Salop Sand and Gravel Ltd

Chadwich Lane Quarry

Air Quality Assessment

September 2019

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Executive Summary

WYG have undertaken an Air Quality Assessment for the proposed HGV movements associated with the sand extraction and landfill activities at Chadwich Lane Quarry.

An operational year assessment for 2021 traffic emissions has been undertaken to assess the effects of the proposed sand extraction and landfill activities.

The maximum predicted annual average exposure to NO_2, PM_{10} and $PM_{2.5}$ at any existing receptor is below the annual average AQO and therefore no additional mitigation is required.

The effect on ecological receptors has been assessed and is determined to be 'negligible'.

The assessment of the impact description of the effects associated with the proposed development, with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure, the impact description of the proposed development is determined 'negligible' for all identified existing sensitive receptors.

1. Introduction

Salop Sand and Gravel Ltd commissioned WYG Environment to prepare an Air Quality Assessment to support an application for the proposed sand extraction and landfill activities at Chadwich Lane Quarry.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is approximately 395550, 276846. The Site is bounded to the north by Madeley Heath, to the east and south by open farmland and to the west by Harbours Hill and open farmland.

Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

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

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

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

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) and less than 2.5 µm ($PM_{2.5}$) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and 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;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (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.go.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and
- Bromsgrove District Council (http://www.bromsgrove.gov.uk/).

Site Specific Reference Documents

- Bromsgrove District Council, 2018 Air Quality Annual Status Report; and,
- Bromsgrove District Plan 2011 – 2030, Adopted January 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 NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

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

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

UK Legislation

The Air Quality Standards Regulations (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 and Table 2.2 long with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

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

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

Table 2.2 Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]
NO_X	UK	30µg/m^3	Annual Mean

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 Bromsgrove District Council (BDC) District Plan (adopted January 2017) sets out and provides guidance for managing development and land use within the district. Following a review of the BDC District Plan, the following policies have been identified:

*"**BDP1: Sustainable Development Principles***

BDP1.4 In considering all proposals for development in Bromsgrove District regard will be had to the following:

a) Accessibility to public transport options and the ability of the local and strategic road networks to accommodate additional traffic;

b) Any implications for air quality in the District and proposed mitigation measures;

c) The cumulative impacts on infrastructure provision;

d) The quality of the natural environment including any potential impact on biodiversity, water quality, geodiversity, landscape and the provision of/and links to green infrastructure (GI) networks;

e) Compatibility with adjoining uses and the impact on residential amenity;

f) The impact on visual amenity;

g) The causes and impacts of climate change i.e. the energy, waste and water hierarchies, flood risk and future proofing;

h) The provision of communication technology infrastructure to allow for future technological enhancements e.g. fibre optic ducting;

i) The impact on the historic environment and the significance of Heritage Assets and their setting;

j) Financial viability and the economic benefits for the District, such as new homes and jobs."

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, BDC has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. Due to high concentrations of NO_2 at some locations of relevant exposure, BDC has designated four Air Quality Management Areas (AQMAs) within the borough which are listed below:

- Lickey End AQMA: A number of residential properties surrounding the M42/A38 junction;
- Redditch Road AQMA: An area encompassing parts of Redditch Road, Sherwood Road, Austin Road, Stoke Road and Hanbury Road in Stoke Heath, Bromsgrove;
- Hagley AQMA: An area encompassing parts of Kidderminster Road, Stourbridge Road, and Hagley Hill, Hagley;
- AQMA No.4 Worcester Road: Part of Worcester Road and Hanover Street, Bromsgrove.

The closest AQMA to the Proposed Development Site is Lickey End AQMA which is located 3.6 km south of the site boundary. As part of the air quality assessment receptors within the AQMA will be included to determine any effects on air quality as a result of the Proposed Development.

Air Quality Monitoring

Monitoring of air quality within BDC 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

BDC operated a network of passive diffusion tubes during 2018. Reference should be made to Figure 1 for the locations of the diffusion tubes within the extents of the air quality study area.

