Harworth Estates

Wakefield Road, Athersley

Air Quality Assessment

September 2017

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Executive Summary

WYG have undertaken an Air Quality Assessment to support a proposed residential development of up to 8.34 hectares of land at Wakefield Road, Athersley.

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

During the construction phase, it is anticipated that dust sensitive receptors will potentially experience increased levels of dust and particulate matter before using any mitigation and control measures. However, these are predicted to be short term and temporary impacts. Throughout this period, the potential impacts from construction on air quality will be managed through site specific mitigation measures detailed within this assessment. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

The assessment of the significance of the traffic effects associated with both the committed and proposed developments with respect to Nitrogen Dioxide (NO_2) exposure is determined to be 'negligible' for all existing and proposed receptors for both assessment scenarios including within the AQMA to the south of the site. With respect to predicted Particulate Matter of 10 micrometers in diameter (PM_{10}) exposure, the significance of the proposed development is determined to be 'negligible' all receptors for both assessment scenarios.

Following the adoption of the recommended mitigation measures during the construction and operational phases in line with the West Yorkshire Low Emissions Strategy, the development is not considered to be contrary to any of the national, regional or local planning policies.

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

1. Introduction

Harworth Estates commissioned WYG Environment Planning and Transport (WYG) to prepare an Air Quality Assessment to support an application for a proposed residential development of up to 8.34 hectares of land at Wakefield Road, Athersley.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is approximately 434714, 408739. The Site is bounded to the north by commercial developments, to the east by Wakefield Road, and to the south and west by grassland and woodland. Reference should be made to Figure 1 for a map of the proposed development site.

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

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

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

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

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}) 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 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, Department for Communities and Local Government, March 2012;
- Planning Practice Guidance: Air Quality, March 2014;
- The Air Quality Standards Regulations, 2010;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG(16), DEFRA, 2016;
- 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; and,
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.go.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and
- Barnsley Metropolitan Borough Council (https://www.barnsley.gov.uk/)

Site Specific Reference Documents

- Barnsley Local Development Framework Core Strategy, Adopted September 2011;
- Barnsley MBC 2016 Air Quality Annual Status Report; and
- Barnsley MBC Air Quality and Emissions Good Practice Planning Guidance, September 2014

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

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

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

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

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

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

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

Within the context of this assessment, the annual mean objectives are those against which residential receptors will be assessed and the short term objectives apply to all receptor locations, both residential and non-residential.

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) 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 broadly retains the principles of PPS 23: Planning and Pollution Control and states in Paragraph 124 that:

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

The Planning Practice Guidance (PPG) web-based resource was launched by the Department for Communities and Local Government (DCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance in Paragraph 005 (Reference ID: 32-005-20140306):

> *'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.'*

Local Policy

Barnsley Metropolitan Borough Council (BMBC) has a number of policies within their Core Strategy, adopted in 2011, and the following policies have been identified as being relevant to the proposed development from an air quality perspective:

Policy CSP 28

'Reducing the Impact of Road Travel

We will reduce the impact of road travel by:

- *Developing and implementing robust, evidence based air quality action plans to improve air quality*
- *Working with our sub regional partner, fleet and freight operators to improve the efficiency of vehicles and goods delivery, and reduce exhaust emissions*
- *Implementing measures to ensure the current road system is used efficiently.'*

Policy CSP 40

'Pollution Control and Protection

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.

We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against.

Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate'

Policy CSP 41

'Development in Air Quality Management Areas

Development in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in

terms of air quality (including residents, employees, visitors and customers), or that any such harmful effects can be mitigated against.

We will only allow residential development in air quality management areas, where the developer provides an assessment that shows living conditions will be acceptable for future residents.

We will only allow development in air quality management areas which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality.'

The Barnsley MBC Air Quality and Emissions Good Practice Planning Guidance has been reviewed and it recommends that a damage costs assessment be carried out for 'MAJOR' proposals in accordance with the West Yorkshire Guidance.

3. Assessment Methodology

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

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

3.1 Determining Significance of the Air Quality Effects

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

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

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Assessment Level (AQAL), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQAL and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQAL;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQAL will have higher severity compared to a relatively large change at a receptor which is significantly below the AQAL;
4. The effects can be adverse when air quality concentration increases or beneficial when concentration decreases as a result of development;
5. The judgement of overall significance of the effects is then based on severity of effects on all the individual receptors considered; and,

6. Where a development is not resulting in any change in emissions itself, the significance of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQAL.

