- C. Development proposals which will have a detrimental effect on important trees, woodland or hedgerows must satisfactorily demonstrate how the impact on biodiversity has been minimised and, wherever possible, a net biodiversity gain delivered through appropriate mitigation, compensation or offsetting, including through new planting or improved management of retained trees and hedgerows. New planting will be expected to be adequately managed to reach full maturity.*
- D. Where new planting is proposed on development sites, principal consideration should be given to planting tree species which are in keeping with the urban or rural character of the area. However, where appropriate, wider environmental or amenity benefits including improvements to local air quality, erosion control, land drainage or shading should be considered."*

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 impact description of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*' and June 2019 '*A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*'.

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 the Impact Magnitude of the Air Quality Effects

The impact magnitude 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 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 impacts are provided as a percentage of the Air Quality Objective (AQO), which may be an 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 impacts can be adverse when pollutant concentrations increase or beneficial when concentration 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 Descriptors for Individual Receptors

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 several sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, South Derbyshire District Council (SDDC) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. SDDC has no designated Air Quality Management Area (AQMA) within the borough.

Air Quality Monitoring

Monitoring of air quality within SDDC is undertaken 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

SDDC operated a network of 17 diffusion tubes during 2017. Reference should be made to Figure 1 for the locations of the diffusion tubes within the extents of the air quality study area. The closest diffusion tube to the Proposed Development site is SDDC5, which is located 347 m north-east of the site boundary.

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

Table 4.1 Monitored Annual Mean NO₂ Concentrations

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	2017 Annual Mean NO ₂ Concentration (µg/m ³)
SDDC2	27 High Street, Woodville	Roadside	4	2	27.2
SDDC5	26 High Street, Woodville	Kerbside	1	2	31.4
SDDC6	8 High Street, Woodville	Roadside	4	2	33.3
SDDC11	Library, Hartsborne Road, Woodville	Roadside	15	2	31.1
SDDC17	210 High Street, Woodville	Roadside	2	2	31.3

As indicated in Table 4.1, no diffusion tubes monitored exceedances of the AQO (40µg/m³ annual mean) in 2017. All diffusion tubes highlighted in Table 4.1 lie within the extents of the study area. However, due to the distance from the kerb SDDC11 has been excluded from the model verification. Additionally, monitoring

locations, SDDC2, SDDC5 and SDDC6 are located within a close proximity to each other. As SDDC2 monitored the lowest concentration during 2017, this has been excluded from the model verification. All other monitoring locations identified within Table 4.1 have been utilised for model verification.

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 2017 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 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 NO₂, PM₁₀ 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 4.1.1 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.

The existing receptor locations are summarised in Table 4.2 (overleaf) and the spatial locations of all of the receptors are illustrated in Figure 1.

Table 4.2 Modelled Existing Sensitive Receptor Locations

	Discrete Sensitive Receptor	Receptor Height (m)
R1	24 Main Street, Albert Village	1.5
R2	12 Bridge Close, Church Gresley	1.5
R3	38 Derby Road, Swadlincote	1.5
R4	161 Swadlincote Road, Woodville	1.5
R5	3 Swadlincote Road, Woodville	1.5
R6	3 Burton Road, Woodville	1.5
R7	3 Hartshorne Road, Woodville	1.5
R8	9 High Street, Woodville	1.5
R9	27b High Street, Woodville	1.5
R10	12 Radleigh Grange, Woodville	1.5
R11	Southfields, Thorn Street, Woodville	1.5
R12	27 Windmill Close, Woodville	1.5
R13	66 Donington Drive, Woodville	1.5
R14	18 Victoria Drive, Woodville	1.5
R15	18 Rivoli Drive, Woodville	1.5
R16	43 Arliston Drive, Woodville	1.5
R17	39 Occupation Lane, Woodville	1.5

12 proposed sensitive receptors have been assessed to determine the effect of air quality, associated with the proposed development. The locations of the receptor are identified on Figure 1.

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. The IAQM guidance on 'Air Quality Impacts on Designated Nature Conservation Sites' (2019) document outlines the types of designated nature sites within 2 km of the proposed development which require air quality assessment. These are inclusive of;

- 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.

Consultation with the Project's Ecologists (FPCR Ecologists), has also been undertaken who identified the below conservation sites. The Ecologists also identified several Potential Local Wildlife Sites (PLWS) which have been included within the assessment.

Following a search within a 2 km radius of the site boundary, ten ecological receptors were identified, as shown in Table 4.3 below.

In accordance with the IAQM Guidance, several points have been included at some sites as part of the assessment.

Table 4.3 Ecological Receptors

Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Road Centre Line (m)
			X	Y		
E1	Church Gresley Scrub	PLWS	429309	318899	1.4	890
E2	Hall Farm Field Ponds	PLWS	429356	319724	1.6	1,140
E3	Midway Fishponds	LWS	430477	320172	1.3	430
E4	Woodville Disused Railway	PLWS	431121	320116	1.1	20
E5	Woodville Disused Railway	LWS	431890	319706	1.0	10
E6	Woodville Disused Railway	LWS	431823	319617	0.9	10
E7	Woodville Disused Railway	LWS	431940	318810	0.5	50
E8	Church Gresley Wood	PLWS	430089	317710	1.1	10
E9	Land off Penkridge Rd	PLWS	430267	318513	0.5	10
E10	Ski Heath	PLWS	430332	319219	0.6	130
E11	Swadlincote Woods	PLWS	430496	319257	0.5	10
E12	Swadlincote Woods	PLWS	430792	319301	0.4	40
E13	MIDWAY CLAY SITE	LWS	430881	319738	0.8	350

It should be noted that the IAQM Guidance only requires the assessment of ecological receptors which are located within 200m of the road network. Due to the distance from the modelled road network, ecological receptors E1, E2, E3 and E13 have been scoped out of this air quality assessment.

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/PM₁₀ concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

5.2 Particulate Matter (PM₁₀)

The UK Air Quality Standards seek to control the health implications of respirable PM₁₀. 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 PM₁₀ 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/m²/day. Therefore, a deposition rate of 200mg/m²/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	Large
Construction	Large
Trackout	Large

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	Large	Low	Low
Construction	Large	Low	Low
Trackout	Large	Low	Low

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 overleaf.

As referenced within the IAQM Guidance document, ecological receptors which are located >500m from the site boundary are not considered to experience a significant effect associated with construction pollutants. All identified receptors are located greater than 500m from the proposed development site boundary. As stated within the IAQM Guidance, impact declines with distance from the site. Therefore, the ecological receptors identified within Table 4.3 have not been assessed as part of the construction assessment.

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	High	Low	Low
Construction	High	Low	Low
Trackout	High	Low	Low

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, road traffic 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 NO₂, PM₁₀ 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 2024. The assessment scenarios are therefore:

- 2017 Baseline = Existing baseline conditions;
- Scenario 1
 - 2024 'Do Minimum 1' = 2024 Baseline Scenario with Com Dev & Regeneration Link (25% Diversion);
 - 2024 'Do Minimum 2' = 2024 Baseline Scenario with Com Dev & Regeneration Link (50% Diversion);
- Scenario 2
 - 2024 'Do Something 1' = 2024 with All Developments Scenario with Regeneration Link (25% Diversion); and,
 - 2024 'Do Something 2' = 2024 with All Developments Scenario with Regeneration Link (50% Diversion).

6.1 Existing and Predicted Traffic Flows

Baseline 2017 data and projected 2024 '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). This traffic data was provided by Curtins Transport Consultants.

It is assumed the average vehicle speeds on the local road network in an opening year of 2024 will be broadly the same as the ones in 2017.

Emission factors for the 2017 baseline and 2024 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 9 (May 2019).

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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 and Table 6.2.

Table 6.1 Traffic Data (Do Minimum 1 & Do Something 1)

Link	Speed (km/h)	2017		2024			
		AADT	HGV%	Do Minimum 1		Do Something 1	
				AADT	HGV%	AADT	HGV%
Occupation Lane (West of Main Street)	48	5284	1.2	5963	1.2	6354	1.4
Mushroom Lane	48	9563	1.2	10794	1.2	11022	1.3
Main Street	48	15916	0.8	17965	0.8	18137	0.9
Occupation Lane (East of Main Street)	64	6350	1.0	7168	1.0	7959	1.3
Occupation Lane (West of Hepworth Road)	64	6177	0.9	8628	1.5	9419	1.9
Hepworth Road (South of Occupation Lane)	64	6280	0.9	10831	2.8	11798	2.9
Occupation Lane (East of Hepworth Road)	20	384	0.0	433	0.0	433	0.0
Hepworth Road (North of Moria Road)	64	6536	2.2	10674	3.7	11641	3.7
Moria Road (South of Hepworth Road)	64	6203	4.7	8244	4.8	8526	4.7
Hepworth Road (South of Moria Road)	64	8820	3.0	12078	3.9	12713	3.8
Moria Road (North of Hepworth Road)	64	5186	4.2	5854	4.2	6188	4.1
Moiria Road (South of Site Access)	64	4986	9.0	5628	9.0	5961	8.7
Moiria Road (North of Site Access)	48	4986	9.0	5628	9.0	5817	8.9
Moiria Road (South of A514/A511)	48	5420	4.3	6121	4.3	6325	4.3
A514 (Swadlincote Road) (West of Moira Road)	48	14453	5.5	14235	5.1	14627	5.1
A514 (Swadlincote Road) (West of Destination G)	48	15099	5.3	15506	4.8	16067	4.8
Woodhouse Street/Regeneration Link	48	6284	5.0	8227	5.8	9359	5.7
A514 (Swadlincote Road) (West of Woodhouse Street)	48	12745	5.2	13687	5.3	14251	5.3
Bernard Street	48	797	0.6	797	0.6	797	0.6
A511 Burton Road	48	14559	3.4	16488	3.3	16753	3.4
A514 (Hartshorne Road)	48	9747	1.4	11006	1.4	11251	1.5
A511 Ashby Road (East of Moira Road)	48	17586	6.2	17832	6.0	17832	6.0
A511 Ashby Road (West of Hepworth Road)	48	15655	7.0	15650	34.4	15650	34.4
A511 Ashby Road (East of Hepworth Road)	48	19126	6.5	21696	6.5	22330	6.4
Hepworth Road (South of A511 Ashby Road)	48	7009	3.6	10174	46.8	10808	44.2
Hepworth Road (North of Forest Road)	64	7368	3.4	10578	4.3	11212	4.3
Forest Road	64	2495	1.6	3025	1.6	3025	1.7
Hepworth Road (West of Forest Road)	64	7625	3.0	10727	4.0	11361	4.0