The most recently available diffusion tube monitoring data is from 2018, which is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO_2 Concentrations

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	2018 Annual Mean NO_2 Concentration ($\mu g/m^3$)
1*	3A Alcester Road, Lickey End	Roadside	11.70	1.84	27.02
LE4*	Harvester PH, Birmingham Road	Roadside	1.35	2.13	48.38
LE5*	5 Old Bimingham Road, Lickey End	Roadside	6.53	1.94	32.49
LE6*	308 Birmingham Road, Lickey End	Urban Background	18.30	2.13	29.66
LE7*	371 Birmingham Road, Lickey End	Urban Background	15.90	2.10	33.40
F1/2/3*	Lickey End/Forrest Inn Island Lamppost	Roadside	2.31	1.92	50.93
TS	Smallholdings, Wildmoor Lane, Catshill	Rural	51.0	1.80	23.60
*Located within the AQMA					

As indicated in Table 4.1, diffusion tubes F1/2/3 and LE4 monitored exceedances of the NO_2 AQO (40µg/m^3 annual mean) in 2018.

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 2018 meteorological data used in the assessment is derived from Pershore 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 Pershore Meteorological Station site.

4.3 Emission Sources

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

The assessment has therefore modelled all roads within the immediate vicinity of the proposed development

site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to Figure 1 for a graphical representation of the traffic data utilised within the ADMS Roads 4.1.1 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 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	Money Lane Farm	1.5
R2	Brookhouse Farm	1.5
R3	115 Wildmoor Lane	1.5
R4	Fockbury Mill Farmhouse	1.5
R5	Washingstocks Farm	1.5
R6*	306 Birmingham Road	1.5
R7*	3 Old Birmingham Road	1.5
R8*	Alcester Road	1.5
R9*	367 Birmingham Road	1.5
*Located within the AQMA		

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.

Following a search within a 2 km radius of the site boundary, one ecological receptor was 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 (m)	Distance from Road Centre Line (m)
			X	Y		
E1	Beacon Wood	AW	397741	276057	1,562	2
E2	Broadmoor Wood	AW	397952	276377	1,707	47
E3	Chadwick Wood	AW	397970	276170	1,732	28
E4	Great Farleyanddales Woods	AW	395295	277909	961	1,164
E5	Little Farley Wood	AW	396360	278003	1,178	161
E6	Pepper Wood	AW	394254	275549	1,527	411
E7	Waseley Hills Country Park	LNR	396937	277581	952	482
E8	Madeley Heath Pit	SSSI	395774	276873	-	2
E9	Sling Gravel Pits	SSSI	394403	278055	1,468	986
E10	Romsley Hill	SSSI	396109	278845	1,813	900
E11	Feckenham Forest	SSSI	394166	275275	1,777	506
E12	Romsley Manor Farm	SSSI	396521	278688	1,848	541

It should be noted that the IAQM Guidance only requires the assessment of ecological receptors which are located within 200m of the road network and are predicted to experience an increase of over 1000 AADT. There are only an additional 120 AADT flows associated with the proposed development, therefore all ecological receptors in Table 4.3 have been scoped out of this air quality assessment.

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

In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2021. The assessment scenarios are therefore:

- 2018 Baseline = Existing baseline conditions;
- 2021 'Do Minimum' = 2021 Baseline Scenario + Committed Developments;
- 2021 'Do Something' = 2021 Baseline Scenario + Committed Developments + Proposed Development Flows.

5.1 Existing and Predicted Traffic Flows

Baseline 2018 data, projected 2021 'do minimum' and 'do something' traffic data and average vehicle speeds have been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT).

Baseline 2018 traffic data was downloaded from the Department for Transport (DfT) website.

To calculate the 2021 'do minimum' traffic flows, a TEMPro factor of 1.031 has been applied to the 2018 baseline traffic data.

The proposed development will generate an additional 120 daily HGV movements. To produce a conservative assessment, all HGV movements have been assumed to travel south along Sandy Lane towards the M5 Junction 4. These HGV movements have been added to the relevant road links to produce 2021 'do something' scenario traffic flows.

Emission factors for the 2018 baseline and 2021 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 9 (May 2019).

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 5.1.