Table 3.1 Significance of Effects Matrix

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

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

4. Baseline Conditions

4.1 Air Quality Review

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

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, Barnsley Metropolitan Borough Council (BMBC) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO_2 and PM_{10} are above the relevant AQOs at a number of locations of relevant public exposure within the Council. BMBC has designated eight Air Quality Management Areas (AQMAs):

- Barnsley AQMA No. 6: Incorporating the A616 road through Langsett;
- Barnsley AQMA No. 7: Incorporating the southbound carriageway of the A61 Sheffield Road adjacent to the junction with the A6133 Cemetery Road;
- Barnsley AQMA No. 4: An area encompassing the southbound carriageway of the A61 Harborough Hill Road from the "PC World" gyratory to the southbound slip road of the A61 near to its junction with Queens Road;
- Barnsley AQMA No. 5: An area encompassing the junction of Rotherham Road and Burton Road;
- Barnsley AQMA No. 2A: An area encompassing the A628 from junction 37 of the M1 to Town End roundabout, including part of Summer Lane from Town End roundabout to Wharncliffe Street;
- Barnsley AQMA No. 2B: An area encompassing the A628 from junction 37 of the M1 to Dodworth Level Crossing;
- Barnsley AQMA No. 3: An area encompassing the junction of the A61 Wakefield Road and Burton Road; and
- Barnsley AQMA No. 1: An area along the M1 between Junction 35a and Junction 38, including Haigh, Darton, Cawthorne Dike, Higham, Dodworth, Gilroyd, Rockley, Birdwell, and Tankersley. The area extends 100m either side of the central reservation.

The proposed development is situated approximately 2.3 km south of AQMA No.2A as such this has been taken into consideration in this assessment.

Air Quality Monitoring

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

Continuous

BMBC operates four continuous automatic monitoring sites. One of these monitors roadside NO_2 concentrations.

The representative automatic annual mean NO_2 monitoring data is from 2015 and is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO_2 Concentrations

Site ID	X	Y	Location	Site Type	NO_2 Annual Mean Concentration 2015 ($\mu g/m^3$)
CM2	432680	406174	Barnsley A628 Roadside	Roadside	39.0

Non - Continuous Monitoring

BMBC operates a network of diffusion tubes. NO_2 concentrations were monitored at 81 locations in 2015. The closest diffusion tube is located approximately 40m east of the site boundary.

The representative diffusion tube data are from 2015 and are presented in Table 4.1.

Table 4.2 Monitored Annual Mean NO_2 Concentrations

Site ID	X	Y	Location	Site Type	NO_2 Annual Mean Concentration 2015 ($\mu g/m^3$)
DT24	434512	409256	Wensley Road, off Wakefield Road	Roadside	25.5
DT25	434935	408647	Wakefield Road / Brunswick Close	Roadside	29.7
DT26	435011	408281	Wakefield Road / Carlton Road	Roadside	34.4
DT27	435027	408104	Wakefield Road / Smithies Lane (North	Roadside	42.0
DT28	435108	407676	Wakefield Rd – app. Burton Rd junc.	Roadside	30.6
DT29	435148	407565	Wakefield Rd – app. Burton Rd junc	Roadside	31.2
DT30	435174	407499	Wakefield Road – Burton Road junction	Roadside	32.8
DT32	434757	406995	Old Mill Lane / Honeywell Street	Roadside	41.5
DT33	434778	406988	Old Mill Lane / Eldon Street	Roadside	34.2

Site ID	X	Y	Location	Site Type	NO_2 Annual Mean Concentration 2015 ($\mu g/m^3$)
DT34	435230	407443	Burton Road – app Wakefield Rd junc.	Roadside	25.6
DT35	435310	407372	Burton Road – app Wakefield Rd junc	Roadside	39.7
DT65	435027	408190	Wakefield Road / Carlton Road	Roadside	42.2
DT66	434933	406695	40 Harborough Hill Road	Roadside	67.4
DT71	434955	406769	Harborough Hills Road – near to bakery	Roadside	65.0
DT72	434979	406918	Harborough Hills Road / Meadow Street	Roadside	34.6
DT73	434951	407003	Harborough Hills Road / Redfearn Street	Roadside	34.6
DT74	435047	407033	113 Harborough Hills	Roadside	43.0

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 2015 meteorological data used in the assessment is derived from Leeds Bradford 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 Leeds Bradford 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 and PM_{10}.

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 4.0 model.