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Link	Speed (km/h)	2017		2024			
		AADT	HGV%	Do Minimum 1		Do Something 1	
				AADT	HGV%	AADT	HGV%
Woodhouse Street	48	6284	0.0	3465	5.6	3636	5.6
Regeneration Link (North of Residential Phase 2 North Access)	48	0	0.0	5397	6.0	6677	5.8
Regeneration Link (South of Residential Phase 2 North Access)	48	0	0.0	5397	6.0	6838	5.7
Regeneration Link (North of Residential Phase 2 South Access)	48	0	0.0	5397	6.0	6840	5.7
Regeneration Link (South of Residential Phase 2 South Access)	48	0	0.0	5397	6.0	7001	5.6
Regeneration Link (North of Occupation Lane)	48	0	0.0	5396	6.0	7042	5.6
Employment Phase 2 (South Access)	48	0	0.0	0	0.0	502	0.7
Residential Phase 2 (South Access)	48	0	0.0	0	0.0	941	6.5
Residential Phase 2 (North Access)	48	0	0.0	0	0.0	502	0.7
Employment Phase 2 (North Access)	48	0	0.0	0	0.0	941	6.5
Regeneration Link (North of Woodhouse Street)	48	6284	5.0	5695	6.1	7016	5.8
Regeneration Link (South of Woodhouse Street)	48	6284	5.0	8564	5.8	9888	5.6
Residential Phase 2 Site Access	48	0	0.0	0	0.0	334	0.7

Table 6.2 Traffic Data (Do Minimum 2 & Do Something 2)

Link	Speed (km/h)	2017		2024			
		AADT	HGV%	Do Minimum 2		Do Something 2	
				AADT	HGV%	AADT	HGV%
Occupation Lane (West of Main Street)	48	5284	1.2	5963	1.2	6354	1.4
Mushroom Lane	48	9563	1.2	10794	1.2	11022	1.3
Main Street	48	15916	0.8	17965	0.8	18137	0.9
Occupation Lane (East of Main Street)	64	6350	1.0	7168	1.0	7959	1.3
Occupation Lane (West of Hepworth Road)	64	6177	0.9	8518	1.6	9309	1.8
Hepworth Road (South of Occupation Lane)	64	6280	0.9	12808	3.7	13774	3.7
Occupation Lane (East of Hepworth Road)	20	384	0.0	433	0.0	433	0.0
Hepworth Road (North of Moria Road)	64	6536	2.2	12651	3.7	13618	4.3
Moria Road (South of Hepworth Road)	64	6203	4.7	8134	4.8	8416	4.7
Hepworth Road (South of Moria Road)	64	8820	3.0	14165	3.9	14800	4.5
Moria Road (North of Hepworth Road)	64	5186	4.2	5854	4.2	6188	4.1
Moir Road (South of Site Access)	64	4986	9.0	5628	9.0	5961	8.7
Moir Road (North of Site Access)	48	4986	9.0	5628	9.0	5817	8.9
Moir Road (South of A514/A511)	48	5420	4.3	6121	4.3	6325	4.3

Occupation Lane, Woodville Air Quality Assessment



Link	Speed (km/h)	2017		2024			
		AADT	HGV%	Do Minimum 2		Do Something 2	
				AADT	HGV%	AADT	HGV%
A514 (Swadlincote Road) (West of Moira Road)	48	14453	5.5	12147	4.5	12539	4.5
A514 (Swadlincote Road) (West of Destination G)	48	15099	5.3	13419	4.2	13980	4.2
Woodhouse Street/Regeneration Link	48	6284	5.0	9794	6.2	10928	6.1
A514 (Swadlincote Road) (West of Woodhouse Street)	48	12745	5.2	13687	5.3	14250	5.3
Bernard Street	48	797	0.6	797	0.6	797	0.6
A511 Burton Road	48	14559	3.4	16488	3.3	16753	3.4
A514 (Hartshorne Road)	48	9747	1.4	11006	1.4	11251	1.5
A511 Ashby Road (East of Moira Road)	48	17586	6.2	15744	5.7	15744	5.7
A511 Ashby Road (West of Hepworth Road)	48	15655	7.0	13563	38.4	13563	38.4
A511 Ashby Road (East of Hepworth Road)	48	19126	6.5	21696	6.4	22331	6.4
Hepworth Road (South of A511 Ashby Road)	48	7009	3.6	12261	40.2	12896	38.4
Hepworth Road (North of Forest Road)	64	7368	3.4	12666	4.4	13301	4.9
Forest Road	64	2495	1.6	3025	1.6	3025	1.6
Hepworth Road (West of Forest Road)	64	7625	3.0	12815	4.1	13450	4.6
Woodhouse Street	48	6284	0.0	3541	5.7	3713	5.7
Regeneration Link (North of Residential Phase 2 North Access)	48	0	0.0	7263	6.6	8543	6.4
Regeneration Link (South of Residential Phase 2 North Access)	48	0	0.0	7263	6.6	8704	6.3
Regeneration Link (North of Residential Phase 2 South Access)	48	0	0.0	7263	6.6	8706	6.3
Regeneration Link (South of Residential Phase 2 South Access)	48	0	0.0	7263	6.6	8867	6.2
Regeneration Link (North of Occupation Lane)	48	0	0.0	7263	6.6	8908	6.1
Employment Phase 2 (South Access)	48	0	0.0	0	0	502	0.7
Residential Phase 2 (South Access)	48	0	0.0	0	0	941	6.5
Residential Phase 2 (North Access)	48	0	0.0	0	0	502	0.7
Employment Phase 2 (North Access)	48	0	0.0	0	0	941	6.5
Regeneration Link (North of Woodhouse Street)	48	6284	5.0	7858	6.6	9181	6.4
Regeneration Link (South of Woodhouse Street)	48	6284	5.0	10209	6.2	11534	6.0
Residential Phase 2 Site Access	48	0	0.0	0	0	334	0.7

6.2 Background Concentrations

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail

emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and TG (16).

The IAQM Guidance states:

"A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO."

Additionally, TG (16) states:

"Typically only the process contributions from local sources are represented within and output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations."

Defra Published Background Concentrations for 2017

The background concentrations shown in Table 6.3 below were referenced 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), NO₂, PM₁₀ and PM_{2.5}. The mapped background concentrations are summarised in Table 6.3 (below).

Table 6.3 Published Background Air Quality Levels (µg/m³)

Receptor Location	2017			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}
Local Authority Monitoring				
SDDC5	12.80	17.72	15.03	10.02
SDDC6	12.80	17.72	15.03	10.02
SDDC11	11.79	16.22	17.45	11.21
Existing Sensitive Receptors				
R1	11.02	15.05	14.33	9.45
R2	11.02	15.05	14.33	9.45
R3	12.89	17.89	15.96	11.08
R4	12.89	17.89	15.96	11.08
R5	12.80	17.72	15.03	10.02
R6	12.80	17.72	15.03	10.02
R7	12.80	17.72	15.03	10.02
R8	12.80	17.72	15.03	10.02
R9	12.80	17.72	15.03	10.02
R10	11.79	16.22	17.45	11.21

Receptor Location	2017			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}
R11	11.79	16.22	17.45	11.21
R12	10.91	14.87	14.74	9.56
R13	10.91	14.87	14.74	9.56
R14	10.91	14.87	14.74	9.56
R15	10.91	14.87	14.74	9.56
R16	10.91	14.87	14.74	9.56
R17	10.91	14.87	14.74	9.56
Proposed Sensitive Receptors				
PR1	10.91	14.87	14.74	9.56
PR2	10.91	14.87	14.74	9.56
PR3	11.02	15.05	14.33	9.45
PR4	11.02	15.05	14.33	9.45
PR5	10.91	14.87	14.74	9.56
PR6	10.91	14.87	14.74	9.56
PR7	10.91	14.87	14.74	9.56
PR8	10.91	14.87	14.74	9.56
PR9	10.91	14.87	14.74	9.56
PR10	10.91	14.87	14.74	9.56
PR11	10.91	14.87	14.74	9.56
PR12	10.91	14.87	14.74	9.56
Ecological Sensitive Receptors				
E1	11.44	15.67	13.86	9.37
E2	14.23	20.08	14.23	9.60
E3	12.83	17.79	14.60	9.85
E4	11.52	15.77	16.00	10.01
E5	12.80	17.72	15.03	10.02
E6	12.80	17.72	15.03	10.02
E7	10.91	14.87	14.74	9.56
E8	10.05	13.60	15.32	9.42
E9	11.02	15.05	14.33	9.45
E10	12.89	17.89	15.96	11.08
E11	12.89	17.89	15.96	11.08
E12	12.89	17.89	15.96	11.08
E13	12.89	17.89	15.96	11.08

All the Defra background concentrations detailed in Table 6.3 for 2017, show that the background levels are predicted to be below the relevant AQO within the study area.