Table 5.1 Traffic Data

Link	Speed (km/h)	2018		2021			
		AADT	HGV%	Do Minimum		Do Something	
				AADT	HGV%	AADT	HGV%
Sandy Lane	48	28,552	4.8	29,437	4.8	29,557	5.2
M5 North	112	77,503	10.1	79,906	10.1	79,906	10.1
M5 South	112	80,177	13.2	82,662	13.2	82,782	13.3
M5 South of M42 Jct	112	65,700	14.2	67,737	14.2	67,797	14.3
Money Lane South of Site	48	4,285	1.4	4,418	1.4	4,538	4.1
A38 North of M42 J1	48	30,343	3.5	31,284	3.5	31,284	3.5
B4096 North of M42 J1	48	15,172	3.5	15,642	3.5	15,642	3.5
A38 South of M42 J1	48	32,242	2.8	33,242	2.8	33,242	2.8
M42 East of J1	112	96,950	11.1	99,955	11.1	100,015	11.2
M42 West of J1	112	81,533	12.7	84,061	12.7	84,121	12.8
B4096 South of M42 J1	48	16,121	2.8	16,621	2.8	16,621	2.8
Money Lane North of Site	48	4,285	1.4	4,418	1.4	4,418	1.4

5.2 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 2018

The background concentrations shown in Table 5.2 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), NO_2, PM_{10} and $PM_{2.5}$. The mapped background concentrations are summarised in Table 5.2.

Table 5.2 Published Background Air Quality Levels (µg/m³)

Receptor Location	2018			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
Local Authority Monitoring				
LE4	13.38	18.41	13.83	8.75
LE5	17.39	24.63	15.28	9.55
1	13.38	18.41	13.83	8.75
F123	15.67	21.93	14.48	9.24
Existing Sensitive Receptors				
R1	17.31	24.48	14.90	9.34
R2	17.31	24.48	14.90	9.34
R3	17.47	24.77	14.72	9.45
R4	10.84	14.59	13.38	8.43
R5	16.15	22.65	14.62	9.23
R6	17.39	24.63	15.28	9.55
R7	17.39	24.63	15.28	9.55
R8	12.10	16.51	12.49	8.26
R9	17.39	24.63	15.28	9.55

All the Defra background concentrations detailed in Table 5.2 for 2018, show that the background levels are predicted to be below the relevant AQO within the study area.

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

A factor of 1.43 has been applied to the NO_2 to produce the NO_x value.

Table 5.3 Roadside Modelled Contribution at Tubes

Tube	Monitored NO_2 (µg/m³)	Modelled Traffic Contribution NO_2 (µg/m³)	Non-Modelled Traffic NO_2 (µg/m³)
LE4*	48.38	21.36	27.02
LE5*	32.49	23.29	9.20

Tube	Monitored NO_2 (µg/m³)	Modelled Traffic Contribution NO_2 (µg/m³)	Non-Modelled Traffic NO_2 (µg/m³)
1*	27.02	23.66	3.36
F123*	50.93	37.65	13.28
*Located within the AQMA			

Following a review of the LA monitoring, by considering the likely apportionment of traffic vs background contributions at each of the monitoring locations, it is considered that the Defra Background Maps produce a worst case scenario at all monitoring locations except LE4. At LE4, to represent background NO_2 conditions, urban background monitoring location LE7 has been utilised.

Table 5.4 shows the background concentrations utilised within the operational phase modelling assessment.

Table 5.4 Utilised Background Concentrations (µg/m³)

Receptor Location	2018		Source
	NO_2	NO_x	
Local Authority Monitoring Locations			
LE4*	33.40	47.76	LE7
LE5*	17.39	24.63	Defra
1*	13.38	18.41	Defra
F123*	15.67	21.93	Defra
Existing Sensitive Receptors			
R1	17.31	24.48	Defra
R2	17.31	24.48	Defra
R3	17.47	24.77	Defra
R4	10.84	14.59	Defra
R5	16.15	22.65	Defra
R6*	17.39	24.63	Defra
R7*	17.39	24.63	Defra
R8*	12.10	16.51	Defra
R9*	17.39	24.63	Defra
*Located within the AQMA			