It should be noted that the pollutant contribution of minor roads and rail sources are not included within the dispersion model and are 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 and proposed receptors which 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		UK NGR (m)	
		X	Y
R1	Athersley South Primary School	434869	409005
R2	279 Wakefield Road	434598	409226
R3	26 High Greave	435009	408442
R4	66 Wakefield Road	435083	407733
R5	11 Wakefield Road	435176	407502
R6	97 Harborough Hill Road	434953	406750
R7	132 Old Mill Lane	435082	407342
R8	29 Harborough Hill Road	434902	406574
R9	Queens Road Academy	434951	406582
R10	Barnsley College	434484	406940
R11	217 Wakefield Road	434862	408906
R12	211 Wakefield Road	434950	408732
R13	Roundhouse Medical Centre	434481	409292
R14	4 Laithes Road	434540	409351
R15	553 Rotherham Road	434858	408970
R16	171 Wakefield Road	435024	408245
R17	1 Carlton Road	435041	408219
R18	98 Carlton Road	435436	408426
R19	92 Carlton Road	435393	408418
R20	381 Rotherham Road	435448	408397
R21	113 Harborough Hill Road	435047	407031
R22	338 Wakefield Road	434556	409196

5. Assessment of Air Quality Impacts - Construction Phase

5.1 Pollutant Sources

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

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

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

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

5.2 Particulate Matter (PM_{10})

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

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

5.3 Dust

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. There are no formal standards or criteria for nuisance caused by deposited particles, however, a deposition rate of 200mg/m^2/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

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

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

5.4 Methodology

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

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

5.5 Assessment Results

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

Table 5.1 Dust Emission Magnitude

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

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

Table 5.2 Sensitivity of the Area

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

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

Table 5.3 Impact Significance of Construction Activities without Mitigation

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

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

6. Assessment of Air Quality Impacts - Operational Phase

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

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

In accordance with the provided traffic data, as contained within the supporting Traffic Statement (TS), the operational phase assessment has been undertaken with an assumed operational opening year of 2019. The assessment scenarios are therefore:

- 2015 Baseline = (2015 Traffic) Existing baseline conditions;
- 2019 "Do Minimum" = Baseline conditions + committed development flows; and
- 2019 "Do Something" = Baseline conditions + committed development flows + proposed development flows.

6.1 Existing and Predicted Traffic Flows

Baseline 2015 traffic data and 2019 'do minimum' and 'do something' traffic data in the form of Annual Average Daily Traffic figures (AADT) have been provided by Optima Transport Consultants.

Additional baseline traffic data for Old Mill Lane and Harborough Road have been obtained from the 2016 Air Quality Assessment for the Aldi Supermarket site on Old Mill Lane.

To calculate the 2019 'do minimum' traffic flows for Old Mill Lane and Harborough Road, a TEMPRO factor of 1.0794 has been applied.

It is assumed that average vehicle speeds on the local road network in the opening year of 2019 will be broadly the same as 2015.

Emission factors for the 2015 baseline and 2019 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 7.0 (July 2016).

For the purposes of the air quality assessment, only roads predicted to experience significant changes in flows have been included in the air quality model. These represent the primary access routes to the proposed development site. Where unavailable, traffic speeds have been estimated based on site observations and national speed limits.

A 50m 20km/hr slow down phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in Figure 1. Detailed traffic figures are provided in the Table 6.1.

Table 6.1 Traffic Data

Link	Speed (km/h)	2015		2019			
		AADT	HGV %	Without the Proposed Development		With Development	
				AADT	%HGV	AADT	%HGV
Wakefield Road(North of Laithes Lane)	64	22,287	4.2	22,966	4.2	23,259	4.1
Laithes Lane	48	9,085	5.9	9,367	6.0	9,465	5.9
Wakefield Road (South of Laithes Lane)	64	17,388	4.2	18,670	4.1	19,061	4.0
Wakefield Road (West Triangle)	64	11,558	5.2	11,914	4.7	12,420	5.0
Wakefield Road (East Triangle)	48	8,545	1.9	8,809	1.8	8,930	1.8
Wakefield road (South Triangle)	20	891	2.6	932	2.5	1,064	2.2
Rotherham Road (Diagonal)	48	9,074	2.1	9,350	2.0	9,597	2.0
Rotherham Road (North of Carlton Road)	48	10,022	2.2	10,327	2.1	10,569	2.2
Rotherham Road (South of Carlton Road)	48	11,500	2.3	11,851	2.2	12,092	2.2
Carlton Road (West of Rotherham Road)	48	7,475	3.2	7,705	3.1	7,751	3.2
Carlton Road (East of Rotherham Road)	48	8,826	2.9	9,102	2.8	9,148	2.9
Wakefield Road (North of Site)	64	12,351	4.8	12,731	4.8	13,375	4.6
Wakefield Road (South of Site)	64	12,351	4.8	12,731	4.8	13,133	4.7
Site Access	20	0	0.0	0	0.0	1,047	0.0
Wakefield Road (North of Carlton Road)	64	12,351	4.8	12,719	4.8	13,133	4.7
Wakefield Road (South of Carlton Road)	64	18,446	4.4	19,010	4.4	19,372	4.3
Carlton Road (East of Wakefield Road)	48	6,624	3.3	6,820	3.2	6,871	3.2
Wakefield Road (North of Smithies Lane)	64	20,154	3.9	20,769	3.6	21,126	3.8
Wakefield Road (South of Smithies Lane)	64	14,835	4.5	15,284	4.4	15,841	4.3
Smithies Lane	48	6,446	4.0	6,647	3.9	6,739	2.3
Harborough Road	48	17,228	2.1	18,596	2.1	18,796	2.1
Old Mill Lane	48	22,244	2.8	24,010	2.8	24,110	2.8