A breakdown of the background source apportionment of NO_x concentrations at each monitoring location and receptor is shown in Table 6.4.

Table 6.4 Pollutant Source Apportionment of NO_x (µg/m³)

Receptor Location	2017						
	Total NO _x	% of NO _x from Road Sources	% of NO _x from Industrial Sources	% of NO _x from Domestic Sources	% of NO _x from Aircraft Sources	% of NO _x from Rail Sources	% of NO _x from Other Sources
Local Authority Monitoring Locations							
SDDC5	17.72	30.08	5.25	7.59	0.08	3.53	53.46
SDDC6	17.72	30.08	5.25	7.59	0.08	3.53	53.46
SDDC17	16.22	21.24	13.42	4.74	0.12	4.28	56.21
Modelled Receptor Locations							
R1	15.05	20.45	6.80	6.22	0.11	5.57	60.85
R2	15.05	20.45	6.80	6.22	0.11	5.57	60.85
R3	17.89	27.47	5.88	8.41	0.08	3.78	54.38
R4	17.89	27.47	5.88	8.41	0.08	3.78	54.38
R5	17.72	30.08	5.25	7.59	0.08	3.53	53.46
R6	17.72	30.08	5.25	7.59	0.08	3.53	53.46
R7	17.72	30.08	5.25	7.59	0.08	3.53	53.46
R8	17.72	30.08	5.25	7.59	0.08	3.53	53.46
R9	17.72	30.08	5.25	7.59	0.08	3.53	53.46
R10	16.22	21.24	13.42	4.74	0.12	4.28	56.21
R11	16.22	21.24	13.42	4.74	0.12	4.28	56.21
R12	14.87	22.75	6.35	6.40	0.09	4.40	60.01
R13	14.87	22.75	6.35	6.40	0.09	4.40	60.01
R14	14.87	22.75	6.35	6.40	0.09	4.40	60.01
R15	14.87	22.75	6.35	6.40	0.09	4.40	60.01
R16	14.87	22.75	6.35	6.40	0.09	4.40	60.01
R17	14.87	22.75	6.35	6.40	0.09	4.40	60.01
Proposed Receptor Locations							
PR1	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR2	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR3	15.05	20.45	6.80	6.22	0.11	5.57	60.85
PR4	15.05	20.45	6.80	6.22	0.11	5.57	60.85
PR5	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR6	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR7	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR8	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR9	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR10	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR11	14.87	22.75	6.35	6.40	0.09	4.40	60.01
PR12	14.87	22.75	6.35	6.40	0.09	4.40	60.01
Ecological Receptor Locations							
E1	15.67	22.67	6.50	7.85	0.07	5.27	57.64
E2	20.08	25.31	9.37	8.53	0.05	3.65	53.08
E3	17.79	29.29	5.85	8.14	0.08	3.69	52.95
E4	15.77	24.03	6.06	6.73	0.12	4.46	58.60
E5	17.72	30.08	5.25	7.59	0.08	3.53	53.46

Receptor Location	2017						
	Total NO _x	% of NO _x from Road Sources	% of NO _x from Industrial Sources	% of NO _x from Domestic Sources	% of NO _x from Aircraft Sources	% of NO _x from Rail Sources	% of NO _x from Other Sources
E6	17.72	30.08	5.25	7.59	0.08	3.53	53.46
E7	14.87	22.75	6.35	6.40	0.09	4.40	60.01
E8	13.60	15.61	7.26	4.55	0.11	6.82	65.65
E9	15.05	20.45	6.80	6.22	0.11	5.57	60.85
E10	17.89	27.47	5.88	8.41	0.08	3.78	54.38
E11	17.89	27.47	5.88	8.41	0.08	3.78	54.38
E12	17.89	27.47	5.88	8.41	0.08	3.78	54.38

Table 6.4 above shows that the major background source of NO_x at the monitoring and sensitive receptor locations, where sources have been identified is comprised of 'other sources' but road sources make up the bulk of identified sources.

A review of the Defra background concentrations shows that the NO₂ concentrations at the monitoring and sensitive receptor locations are lower in comparison to the LA monitoring.

Local Authority Monitoring Background

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 NO₂ = 70%
- NO₂/NO_x = 70%
- Therefore, NO_x = NO₂/0.7 = 1.428

A factor of 1.428 has been applied to the NO₂ to produce the NO_x value.

Table 6.5 Roadside Modelled Contribution at Tubes

Tube	Monitored NO ₂ (µg/m ³)	Modelled Traffic Contribution NO ₂ (µg/m ³)	Non-Modelled Traffic NO ₂ (µg/m ³)
SDDC5	31.40	10.45	20.95
SDDC6	33.30	11.96	21.34
SDDC17	31.30	11.72	19.58
Average			20.62

Following a review of the LA monitoring, by considering the likely apportionment of traffic vs background contributions at each of the monitoring locations (Table 6.5 above), it is considered that the Defra Background

Maps produce a lower background compared to the non-traffic element from the LA monitoring. Therefore, the Defra background concentration are considered to be unrepresentative at these roadside locations.

As the roadside contribution is more representative than the Defra background concentrations, the above backgrounds have been averaged to calculate a site-wide representative background concentration. It should also be noted that as a worse case, the average concentration has been rounded up.

For comparison, an assessment using only Defra published background concentrations has been undertaken and is presented in **Appendix B** of this report.

Table 6.6 Utilised Background Concentrations ($\mu\text{g}/\text{m}^3$)

Receptor Location	2017		Source
	NO ₂	NO _x	
Local Authority Monitoring			
SDDC5	21.00	29.99	Averaged Roadside Contribution
SDDC6			
SDDC17			
Existing Sensitive Receptors			
Existing Sensitive Receptors	21.00	29.99	Averaged Roadside Contribution
Proposed Sensitive Receptors			
Proposed Sensitive Receptors	21.00	29.99	Averaged Roadside Contribution

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 NO₂ exposure at the relevant receptor locations based on the updated approach to deriving NO₂ from NO_x for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_x to NO₂ worksheet in the online LAQM tools website hosted by Defra. Table 6.7 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6.7 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
SDDC5	31.40	31.15	-0.80
SDDC6	33.30	32.53	-2.31
SDDC17	31.30	32.31	3.23

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

The final verification model correlation coefficient (representing the model uncertainty) is 1.00¹. 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 6.8 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 Airport 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 were used for both Site Data and Met Measurement Site Data
Latitude	Allows the location of the model area to be set	United Kingdom = 52.7
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 was used for the Site Data. With Small Towns= 10m was used for the Met Measurement Site Data
Elevation of Road	Allows the height of the road link above ground level to be specified.	All other 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 Google Map observations
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 9 (2019) dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	2017 data for verification and baseline operational phase assessment

¹ This was achieved by applying a model correction factor of 1.37 to roadside predicted NO_x concentrations before converting to NO₂

Parameter	Description	Input Value
		2024 data for the operational phase assessment.
Site Plans	Source: Pegasus Design	Drawing Title: Illustrative Masterplan Drawing No.: P16-1422_004 Revision: A Date: 11/16/19

6.5 ADMS Modelling Results

6.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO₂, PM₁₀ 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.

6.5.2 Assessment Scenarios

For the operational year of 2024, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2024 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;
- Scenario 1
 - 2024 'Do Minimum 1' = 2024 Baseline Scenario with Com Dev & Regeneration Link (25% Diversion);
 - 2024 'Do Minimum 2' = 2024 Baseline Scenario with Com Dev & Regeneration Link (50% Diversion);
- Scenario 2
 - 2024 'Do Something 1' = 2024 with All Developments Scenario with Regeneration Link (25% Diversion); and,
 - 2024 'Do Something 2' = 2024 with All Developments Scenario with Regeneration Link (50% Diversion).

6.5.3 'Do Minimum 1' v. 'Do Something 1'

Nitrogen Dioxide

Table 6.9 presents a summary of the predicted change in NO₂ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' (DM1) and 'do something' (DS1) scenarios.

Table 6.9 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
R1	24 Main Street, Albert Village	23.72	22.81	22.87	0.06
R2	12 Bridge Close, Church Gresley	23.28	22.31	22.49	0.18
R3	38 Derby Road, Swadlincote	25.53	23.25	23.36	0.11
R4	161 Swadlincote Road, Woodville	27.71	24.70	24.91	0.21
R5	3 Swadlincote Road, Woodville	28.53	24.86	24.98	0.12
R6	3 Burton Road, Woodville	26.06	23.87	23.94	0.07
R7	3 Hartshorne Road, Woodville	27.79	24.82	24.89	0.07
R8	9 High Street, Woodville	30.77	25.08	25.11	0.03
R9	27b High Street, Woodville	38.54	29.39	29.41	0.02
R10	12 Radleigh Grange, Woodville	28.26	27.07	27.12	0.05
R11	Southfields, Thorn Street, Woodville	21.64	21.50	21.52	0.02
R12	27 Windmill Close, Woodville	22.64	22.28	22.36	0.08
R13	66 Donington Drive, Woodville	23.48	22.80	22.89	0.09
R14	18 Victoria Drive, Woodville	24.80	23.79	23.94	0.15
R15	18 Rivoli Drive, Woodville	23.91	23.37	23.54	0.17
R16	43 Arliston Drive, Woodville	22.71	22.31	22.39	0.08
R17	39 Occupation Lane, Woodville	24.75	24.85	25.22	0.37
PR1	Proposed Residential Property	-	-	21.50	-
PR2	Proposed Residential Property	-	-	21.62	-
PR3	Proposed Residential Property	-	-	21.89	-
PR4	Proposed Residential Property	-	-	22.55	-
PR5	Proposed Residential Property	-	-	22.45	-
PR6	Proposed Residential Property	-	-	22.21	-
PR7	Proposed Residential Property	-	-	22.56	-
PR8	Proposed Residential Property	-	-	22.52	-
PR9	Proposed Residential Property	-	-	22.87	-
PR10	Proposed Residential Property	-	-	21.76	-
PR11	Proposed Residential Property	-	-	21.47	-
PR12	Proposed Residential Property	-	-	21.50	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.9, the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the development, is 0.37 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 22.87 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂, and therefore no additional mitigation will be required. The predicted long-term NO₂

concentrations at all proposed receptors are well below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all proposed receptors as outlined in LAQM TG16 technical guidance.