5.3 Model Verification

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

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_X at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_X emissions. These are converted into predicted roadside contribution NO_2 exposure at the relevant

receptor locations based on the updated approach to deriving NO_2 from NO_X for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_X to NO_2 worksheet in the online LAQM tools website hosted by Defra. Table 5.5 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 5.5 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
LE4*	48.38	49.40	2.11
LE5*	32.49	35.97	10.71
1*	27.02	32.56	20.49
F123*	50.93	44.42	-12.78
*In AQMA			

The final model produced data at the monitoring locations to within 25 % 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 1.00[1]. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

[1] This was achieved by applying a model correction factor of 1.17 to roadside predicted NO_X concentrations before converting to NO_2

5.4 Summary of Model Inputs

Table 5.6 Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), NO_2, Ozone (O_3) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	**Pershore 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 = **52.3**
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= **30 m** was used for both Site Data and 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 **9.0 (2019)** dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	**2018** data for verification and baseline operational phase assessment **2021** data for the operational phase assessment.

5.5 ADMS Modelling Results

5.5.1 Traffic Assessment

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

5.5.2 Assessment Scenarios

For the operational year of 2021, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2021 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors:

- 2018 Baseline = Existing baseline conditions;

- 2021 'Do Minimum' = 2021 Baseline Scenario + Committed Developments; and,
- 2021 'Do Something' = 2021 Baseline Scenario + Committed Developments + Proposed Development Flows.

Nitrogen Dioxide

Table 5.7 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 5.7 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Money Lane Farm	20.02	19.48	19.59	0.11
R2	Brookhouse Farm	22.58	21.42	21.45	0.03
R3	115 Wildmoor Lane	31.93	28.64	28.66	0.02
R4	Fockbury Mill Farmhouse	16.44	15.10	15.11	0.01
R5	Washingstocks Farm	29.02	26.12	26.13	0.01
R6*	306 Birmingham Road	37.05	32.72	32.74	0.02
R7*	3 Old Birmingham Road	40.52	35.35	35.38	0.03
R8*	Alcester Road	31.42	27.21	27.23	0.02
R9*	367 Birmingham Road	35.74	31.63	31.65	0.02
Annual Mean AQO		**40 µg/m³**			
*Located within the AQMA					

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

As indicated in Table 5.7, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development, is 0.11 µg/m³ at Money Lane Farm (R1).

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 5.8.

Table 5.8 Impact Description of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.11	0.27	0%	≤75% of AQO	Negligible
R2	0.03	0.07	0%	≤75% of AQO	Negligible

Impact Description of NO_2 Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R3	0.02	0.05	0%	≤75% of AQO	Negligible
R4	0.01	0.02	0%	≤75% of AQO	Negligible
R5	0.01	0.02	0%	≤75% of AQO	Negligible
R6*	0.02	0.05	0%	76-94% of AQO	Negligible
R7*	0.03	0.07	0%	76-94% of AQO	Negligible
R8*	0.02	0.05	0%	≤75% of AQO	Negligible
R9*	0.02	0.05	0%	76-94% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within the AQMA					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors, is determined to be 'negligible' at all 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 (PM_{10})

Table 5.9 presents a summary of the predicted change in annual mean PM_{10} concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 5.9 Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		Baseline 2018	**Do Minimum 2021**	**Do Something 2021**	**Development Contribution**
R1	Money Lane Farm	15.37	15.36	15.39	0.03
R2	Brookhouse Farm	15.80	15.77	15.78	0.01
R3	115 Wildmoor Lane	17.21	17.11	17.12	0.01
R4	Fockbury Mill Farmhouse	14.29	14.25	14.25	<0.01
R5	Washingstocks Farm	16.79	16.71	16.71	<0.01
R6*	306 Birmingham Road	18.36	18.24	18.25	0.01
R7*	3 Old Birmingham Road	18.83	18.69	18.70	0.01
R8*	Alcester Road	15.42	15.32	15.33	0.01
R9*	367 Birmingham Road	18.14	18.03	18.03	<0.01
Annual Mean AQO		**40 µg/m³**			
*Located within the AQMA					

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

As indicated in Table 5.9, the maximum predicted increase in the annual average exposure to PM_{10} at any existing receptor, due to changes in traffic movements associated with the development, is 0.03 µg/m^3 at Money Lane Farm (R1).

The impact description of changes in traffic flow associated with the development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 5.10.