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.

Background concentrations as used within the prediction calculations 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 June 2014, DEFRA issued revised 2013 based background maps for

nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$ which incorporate updates to the input data used for modelling. 2015 background maps have been utilised throughout the assessment to provide a conservative assessment. The updated mapped background concentrations used in the assessment are summarised in Table 6.2.

Table 6.2 Published Background Air Quality Levels (µg/m^3)

UK NGR(m)		2015			
X	Y	NO_x	NO_2	PM_{10}	$PM_{2.5}$
434500	408500	17.2	24.9	15.3	11.1
435500	408500	18.9	27.9	15.8	11.9
434500	409500	18.2	26.7	16.0	12.2
435500	409500	17.7	25.9	15.8	12.0

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 presented as the 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.

A model correction factor of 3.10 was applied to roadside predicted NO_X concentrations before converting to NO_2. This figure demonstrates that the model predictions are slightly over predicting the road traffic emissions at the monitoring locations. Table 6.3 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6.3 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
DT24			
DT25			
DT26			
DT27			
DT29			
DT30			

Tube location	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
DT32			
DT33			
DT65			
DT66			
DT71			
DT74			

The final model produced data at the monitoring locations to within 25% of the monitoring results, as recommended within the TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 1.002. The 'ideal value' correlation coefficient recommended in Box 7.15 of TG16 is 1.00. The model is therefore considered to be verified and suitably representative of local emissions and exposures.

6.4 Summary of Model Inputs

Table 6.4 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	**Leeds Bradford Meteorological Station**, hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	**1m** representing Cities, Woodlands.
Latitude	Allows the location of the model area to be set	United Kingdom = **52**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Cities and Large Towns = **30m.**
Elevation of Road	Allows the height of the road link above ground level to be specified.	All road links were set at ground level = **0m**.
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	**Urban (Not London)** settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a "street canyon".	No canyons used within the model
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EfT database of traffic emission factors.	The **EFT** Version **7.0 (2016)** dataset was used.
Year	Predicted EfT emissions rates depend on the year of emission.	**2015 traffic** data for verification and baseline operational phase assessment **2019** data for the operational phase assessment.

6.5 ADMS Modelling Results

Traffic Assessment

The ADMS Model has predicted concentrations of NO_2 and PM_{10} at relevant receptor locations adjacent to roads likely to be effected 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.

Assessment Scenarios:

For the operational year of 2019, assessment of the effects of emissions from the proposed traffic associated with the scheme, have been undertaken under the following scenarios:

- Scenario 1: Using the Emissions Factor Toolkit (EFT) 2019 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future.

In Scenario 1, for the operational year of 2019, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the EFT 2019 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors

  - 2015 Baseline = (2015 Traffic data) Existing baseline conditions;
  - 2019 "Do Minimum" = Baseline conditions + committed development flows;
  - 2019 "Do Something" = Baseline conditions + committed development flows + proposed development flows.

- Scenario 2: Using the Theoretical Style assessment with emissions factors of the year of 2015 for the future 2019 'no and with' development scenarios. This scenario assumes no reduction in emissions rates from road vehicles from 2015 to 2019.

In Scenario 2, this is an additional theoretical scenario which uses emission factors for 2015 for the 'no development' and 'with development' based on a recent appeal decision (planning reference no.APP/D3830/A/14/22269877) that favoured the uncertainty of emissions forecasts. It should be noted that this is a theoretical scenario which assumes that the government (Defra) predictions for reduction in emissions over the forthcoming years will not occur. However, this should be not be considered as a 'more correct' scenario in accordance with the 2010 note [http://laqm.defra.gov.uk/laqm-faqs/faq5.html] which confirms that: *'There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast. This disparity in the historical data highlights the uncertainty of future year projections of both NO_x and NO_2, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections'*.