The impact description of changes in traffic flow associated with the development with respect to annual mean NO₂ 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 (NO₂)

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.06	0.15	0%	≤75% of AQAL	Negligible
R2	0.18	0.45	0%	≤75% of AQAL	Negligible
R3	0.11	0.27	0%	≤75% of AQAL	Negligible
R4	0.21	0.52	1%	≤75% of AQAL	Negligible
R5	0.12	0.30	0%	≤75% of AQAL	Negligible
R6	0.07	0.17	0%	≤75% of AQAL	Negligible
R7	0.07	0.17	0%	≤75% of AQAL	Negligible
R8	0.03	0.07	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	0.02	0.05	0%	≤75% of AQAL	Negligible
R12	0.08	0.20	0%	≤75% of AQAL	Negligible
R13	0.09	0.22	0%	≤75% of AQAL	Negligible
R14	0.15	0.37	0%	≤75% of AQAL	Negligible
R15	0.17	0.42	0%	≤75% of AQAL	Negligible
R16	0.08	0.20	0%	≤75% of AQAL	Negligible
R17	0.37	0.92	1%	≤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 NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is 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 (PM₁₀)

Table 6.11 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' (DM1) and 'do something' (DS1) scenarios.

Table 6.11 Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
R1	24 Main Street, Albert Village	14.80	14.82	14.83	0.01
R2	12 Bridge Close, Church Gresley	14.66	14.62	14.66	0.04
R3	38 Derby Road, Swadlincote	16.75	16.46	16.49	0.03
R4	161 Swadlincote Road, Woodville	17.10	17.00	17.05	0.05
R5	3 Swadlincote Road, Woodville	16.18	16.06	16.09	0.03
R6	3 Burton Road, Woodville	15.73	15.72	15.74	0.02
R7	3 Hartshorne Road, Woodville	15.91	15.88	15.90	0.02
R8	9 High Street, Woodville	15.89	15.80	15.81	0.01
R9	27b High Street, Woodville	16.71	16.50	16.51	0.01
R10	12 Radleigh Grange, Woodville	18.33	18.74	18.75	0.01
R11	Southfields, Thorn Street, Woodville	17.55	17.59	17.60	0.01
R12	27 Windmill Close, Woodville	15.05	15.15	15.17	0.02
R13	66 Donington Drive, Woodville	15.08	15.16	15.18	0.02
R14	18 Victoria Drive, Woodville	15.25	15.37	15.40	0.03
R15	18 Rivoli Drive, Woodville	15.14	15.27	15.31	0.04
R16	43 Arliston Drive, Woodville	14.98	15.05	15.06	0.01
R17	39 Occupation Lane, Woodville	15.28	15.61	15.69	0.08
PR1	Proposed Residential Property	-	-	14.87	-
PR2	Proposed Residential Property	-	-	14.90	-
PR3	Proposed Residential Property	-	-	14.55	-
PR4	Proposed Residential Property	-	-	14.68	-
PR5	Proposed Residential Property	-	-	15.07	-
PR6	Proposed Residential Property	-	-	15.02	-
PR7	Proposed Residential Property	-	-	15.09	-
PR8	Proposed Residential Property	-	-	15.09	-
PR9	Proposed Residential Property	-	-	15.17	-
PR10	Proposed Residential Property	-	-	14.93	-
PR11	Proposed Residential Property	-	-	14.86	-
PR12	Proposed Residential Property	-	-	14.86	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.9, the maximum predicted increase in the annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the development, is 0.08 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to PM₁₀ at any proposed receptor at the ground floor is 15.17 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM₁₀, and therefore no additional mitigation will be required.

The impact description of changes in traffic flow associated with the development with respect to annual mean PM₁₀ 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 (PM₁₀)

PM ₁₀ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.01	0.03	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	0.05	0.14	0%	≤75% of AQAL	Negligible
R5	0.03	0.08	0%	≤75% of AQAL	Negligible
R6	0.02	0.04	0%	≤75% of AQAL	Negligible
R7	0.02	0.04	0%	≤75% of AQAL	Negligible
R8	0.01	0.02	0%	≤75% of AQAL	Negligible
R9	0.01	0.02	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	0.02	0.06	0%	≤75% of AQAL	Negligible
R13	0.02	0.05	0%	≤75% of AQAL	Negligible
R14	0.03	0.09	0%	≤75% of AQAL	Negligible
R15	0.04	0.09	0%	≤75% of AQAL	Negligible
R16	0.01	0.03	0%	≤75% of AQAL	Negligible
R17	0.08	0.21	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 as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' 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 (PM_{2.5})

Table 6.13 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' (DM1) and 'do something' (DS1) scenarios.

Table 6.13 Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
R1	24 Main Street, Albert Village	9.73	9.73	9.73	<0.01
R2	12 Bridge Close, Church Gresley	9.65	9.62	9.64	0.02

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Receptor		PM _{2.5} (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
R3	38 Derby Road, Swadlincote	11.55	11.36	11.38	0.02
R4	161 Swadlincote Road, Woodville	11.76	11.66	11.69	0.03
R5	3 Swadlincote Road, Woodville	10.72	10.60	10.62	0.02
R6	3 Burton Road, Woodville	10.45	10.41	10.42	0.01
R7	3 Hartshorne Road, Woodville	10.56	10.50	10.51	0.01
R8	9 High Street, Woodville	10.57	10.46	10.47	0.01
R9	27b High Street, Woodville	11.10	10.87	10.88	0.01
R10	12 Radleigh Grange, Woodville	11.76	11.93	11.94	0.01
R11	Southfields, Thorn Street, Woodville	11.27	11.28	11.29	0.01
R12	27 Windmill Close, Woodville	9.74	9.78	9.80	0.02
R13	66 Donington Drive, Woodville	9.76	9.79	9.80	0.01
R14	18 Victoria Drive, Woodville	9.87	9.91	9.93	0.02
R15	18 Rivoli Drive, Woodville	9.80	9.86	9.88	0.02
R16	43 Arliston Drive, Woodville	9.70	9.73	9.74	0.01
R17	39 Occupation Lane, Woodville	9.89	10.05	10.09	0.04
PR1	Proposed Residential Property	-	-	9.63	-
PR2	Proposed Residential Property	-	-	9.64	-
PR3	Proposed Residential Property	-	-	9.57	-
PR4	Proposed Residential Property	-	-	9.65	-
PR5	Proposed Residential Property	-	-	9.74	-
PR6	Proposed Residential Property	-	-	9.71	-
PR7	Proposed Residential Property	-	-	9.75	-
PR8	Proposed Residential Property	-	-	9.75	-
PR9	Proposed Residential Property	-	-	9.80	-
PR10	Proposed Residential Property	-	-	9.66	-
PR11	Proposed Residential Property	-	-	9.62	-
PR12	Proposed Residential Property	-	-	9.62	-
Annual Mean AQO		40 µg/m³			

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

As indicated in Table 6.13, the maximum predicted increase in the annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the development, is 0.04 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to PM_{2.5} at any proposed receptor at the ground floor is 9.80 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{2.5}, and therefore no additional mitigation will be required.

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 6.14.

Table 6.14 Significance of Effects at Key Receptors (PM_{2.5})

PM _{2.5} Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Significance
R1	<0.01	0.00	0%	≤75% of AQAL	Negligible
R2	0.02	0.09	0%	≤75% of AQAL	Negligible
R3	0.02	0.08	0%	≤75% of AQAL	Negligible
R4	0.03	0.12	0%	≤75% of AQAL	Negligible
R5	0.02	0.07	0%	≤75% of AQAL	Negligible
R6	0.01	0.04	0%	≤75% of AQAL	Negligible
R7	0.01	0.04	0%	≤75% of AQAL	Negligible
R8	0.01	0.04	0%	≤75% of AQAL	Negligible
R9	0.01	0.04	0%	≤75% of AQAL	Negligible
R10	0.01	0.03	0%	≤75% of AQAL	Negligible
R11	0.01	0.04	0%	≤75% of AQAL	Negligible
R12	0.02	0.08	0%	≤75% of AQAL	Negligible
R13	0.01	0.04	0%	≤75% of AQAL	Negligible
R14	0.02	0.08	0%	≤75% of AQAL	Negligible
R15	0.02	0.09	0%	≤75% of AQAL	Negligible
R16	0.01	0.04	0%	≤75% of AQAL	Negligible
R17	0.04	0.16	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 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. 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'.

Ecological Sensitive Receptor Locations

Background concentrations at each of the ecologically sensitive sites were determined through a review of the NO_x pollutants published on the APIS website.