Table 5.10 Impact Description of Effects at Key Receptors (PM_{10})

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change Due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	0.03	0.07	0%	≤75% of AQO	Negligible
R2	0.01	0.02	0%	≤75% of AQO	Negligible
R3	0.01	0.02	0%	≤75% of AQO	Negligible
R4	<0.01	0.01	0%	≤75% of AQO	Negligible
R5	<0.01	0.01	0%	≤75% of AQO	Negligible
R6*	0.01	0.01	0%	≤75% of AQO	Negligible
R7*	0.01	0.02	0%	≤75% of AQO	Negligible
R8*	0.01	0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within the AQMA					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in Section 3. 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 5.11 presents a summary of the predicted change in annual mean $PM_{2.5}$ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 5.11 Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{2.5}$ (µg/m^3)			
		Baseline 2018	**Do Minimum 2021**	**Do Something 2021**	**Development Contribution**
R1	Money Lane Farm	9.62	9.60	9.62	0.02
R2	Brookhouse Farm	9.88	9.84	9.84	<0.01
R3	115 Wildmoor Lane	10.94	10.81	10.81	<0.01
R4	Fockbury Mill Farmhouse	8.97	8.92	8.92	<0.01

Receptor		$PM_{2.5}$ (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R5	Washingstocks Farm	10.53	10.42	10.42	<0.01
R6*	306 Birmingham Road	11.40	11.25	11.25	<0.01
R7*	3 Old Birmingham Road	11.69	11.51	11.52	0.01
R8*	Alcester Road	10.03	9.89	9.89	<0.01
R9*	367 Birmingham Road	11.27	11.12	11.13	0.01
Annual Mean AQO		**25 µg/m³**			
*Located within the AQMA					

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 5.11, 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 0.02 µg/m³ at Money Lane Farm (R1).

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 5.12.

Table 5.12 Impact Description of Effects at Key Receptors ($PM_{2.5}$)

Impact Description of $PM_{2.5}$ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.02	0.06	0%	≤75% of AQO	Negligible
R2	<0.01	0.02	0%	≤75% of AQO	Negligible
R3	<0.01	0.02	0%	≤75% of AQO	Negligible
R4	<0.01	0.01	0%	≤75% of AQO	Negligible
R5	<0.01	0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	0.01	0%	≤75% of AQO	Negligible
R7*	0.01	0.02	0%	≤75% of AQO	Negligible
R8*	<0.01	0.01	0%	≤75% of AQO	Negligible
R9*	0.01	0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean $PM_{2.5}$ exposure, for existing 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'.

6. Mitigation

There are not predicted to be any significant changes in air quality conditions as a result of the proposed development. The proposed development is also not expected to elevate any airborne pollutant levels to concentrations above their respective AQOs. Therefore, there are no proposed mitigation measures in relation to air quality.

7. Conclusions

WYG have undertaken an Air Quality Assessment to support an application for the proposed sand extraction and landfill activities at Chadwich Lane Quarry.

Operational Assessment

The 2021 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor is likely to be 0.11 µg/m^3 at Money Lane Farm (R1).

For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be 0.03 µg/m^3 at Money Lane Farm (R1).

For $PM_{2.5}$, the maximum predicted increase in the annual average exposure is likely to be 0.02 µg/m^3 at Money Lane Farm (R1).

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2, PM_{10} and $PM_{2.5}$ exposures, are determined to be 'negligible' at all identified receptor locations.

Figures

Figure 1 Air Quality Assessment Area

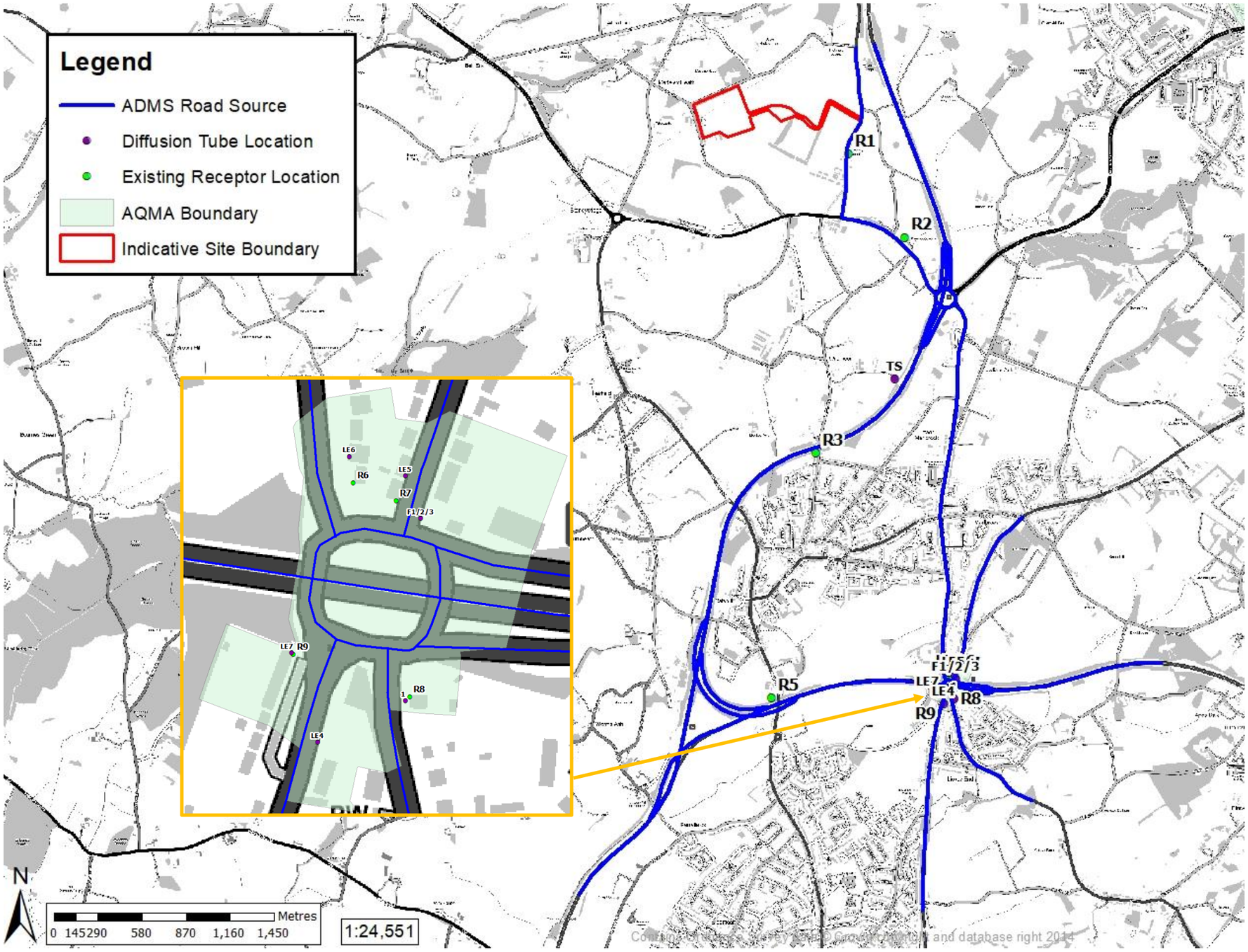
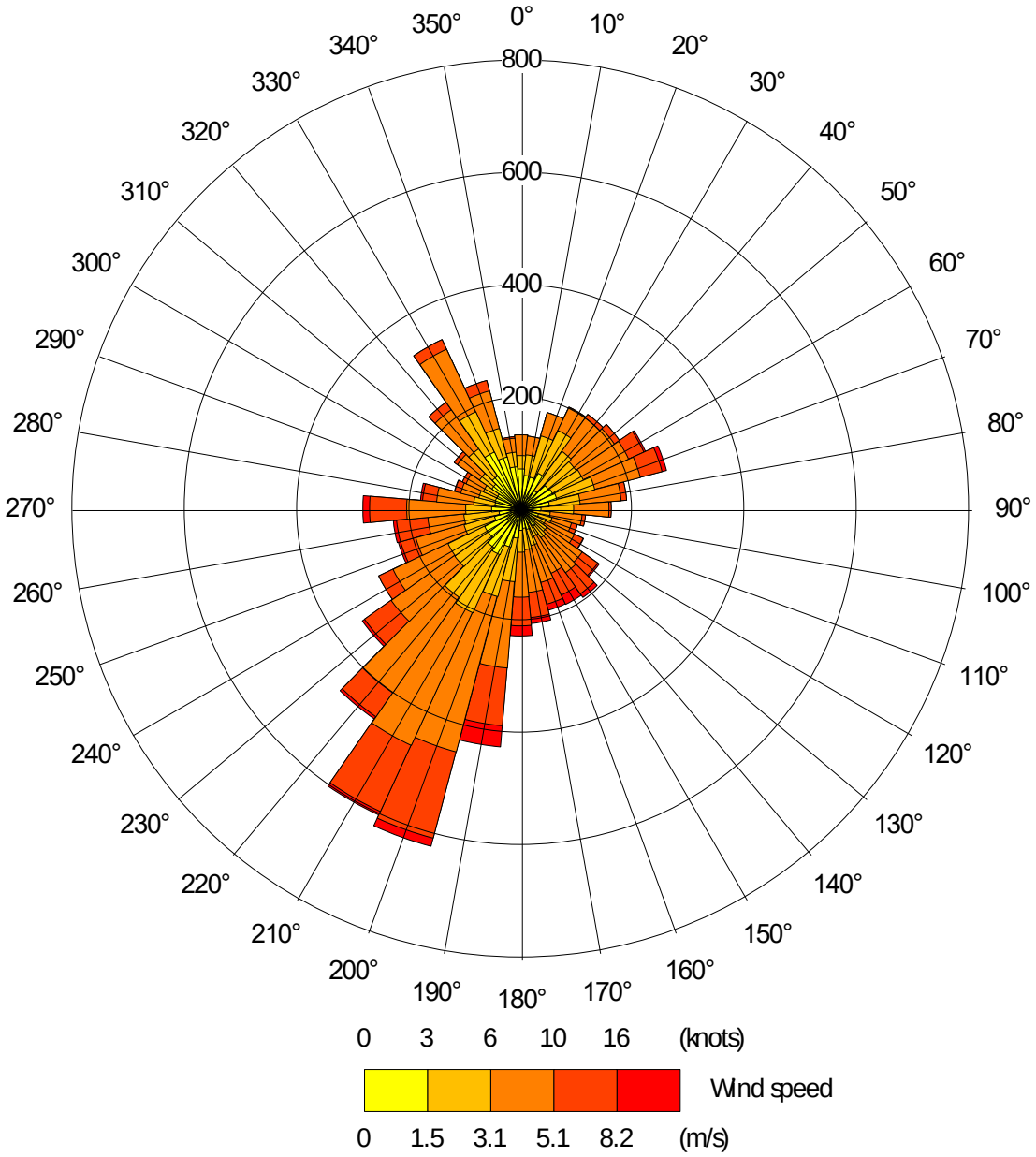