The below assessment has been undertaken in accordance with *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites* (IAQM, 2019).

Nitrogen Oxide

Table 6.15 presents a summary of the predicted change in NO_x concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' (DS1) and 'do something' (DS1) scenarios.

Table 6.15 Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations

Receptor		NO _x (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
E4	Woodville Disused Railway PLWS	25.11	22.57	22.66	0.09
E5	Woodville Disused Railway LWS	24.18	22.18	22.27	0.09
E6	Woodville Disused Railway LWS	23.82	21.93	22.01	0.08
E7	Woodville Disused Railway LWS	22.99	21.52	21.54	0.02
E8	Church Gresley Wood PLWS	16.34	15.67	15.76	0.09
E9	Land off Penkridge Rd PLWS	19.72	18.48	18.52	0.04
E10	Ski Heath PLWS	19.05	18.88	18.90	0.02
E11	Swadlincote Woods PLWS	29.28	24.86	25.12	0.26
E12	Swadlincote Woods PLWS	20.36	19.73	19.81	0.08

As indicated in Table 6.15, the maximum predicted increase in the annual average exposure to NO_x at any ecological receptor, due to changes in traffic movements associated with the development, is 0.26 µg/m³ at Swadlincote Woods PLWS.

Section 5.5.4.1 of *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*, IAQM 2019 states:

Where the assessment indicates that changes in annual mean NO_x concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.4 µg/m³) and the NO_x critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance.

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.26 µg/m³ at Swadlincote Woods PLWS which is less than the 0.40 µg/m³ development contribution stated within the guidance of *'A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites'*, IAQM 2019. It is considered that the effect can therefore be dismissed as imperceptible.

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_x exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.16.

Table 6.16 Significance of Effects at Key Receptors (NO_x)

Impact Description of NO _x at Key Receptors					
Recep	Change Due to Development (DS-DM) (µg/m ³)	% of Critical Level	% Change in Concentration Relative to Critical Level	% Annual Mean Concentration in Assessment Year	Impact Descriptor
E4	0.09	0.30	0%	76-94% of AQAL	Negligible
E5	0.09	0.30	0%	≤75% of AQAL	Negligible
E6	0.08	0.27	0%	≤75% of AQAL	Negligible
E7	0.02	0.07	0%	≤75% of AQAL	Negligible
E8	0.09	0.30	0%	≤75% of AQAL	Negligible
E9	0.04	0.13	0%	≤75% of AQAL	Negligible
E10	0.02	0.07	0%	≤75% of AQAL	Negligible
E11	0.26	0.87	1%	76-94% of AQAL	Negligible
E12	0.08	0.27	0%	≤75% of AQAL	Negligible

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_x exposure for ecologically sensitive receptors is determined to be 'negligible' at all receptors. This is 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'.

6.5.4 'Do Minimum 2' v. 'Do Something 2'

Nitrogen Dioxide

Table 6.17 presents a summary of the predicted change in NO₂ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' (DM2) and 'do something' (DS2) scenarios.

Table 6.17 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
R1	24 Main Street, Albert Village	23.72	22.81	22.87	0.06
R2	12 Bridge Close, Church Gresley	23.28	22.47	22.50	0.03
R3	38 Derby Road, Swadlincote	25.53	23.27	23.37	0.10
R4	161 Swadlincote Road, Woodville	27.71	24.51	24.73	0.22
R5	3 Swadlincote Road, Woodville	28.53	24.34	24.45	0.11
R6	3 Burton Road, Woodville	26.06	23.76	23.83	0.07
R7	3 Hartshorne Road, Woodville	27.79	24.66	24.74	0.08
R8	9 High Street, Woodville	30.77	24.67	24.70	0.03
R9	27b High Street, Woodville	38.54	28.45	28.47	0.02
R10	12 Radleigh Grange, Woodville	28.26	26.84	26.89	0.05
R11	Southfields, Thorn Street, Woodville	21.64	21.57	21.59	0.02

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Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
R12	27 Windmill Close, Woodville	22.64	22.51	22.59	0.08
R13	66 Donington Drive, Woodville	23.48	22.95	23.06	0.11
R14	18 Victoria Drive, Woodville	24.80	24.15	24.35	0.20
R15	18 Rivoli Drive, Woodville	23.91	23.71	23.92	0.21
R16	43 Arliston Drive, Woodville	22.71	22.44	22.54	0.10
R17	39 Occupation Lane, Woodville	24.75	25.59	25.95	0.36
PR1	Proposed Residential Property	-	-	21.56	-
PR2	Proposed Residential Property	-	-	21.72	-
PR3	Proposed Residential Property	-	-	22.08	-
PR4	Proposed Residential Property	-	-	22.92	-
PR5	Proposed Residential Property	-	-	22.80	-
PR6	Proposed Residential Property	-	-	22.48	-
PR7	Proposed Residential Property	-	-	22.92	-
PR8	Proposed Residential Property	-	-	22.86	-
PR9	Proposed Residential Property	-	-	23.23	-
PR10	Proposed Residential Property	-	-	21.79	-
PR11	Proposed Residential Property	-	-	21.54	-
PR12	Proposed Residential Property	-	-	21.57	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.17, the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the development, is 0.36 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 23.23 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂, and therefore no additional mitigation will be required. The predicted long-term NO₂ concentrations at all proposed receptors are well below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all proposed receptors as outlined in LAQM TG16 technical guidance.

The impact description of changes in traffic flow associated with the development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.18 (overleaf).

Table 6.18 Significance of Effects at Key Receptors (NO₂)

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.06	0.15	0%	≤75% of AQAL	Negligible
R2	0.03	0.07	0%	≤75% of AQAL	Negligible
R3	0.10	0.25	0%	≤75% of AQAL	Negligible
R4	0.22	0.55	1%	≤75% of AQAL	Negligible
R5	0.11	0.27	0%	≤75% of AQAL	Negligible
R6	0.07	0.17	0%	≤75% of AQAL	Negligible
R7	0.08	0.20	0%	≤75% of AQAL	Negligible
R8	0.03	0.07	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	0.02	0.05	0%	≤75% of AQAL	Negligible
R12	0.08	0.20	0%	≤75% of AQAL	Negligible
R13	0.11	0.27	0%	≤75% of AQAL	Negligible
R14	0.20	0.50	0%	≤75% of AQAL	Negligible
R15	0.21	0.52	1%	≤75% of AQAL	Negligible
R16	0.10	0.25	0%	≤75% of AQAL	Negligible
R17	0.36	0.90	1%	≤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 NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is 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 (PM₁₀)

Table 6.19 (overleaf) presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' (DM2) and 'do something' (DS2) scenarios.

Table 6.19 Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
R1	24 Main Street, Albert Village	14.80	14.82	14.84	0.02
R2	12 Bridge Close, Church Gresley	14.66	14.66	14.66	<0.01
R3	38 Derby Road, Swadlincote	16.75	16.47	16.49	0.02
R4	161 Swadlincote Road, Woodville	17.10	16.92	16.97	0.05
R5	3 Swadlincote Road, Woodville	16.18	15.92	15.95	0.03
R6	3 Burton Road, Woodville	15.73	15.69	15.71	0.02
R7	3 Hartshorne Road, Woodville	15.91	15.85	15.86	0.01
R8	9 High Street, Woodville	15.89	15.73	15.74	0.01
R9	27b High Street, Woodville	16.71	16.33	16.34	0.01
R10	12 Radleigh Grange, Woodville	18.33	18.69	18.70	0.01
R11	Southfields, Thorn Street, Woodville	17.55	17.61	17.62	0.01
R12	27 Windmill Close, Woodville	15.05	15.22	15.25	0.03
R13	66 Donington Drive, Woodville	15.08	15.19	15.21	0.02
R14	18 Victoria Drive, Woodville	15.25	15.45	15.49	0.04
R15	18 Rivoli Drive, Woodville	15.14	15.35	15.39	0.04
R16	43 Arliston Drive, Woodville	14.98	15.07	15.10	0.03
R17	39 Occupation Lane, Woodville	15.28	15.76	15.85	0.09
PR1	Proposed Residential Property	-	-	14.88	-
PR2	Proposed Residential Property	-	-	14.92	-
PR3	Proposed Residential Property	-	-	14.59	-
PR4	Proposed Residential Property	-	-	14.76	-
PR5	Proposed Residential Property	-	-	15.14	-
PR6	Proposed Residential Property	-	-	15.07	-
PR7	Proposed Residential Property	-	-	15.17	-
PR8	Proposed Residential Property	-	-	15.16	-
PR9	Proposed Residential Property	-	-	15.24	-
PR10	Proposed Residential Property	-	-	14.93	-
PR11	Proposed Residential Property	-	-	14.87	-
PR12	Proposed Residential Property	-	-	14.88	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.19, the maximum predicted increase in the annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the development, is 0.09 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to PM₁₀ at any proposed receptor at the ground floor is 15.24 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM₁₀, and therefore no additional mitigation will be required.

The impact description of changes in traffic flow associated with the development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.20 (below).