Figure 2 Pershore 2018 Meteorological Station Wind Rose



Appendix A Theoretical Scenario Results

Table A1 Theoretical Scenario NO_2 Results

Receptor		NO_2 (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Money Lane Farm	20.02	20.11	20.31	0.20
R2	Brookhouse Farm	22.58	22.76	22.81	0.05
R3	115 Wildmoor Lane	31.93	32.41	32.44	0.03
R4	Fockbury Mill Farmhouse	16.44	16.63	16.64	0.01
R5	Washingstocks Farm	29.02	29.44	29.46	0.02
R6*	306 Birmingham Road	37.05	37.68	37.70	0.03
R7*	3 Old Birmingham Road	40.52	41.24	41.29	0.05
R8*	Alcester Road	31.42	32.02	32.06	0.04
R9*	367 Birmingham Road	35.74	36.34	36.38	0.04
Annual Mean AQO		**40 µg/m³**			
*In AQMA					

Table A2 Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Money Lane Farm	15.37	15.39	15.42	0.03
R2	Brookhouse Farm	15.80	15.83	15.84	0.01
R3	115 Wildmoor Lane	17.21	17.29	17.30	0.01
R4	Fockbury Mill Farmhouse	14.29	14.31	14.32	0.01
R5	Washingstocks Farm	16.79	16.86	16.87	0.01
R6*	306 Birmingham Road	18.36	18.45	18.46	0.01
R7*	3 Old Birmingham Road	18.83	18.94	18.95	0.01
R8*	Alcester Road	15.42	15.52	15.52	<0.01
R9*	367 Birmingham Road	18.14	18.23	18.23	<0.01
Annual Mean AQO		**40 µg/m³**			
*In AQMA					

Table A3 Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{2.5}$ (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Money Lane Farm	9.62	9.63	9.65	0.02
R2	Brookhouse Farm	9.88	9.89	9.90	0.01
R3	115 Wildmoor Lane	10.94	10.99	10.99	<0.01
R4	Fockbury Mill Farmhouse	8.97	8.99	8.99	<0.01
R5	Washingstocks Farm	10.53	10.57	10.58	0.01
R6*	306 Birmingham Road	11.40	11.46	11.46	<0.01
R7*	3 Old Birmingham Road	11.69	11.76	11.76	<0.01
R8*	Alcester Road	10.03	10.08	10.08	<0.01
R9*	367 Birmingham Road	11.27	11.32	11.33	0.01

Receptor	$PM_{2.5}$ (µg/m³)			
	Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
Annual Mean AQO	**25 µg/m³**			
*In AQMA				

For Scenario 2, the maximum predicted increase in annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development is 0.20 µg/m³ at Money Lane Farm (R1).

For PM_{10}, the maximum predicted increase in annual average exposure to PM_{10} at any existing receptor, due to changes in traffic movements associated with the development is 0.03 µg/m³ at Money Lane Farm (R1).

For $PM_{2.5}$, the maximum predicted increase in annual average exposure to $PM_{2.5}$ at any existing receptor, due to changes in traffic movements associated with the development is 0.02 µg/m³ at Money Lane Farm (R1).

Appendix B Defra Verification Scenario Results

Model Verification

Table B1 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m³		
	Monitored NO_2	Modelled NO_2	Difference (%)
LE4*	48.38	33.99	-29.74
LE5*	32.49	39.30	20.95
1*	27.02	35.98	33.15
F123*	50.93	49.30	-3.20

The final model predicted NO_2 concentrations at the monitoring locations with over 25 % divergence from the monitored results. This does not meet the requirement of the TG16 guidance and suggests that by using solely Defra backgrounds, there are large variances in the actual versus real trends of NO_2 concentrations.

Table B2 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Money Lane Farm	20.55	19.91	20.04	0.13
R2	Brookhouse Farm	23.59	22.23	22.26	0.03
R3	115 Wildmoor Lane	34.58	30.72	30.74	0.02
R4	Fockbury Mill Farmhouse	17.52	15.92	15.93	0.01
R5	Washingstocks Farm	31.41	27.99	28.01	0.02
R6*	306 Birmingham Road	40.54	35.52	35.54	0.02
R7*	3 Old Birmingham Road	44.55	38.58	38.61	0.03
R8*	Alcester Road	34.86	29.97	30.00	0.03
R9*	367 Birmingham Road	39.04	34.25	34.28	0.03
Annual Mean AQO		**40 µg/m³**			
*In AQMA					

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

The maximum predicted increase in annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development is 0.13 µg/m³ at Money Lane Farm (R1)

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

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

Impact Description of NO_2 Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	0.13	0.32	0%	≤75% of AQO	Negligible
R2	0.03	0.07	0%	≤75% of AQO	Negligible
R3	0.02	0.05	0%	76-94% of AQO	Negligible
R4	0.01	0.02	0%	≤75% of AQO	Negligible
R5	0.02	0.05	0%	≤75% of AQO	Negligible
R6*	0.02	0.05	0%	76-94% of AQO	Negligible
R7*	0.03	0.07	0%	95-102% of AQO	Negligible
R8*	0.03	0.07	0%	≤75% of AQO	Negligible
R9*	0.03	0.07	0%	76-94% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*In AQMA					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing modelled receptors is determined to be 'negligible'.

Appendix C Report Terms and Conditions

This Report has been prepared using reasonable skill and care for the sole benefit of Salop Sand and Gravel Ltd ("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