Table 6.20 Significance of Effects at Key Receptors (PM₁₀)

PM ₁₀ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.02	0.04	0%	≤75% of AQAL	Negligible
R2	<0.01	0.00	0%	≤75% of AQAL	Negligible
R3	0.02	0.06	0%	≤75% of AQAL	Negligible
R4	0.05	0.14	0%	≤75% of AQAL	Negligible
R5	0.03	0.08	0%	≤75% of AQAL	Negligible
R6	0.02	0.04	0%	≤75% of AQAL	Negligible
R7	0.01	0.03	0%	≤75% of AQAL	Negligible
R8	0.01	0.02	0%	≤75% of AQAL	Negligible
R9	0.01	0.02	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	0.03	0.08	0%	≤75% of AQAL	Negligible
R13	0.02	0.06	0%	≤75% of AQAL	Negligible
R14	0.04	0.11	0%	≤75% of AQAL	Negligible
R15	0.04	0.10	0%	≤75% of AQAL	Negligible
R16	0.03	0.08	0%	≤75% of AQAL	Negligible
R17	0.09	0.23	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 as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' 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 (PM_{2.5})

Table 6.21 (overleaf) 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' (DM2) and 'do something' (DS2) scenarios.

Table 6.21 Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
R1	24 Main Street, Albert Village	9.73	9.73	9.73	<0.01
R2	12 Bridge Close, Church Gresley	9.65	9.64	9.64	<0.01
R3	38 Derby Road, Swadlincote	11.55	11.37	11.38	0.01
R4	161 Swadlincote Road, Woodville	11.76	11.62	11.65	0.03
R5	3 Swadlincote Road, Woodville	10.72	10.52	10.53	0.01
R6	3 Burton Road, Woodville	10.45	10.39	10.40	0.01
R7	3 Hartshorne Road, Woodville	10.56	10.48	10.49	0.01
R8	9 High Street, Woodville	10.57	10.42	10.43	<0.01
R9	27b High Street, Woodville	11.10	10.78	10.78	<0.01
R10	12 Radleigh Grange, Woodville	11.76	11.90	11.91	0.01
R11	Southfields, Thorn Street, Woodville	11.27	11.29	11.30	0.01
R12	27 Windmill Close, Woodville	9.74	9.82	9.84	0.02
R13	66 Donington Drive, Woodville	9.76	9.81	9.82	0.01
R14	18 Victoria Drive, Woodville	9.87	9.96	9.98	0.02
R15	18 Rivoli Drive, Woodville	9.80	9.90	9.93	0.03
R16	43 Arliston Drive, Woodville	9.70	9.74	9.76	0.02
R17	39 Occupation Lane, Woodville	9.89	10.14	10.18	0.04
PR1	Proposed Residential Property	-	-	9.63	-
PR2	Proposed Residential Property	-	-	9.66	-
PR3	Proposed Residential Property	-	-	9.60	-
PR4	Proposed Residential Property	-	-	9.70	-
PR5	Proposed Residential Property	-	-	9.78	-
PR6	Proposed Residential Property	-	-	9.74	-
PR7	Proposed Residential Property	-	-	9.80	-
PR8	Proposed Residential Property	-	-	9.79	-
PR9	Proposed Residential Property	-	-	9.84	-
PR10	Proposed Residential Property	-	-	9.66	-
PR11	Proposed Residential Property	-	-	9.63	-
PR12	Proposed Residential Property	-	-	9.63	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors, including those located within the AQMA, are predicted to be below the AQO for PM_{2.5} in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.21, the maximum predicted increase in the annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the development, is 0.04 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to PM_{2.5} at any proposed receptor at the ground floor is 9.84 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{2.5}, and therefore no additional mitigation will be required.

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 6.22 (below).

Table 6.22 Significance of Effects at Key Receptors (PM_{2.5})

PM _{2.5} Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Significance
R1	<0.01	0.00	0%	≤75% of AQAL	Negligible
R2	<0.01	0.01	0%	≤75% of AQAL	Negligible
R3	0.01	0.05	0%	≤75% of AQAL	Negligible
R4	0.03	0.12	0%	≤75% of AQAL	Negligible
R5	0.01	0.04	0%	≤75% of AQAL	Negligible
R6	0.01	0.04	0%	≤75% of AQAL	Negligible
R7	0.01	0.04	0%	≤75% of AQAL	Negligible
R8	<0.01	0.02	0%	≤75% of AQAL	Negligible
R9	<0.01	0.02	0%	≤75% of AQAL	Negligible
R10	0.01	0.03	0%	≤75% of AQAL	Negligible
R11	0.01	0.04	0%	≤75% of AQAL	Negligible
R12	0.02	0.07	0%	≤75% of AQAL	Negligible
R13	0.01	0.06	0%	≤75% of AQAL	Negligible
R14	0.02	0.08	0%	≤75% of AQAL	Negligible
R15	0.03	0.10	0%	≤75% of AQAL	Negligible
R16	0.02	0.08	0%	≤75% of AQAL	Negligible
R17	0.04	0.16	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 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. 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'.

Ecological Sensitive Receptor Locations

Background concentrations at each of the ecologically sensitive sites were determined through a review of the NO_x pollutants published on the APIS website.

The below assessment has been undertaken in accordance with *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites* (IAQM, 2019).

Nitrogen Oxide

Table 6.23 (below) presents a summary of the predicted change in NO_x concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' (DS1) and 'do something' (DS1) scenarios.

Table 6.23 Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations

Receptor		NO _x (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
E4	Woodville Disused Railway PLWS	25.11	22.57	22.66	0.09
E5	Woodville Disused Railway LWS	24.18	22.18	22.26	0.08
E6	Woodville Disused Railway LWS	23.82	21.92	22.00	0.08
E7	Woodville Disused Railway LWS	22.99	21.28	21.31	0.03
E8	Church Gresley Wood PLWS	16.34	15.67	15.76	0.09
E9	Land off Penkridge Rd PLWS	19.72	18.48	18.52	0.04
E10	Ski Heath PLWS	19.05	18.89	18.90	0.01
E11	Swadlincote Woods PLWS	29.28	24.87	25.13	0.26
E12	Swadlincote Woods PLWS	20.36	19.77	19.85	0.08

As indicated in Table 6.23, the maximum predicted increase in the annual average exposure to NO_x at any ecological receptor, due to changes in traffic movements associated with the development, is 0.26 µg/m³ at Swadlincote Woods PLWS.

Section 5.5.4.1 of *A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*, IAQM 2019 states:

Where the assessment indicates that changes in annual mean NO_x concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.4 µg/m³) and the NO_x critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance.

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.26 µg/m³ at Swadlincote Woods PLWS which is less than the 0.40 µg/m³ development contribution stated within the guidance of *'A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites'*, IAQM 2019. It is considered that the effect can therefore be dismissed as imperceptible.

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_x exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.24 (overleaf).

Table 6.24 Significance of Effects at Key Receptors (NO_x)

Impact Description of NO _x at Key Receptors					
Recep	Change Due to Development (DS-DM) (µg/m ³)	% of Critical Level	% Change in Concentration Relative to Critical Level	% Annual Mean Concentration in Assessment Year	Impact Descriptor
E4	0.30	0.30	0%	76-94% of AQAL	Negligible
E5	0.27	0.27	0%	≤75% of AQAL	Negligible
E6	0.27	0.27	0%	≤75% of AQAL	Negligible
E7	0.10	0.10	0%	≤75% of AQAL	Negligible
E8	0.30	0.30	0%	≤75% of AQAL	Negligible
E9	0.13	0.13	0%	≤75% of AQAL	Negligible
E10	0.03	0.03	0%	≤75% of AQAL	Negligible
E11	0.87	0.87	1%	76-94% of AQAL	Negligible
E12	0.08	0.27	0%	≤75% of AQAL	Negligible

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_x exposure for ecologically sensitive receptors is determined to be 'negligible' at all receptors. This is 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'.

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 'high 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 and 7.2 below:

Table 7.1 Highly Recommended Construction Phase Mitigation Measures

Communications
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
Dust Management
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.
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.
Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
Carry out regular site inspections to monitor compliance with the 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.
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period
Avoid site runoff of water or mud.
Keep site fencing, barriers and scaffolding clean using wet methods.
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
Cover, seed or fence stockpiles to prevent wind whipping.

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Ensure all vehicles switch off engines when stationary - no idling vehicles.
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
Use enclosed chutes and conveyors and covered skips
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods
Avoid bonfires and burning of waste materials.
Earthworks
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
Only remove the cover in small areas during work and not all at once
Construction
Avoid scabbling (roughening of concrete surfaces) if possible
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
Trackout
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
Avoid dry sweeping of large areas.
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
Record all inspections of haul routes and any subsequent action in a site log book.
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsters and regularly cleaned.
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
Access gates to be located at least 10m from receptors where possible.

Table 7.2 Desirable Construction Phase Mitigation Measures

Construction
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

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 to support an application for the proposed mixed-use development at land off Occupation Lane, Woodville.

Construction Phase

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 'high' 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.

Operational Assessment

An operational assessment of 2024 emissions has been undertaken.

'DM1 v DS1'

The 2024 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 NO₂ at any existing receptor is likely to be 0.37 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 22.87 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂, and therefore no additional mitigation will be required. The predicted long-term NO₂ concentrations at all proposed receptors are well below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all proposed receptors as outlined in LAQM TG16 technical guidance.

For PM₁₀, the maximum predicted increase in the annual average exposure is likely to be 0.08 µg/m³ at 39 Occupation Lane (R17). For PM_{2.5}, the maximum predicted increase in the annual average exposure is likely to be 0.04 µg/m³ at 39 Occupation Lane (R17).

The significance of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposures, significance is determined to be 'negligible' at all identified receptor locations.

At any proposed sensitive receptors, there is not predicted to be any exceedances of the NO₂, PM₁₀ or PM_{2.5} pollutant concentrations and therefore, mitigation is not required at the proposed development.

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.26 µg/m³ at Swadlincote Woods PLWS which is less than the 0.40 µg/m³ development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2019. It is considered that the effect can therefore be dismissed as imperceptible.

'DM2 v DS2'

The 2024 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 NO₂ at any existing receptor is likely to be 0.36 µg/m³ at 39 Occupation Lane (R17).

The maximum predicted annual average exposure to NO₂ at any proposed receptor at the ground floor is 23.23 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO₂, and therefore no additional mitigation will be required. The predicted long-term NO₂ concentrations at all proposed receptors are well below 60 µg/m³ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO₂ AQO at all proposed receptors as outlined in LAQM TG16 technical guidance.

For PM₁₀, the maximum predicted increase in the annual average exposure is likely to be 0.09 µg/m³ at 39 Occupation Lane (R17). For PM_{2.5}, the maximum predicted increase in the annual average exposure is likely to be 0.04 µg/m³ at 39 Occupation Lane (R17).

The significance of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposures, significance is determined to be 'negligible' at all identified receptor locations.

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.26 µg/m³ at Swadlincote Woods PLWS which is less than the 0.40 µg/m³ development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2019. It is considered that the effect can therefore be dismissed as imperceptible.

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'. In conclusion, the development is not considered to be contrary to any of the national and local planning policies.

Figures

Occupation Lane, Woodville
Air Quality Assessment



Figure 1 Air Quality Assessment Area

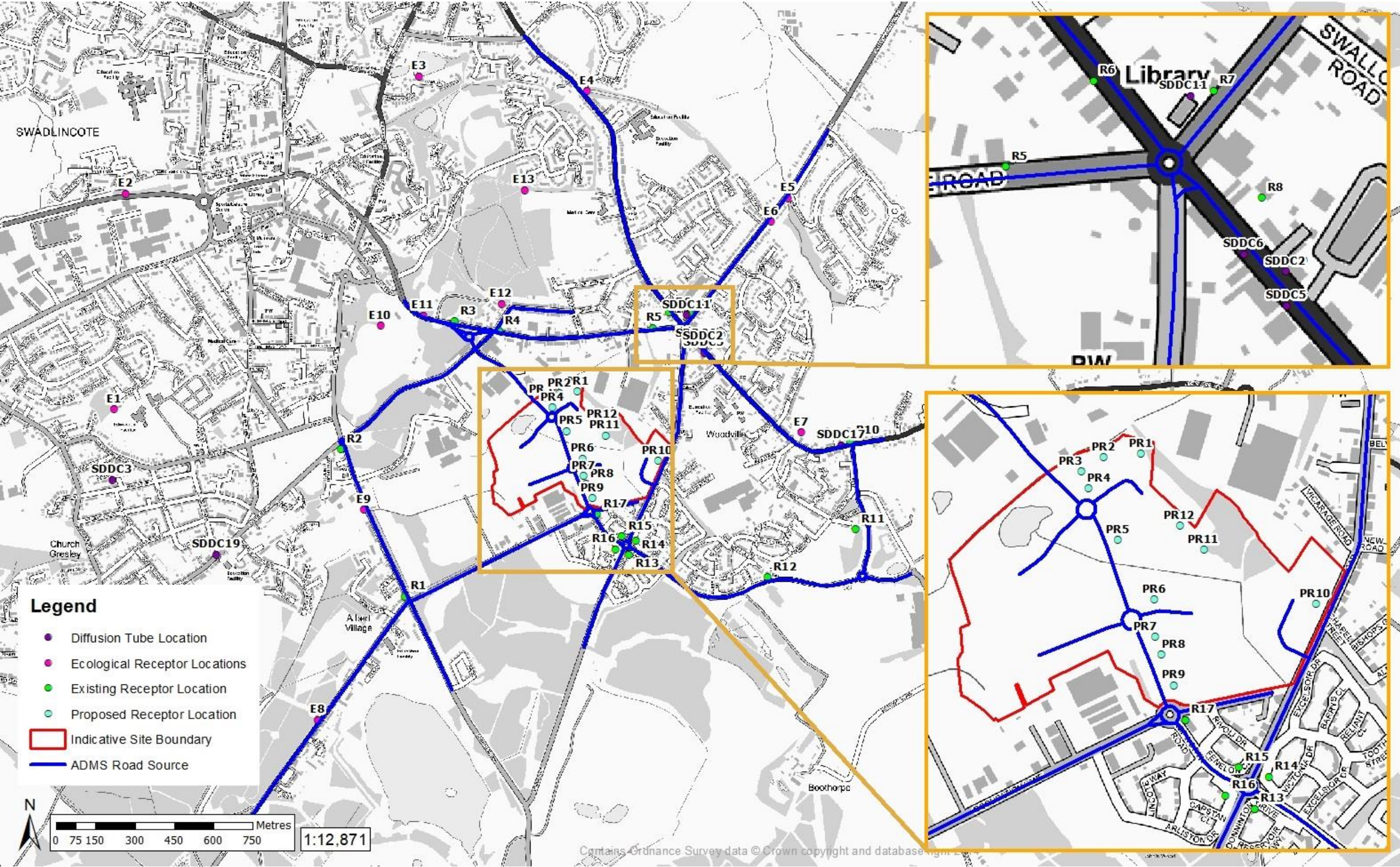


Figure 2 East Midlands 2017 Meteorological Station Wind Rose

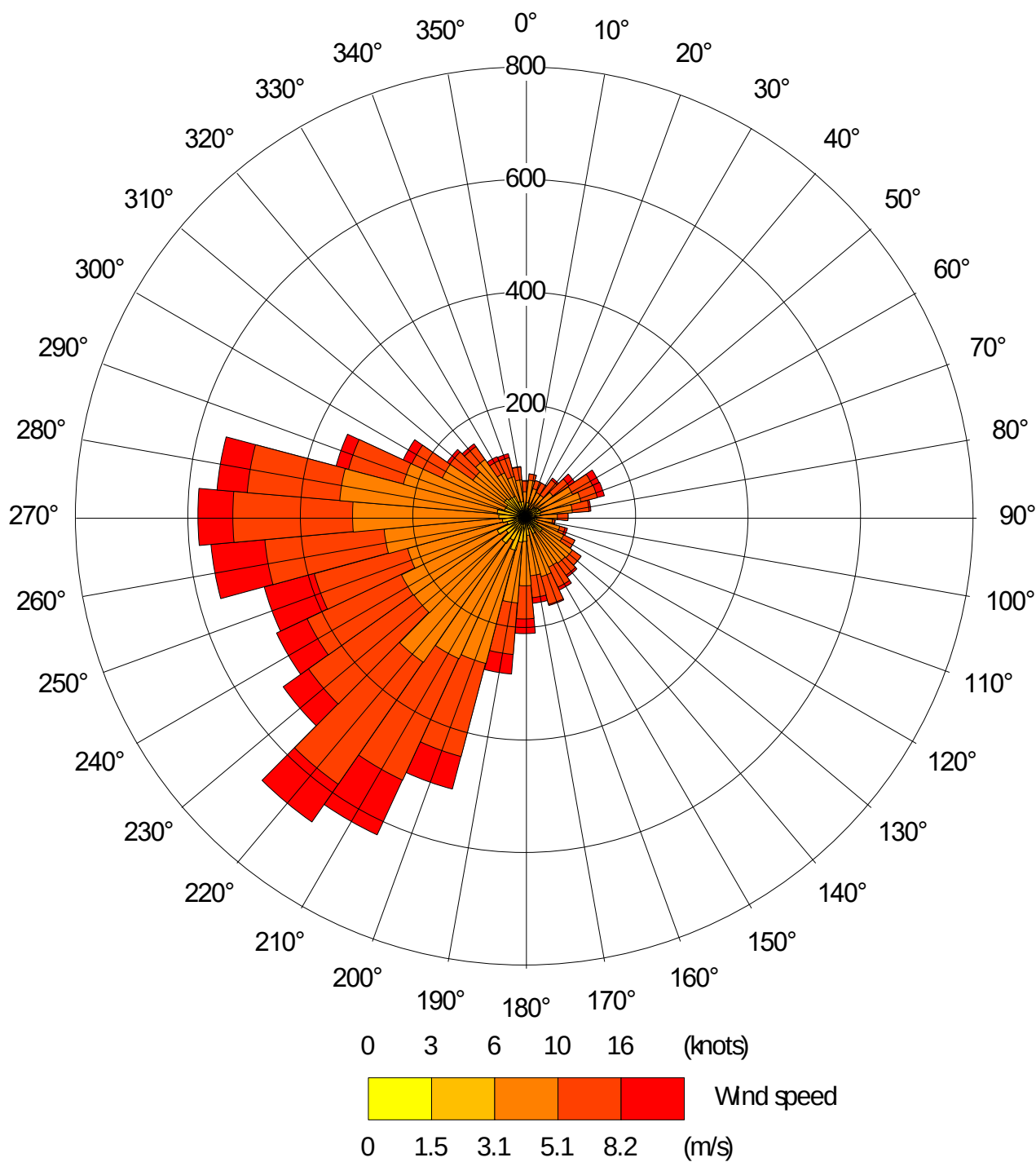


Figure 3 'Do Something 1' Environmental NO₂ Contour Plot



Figure 4 'Do Something 2' Environmental NO₂ 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 guidance².

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 000m³, potentially dusty construction (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;
- *Medium:* Total building volume 20 000m³ – 50 000m³, potentially dusty construction material, demolition activities 10-20m above ground level; and,
- *Small:* Total building volume <20 000m³, 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 000m², 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 500m² – 10 000m², 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 m², 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 000m³, on site concrete batching; sandblasting
- *Medium:* Total building volume 25 000m³ – 100 000m³, potentially dusty construction material (e.g. concrete), on site concrete batching; and,
- *Small:* Total building volume <25 000m³, 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,
- *Small:* <10 HGV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

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

Occupation Lane, Woodville Air Quality Assessment



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 PM₁₀

- **High:**
 - * Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (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 PM₁₀ (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 PM₁₀, 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.

Occupation Lane, Woodville Air Quality Assessment



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.

Occupation Lane, Woodville Air Quality Assessment



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 C Defra Background Concentration Assessment

Model Verification

Table C1 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
SDDC5	31.40	30.84	-1.79
SDDC6	33.30	33.20	-0.31
SDDC17	31.30	31.91	1.94

The final model produced data at the monitoring locations to within 10% of the monitoring results, which is within the requirement of the TG16 guidance. However, this verification using Defra background map concentrations at the monitoring locations gives a higher primary adjustment factor of 2.44. This means that the model output is multiplied by a greater factor than when using the WYG monitoring location.

The final verification model correlation coefficient (representing the model uncertainty) is 1.00³. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

DM1 v DS1

Table C2 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
R1	24 Main Street, Albert Village	16.03	14.35	14.47	0.12
R2	12 Bridge Close, Church Gresley	15.22	13.43	13.78	0.35
R3	38 Derby Road, Swadlincote	21.11	17.01	17.20	0.19
R4	161 Swadlincote Road, Woodville	24.97	19.62	20.00	0.38
R5	3 Swadlincote Road, Woodville	26.32	19.83	20.03	0.20
R6	3 Burton Road, Woodville	21.96	18.04	18.16	0.12
R7	3 Hartshorne Road, Woodville	25.02	19.75	19.88	0.13
R8	9 High Street, Woodville	30.20	20.21	20.27	0.06
R9	27b High Street, Woodville	43.19	27.81	27.86	0.05
R10	12 Radleigh Grange, Woodville	24.88	22.79	22.88	0.09
R11	Southfields, Thorn Street, Woodville	12.96	12.71	12.76	0.05
R12	27 Windmill Close, Woodville	13.93	13.28	13.42	0.14
R13	66 Donington Drive, Woodville	15.47	14.24	14.40	0.16
R14	18 Victoria Drive, Woodville	17.87	16.04	16.32	0.28
R15	18 Rivoli Drive, Woodville	16.25	15.27	15.59	0.32
R16	43 Arliston Drive, Woodville	14.07	13.33	13.48	0.15
R17	39 Occupation Lane, Woodville	17.78	17.97	18.65	0.68

³ This was achieved by applying a model correction factor of 2.44 to roadside predicted NO_x concentrations before converting to NO₂

Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM1 2024	DS1 2024	Development Contribution
PR1	Proposed Residential Property	-	-	11.84	-
PR2	Proposed Residential Property	-	-	12.05	-
PR3	Proposed Residential Property	-	-	12.67	-
PR4	Proposed Residential Property	-	-	13.89	-
PR5	Proposed Residential Property	-	-	13.59	-
PR6	Proposed Residential Property	-	-	13.15	-
PR7	Proposed Residential Property	-	-	13.79	-
PR8	Proposed Residential Property	-	-	13.72	-
PR9	Proposed Residential Property	-	-	14.36	-
PR10	Proposed Residential Property	-	-	12.31	-
PR11	Proposed Residential Property	-	-	11.78	-
PR12	Proposed Residential Property	-	-	11.83	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table C2, there predicted to be an increase in annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the development is 0.68 µg/m³ at 39 Occupation Lane (R17).

At any proposed sensitive receptor, the maximum NO₂ concentration, associated with the traffic movements from the proposed development is 14.36 µg/m³. This does not exceed the relevant AQO for NO₂ and therefore, mitigation is not required at the proposed development.

The significance of changes in traffic flow associated with the development with respect to annual mean NO₂ 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 (NO₂)

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.12	0.30	0%	≤75% of AQAL	Negligible
R2	0.35	0.88	1%	≤75% of AQAL	Negligible
R3	0.19	0.48	0%	≤75% of AQAL	Negligible
R4	0.38	0.95	1%	≤75% of AQAL	Negligible
R5	0.20	0.50	1%	≤75% of AQAL	Negligible
R6	0.12	0.30	0%	≤75% of AQAL	Negligible
R7	0.13	0.33	0%	≤75% of AQAL	Negligible
R8	0.06	0.15	0%	≤75% of AQAL	Negligible
R9	0.05	0.13	0%	≤75% of AQAL	Negligible

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R10	0.09	0.23	0%	≤75% of AQAL	Negligible
R11	0.05	0.13	0%	≤75% of AQAL	Negligible
R12	0.14	0.35	0%	≤75% of AQAL	Negligible
R13	0.16	0.40	0%	≤75% of AQAL	Negligible
R14	0.28	0.70	1%	≤75% of AQAL	Negligible
R15	0.32	0.80	1%	≤75% of AQAL	Negligible
R16	0.15	0.38	0%	≤75% of AQAL	Negligible
R17	0.68	1.70	2-5%	≤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 NO₂ exposure for existing residential receptors is determined to be 'negligible' at all receptors. However, this approach significantly overestimates the amount of emissions from road traffic by a factor of 2.44.

DM2 v DS2

Table C4 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
R1	24 Main Street, Albert Village	16.03	14.36	14.47	0.11
R2	12 Bridge Close, Church Gresley	15.22	13.74	13.78	0.04
R3	38 Derby Road, Swadlincote	21.11	17.04	17.23	0.19
R4	161 Swadlincote Road, Woodville	24.97	19.29	19.67	0.38
R5	3 Swadlincote Road, Woodville	26.32	18.88	19.09	0.21
R6	3 Burton Road, Woodville	21.96	17.84	17.96	0.12
R7	3 Hartshorne Road, Woodville	25.02	19.46	19.60	0.14
R8	9 High Street, Woodville	30.20	19.48	19.54	0.06
R9	27b High Street, Woodville	43.19	26.17	26.22	0.05
R10	12 Radleigh Grange, Woodville	24.88	22.39	22.48	0.09
R11	Southfields, Thorn Street, Woodville	12.96	12.83	12.89	0.06
R12	27 Windmill Close, Woodville	13.93	13.70	13.85	0.15
R13	66 Donington Drive, Woodville	15.47	14.52	14.71	0.19
R14	18 Victoria Drive, Woodville	17.87	16.70	17.06	0.36
R15	18 Rivoli Drive, Woodville	16.25	15.90	16.28	0.38
R16	43 Arliston Drive, Woodville	14.07	13.57	13.75	0.18
R17	39 Occupation Lane, Woodville	17.78	19.31	19.96	0.65
PR1	Proposed Residential Property	-	-	11.95	-
PR2	Proposed Residential Property	-	-	12.24	-
PR3	Proposed Residential Property	-	-	13.01	-
PR4	Proposed Residential Property	-	-	14.57	-
PR5	Proposed Residential Property	-	-	14.24	-
PR6	Proposed Residential Property	-	-	13.65	-

Receptor		NO ₂ (µg/m ³)			
		Baseline 2017	DM2 2024	DS2 2024	Development Contribution
PR7	Proposed Residential Property	-	-	14.46	-
PR8	Proposed Residential Property	-	-	14.34	-
PR9	Proposed Residential Property	-	-	15.02	-
PR10	Proposed Residential Property	-	-	12.37	-
PR11	Proposed Residential Property	-	-	11.90	-
PR12	Proposed Residential Property	-	-	11.97	-
Annual Mean AQO		40 µg/m³			

All modelled existing receptors are predicted to be below the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table C4, there predicted to be an increase in annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the development is 0.65 µg/m³ at 39 Occupation Lane (R17).

At any proposed sensitive receptor, the maximum NO₂ concentration, associated with the traffic movements from the proposed development is 15.02 µg/m³. This does not exceed the relevant AQO for NO₂ and therefore, mitigation is not required at the proposed development.

The significance of changes in traffic flow associated with the development with respect to annual mean NO₂ 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 (NO₂)

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.11	0.28	0%	≤75% of AQAL	Negligible
R2	0.04	0.10	0%	≤75% of AQAL	Negligible
R3	0.19	0.48	0%	≤75% of AQAL	Negligible
R4	0.38	0.95	1%	≤75% of AQAL	Negligible
R5	0.21	0.53	1%	≤75% of AQAL	Negligible
R6	0.12	0.30	0%	≤75% of AQAL	Negligible
R7	0.14	0.35	0%	≤75% of AQAL	Negligible
R8	0.06	0.15	0%	≤75% of AQAL	Negligible
R9	0.05	0.13	0%	≤75% of AQAL	Negligible
R10	0.09	0.23	0%	≤75% of AQAL	Negligible
R11	0.06	0.15	0%	≤75% of AQAL	Negligible
R12	0.15	0.38	0%	≤75% of AQAL	Negligible
R13	0.19	0.48	0%	≤75% of AQAL	Negligible
R14	0.36	0.90	1%	≤75% of AQAL	Negligible
R15	0.38	0.95	1%	≤75% of AQAL	Negligible

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R16	0.18	0.45	0%	≤75% of AQAL	Negligible
R17	0.65	1.63	2-5%	≤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 NO₂ exposure for existing residential receptors is determined to be 'negligible' at all receptors. However, this approach significantly overestimates the amount of emissions from road traffic by a factor of 2.44.

Appendix C Report Terms & Conditions

This Report has been prepared using reasonable skill and care for the sole benefit of Harworth Estates Investments Limited ("the Client") for the proposed uses stated in the report by [WYG Environment Planning Limited] ("WYG"). WYG exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

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The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections'. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. WYG accept no liability for issues with performance arising from such factors