- 2019 'No development' Theoretical Scenario = Baseline + committed development (**using 2015 traffic emission factors**);
- 2019 'With development' Theoretical Scenario = Baseline + committed development + Proposed development (**using 2015 traffic emission factors**);

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

Assessment Scenario 1 Results

Nitrogen Dioxide

Table 6.5 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.5 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m^3)			
		Baseline 2015	No development 2019	With development 2019	Development Contribution
R1	Athersley South Primary School	20.11	19.47	19.50	0.04
R2	279 Wakefield Road	21.39	20.39	20.42	0.04
R3	26 High Greave	22.00	20.90	20.96	0.06
R4	66 Wakefield Road	29.59	26.81	26.89	0.08
R5	11 Wakefield Road	31.23	27.87	27.97	0.09
R6	97 Harborough Hill Road	61.66	58.86	58.91	0.05
R7	132 Old Mill Lane	28.88	26.35	26.44	0.08
R8	29 Harborough Hill Road	60.36	57.88	57.92	0.05
R9	Queens Road Academy	36.78	36.03	36.04	0.01
R10	Barnsley College	36.99	36.13	36.15	0.01
R11	217 Wakefield Road	24.59	22.87	23.01	0.14
R12	211 Wakefield Road	19.43	18.66	18.71	0.05
R13	Roundhouse Medical Centre	20.66	19.83	19.85	0.02
R14	4 Laithes Road	22.55	21.03	21.06	0.02
R15	553 Rotherham Road	21.16	19.84	19.91	0.07
R16	171 Wakefield Road	27.82	24.75	24.90	0.15
R17	1 Carlton Road	25.67	23.34	23.45	0.11
R18	98 Carlton Road	25.13	23.10	23.17	0.07
R19	92 Carlton Road	22.24	21.15	21.19	0.05
R20	381 Rotherham Road	23.74	22.19	22.24	0.06
R21	113 Harborough Hill Road	42.73	43.04	43.09	0.06
R22	338 Wakefield Road	20.45	19.73	19.76	0.02
PR1	Proposed Residential Receptor	19.55	18.75	18.83	0.08
PR2	Proposed Residential Receptor	19.88	18.97	19.18	0.21
PR3	Proposed Residential Receptor	19.90	18.99	19.18	0.19
PR4	Proposed Residential Receptor	19.19	18.51	18.57	0.06
PR5	Proposed Residential Receptor	18.49	18.04	18.25	0.21
PR6	Proposed Residential Receptor	18.37	17.96	18.23	0.27
PR7	Proposed Residential Receptor	18.14	17.81	17.83	0.02
PR8	Proposed Residential Receptor	18.27	17.89	17.92	0.02
PR9	Proposed Residential Receptor	17.96	17.70	17.72	0.01
PR10	Proposed Residential Receptor	17.75	17.56	17.58	0.01
PR11	Proposed Residential Receptor	17.67	17.51	17.52	0.01
PR12	Proposed Residential Receptor	17.61	17.47	17.47	<0.01
PR13	Proposed Residential Receptor	17.58	17.44	17.45	0.01
PR14	Proposed Residential Receptor	17.52	17.40	17.41	0.01
PR15	Proposed Residential Receptor	17.51	17.40	17.40	<0.01
PR16	Proposed Residential Receptor	17.46	17.37	17.37	<0.01
Annual Mean AQO not to be exceeded		**40 µg/m^3**			

As indicated in Table 6.5, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptors, due to changes in traffic movements associated with the development, is 0.15 µg/m^3 at 171 Wakefield (R16).

All modelled receptor locations are predicted to meet the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios.

The significance of changes in traffic flow associated with the development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.6.

Table 6.6 Significance of Effects at Key Receptors (NO_2)

NO_2 Significance Effects at Key Receptors				
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**% Change in Concentration Relative to AQAL**	**% Annual Mean Concentration in Assessment Year**	**Significance**
R1	0.04	0%	<75% of AQAL	Negligible
R2	0.04	0%	<75% of AQAL	Negligible
R3	0.06	0%	<75% of AQAL	Negligible
R4	0.08	0%	<75% of AQAL	Negligible
R5	0.09	0%	<75% of AQAL	Negligible
R6	0.05	0%	>110% of AQAL	Negligible
R7	0.08	0%	<75% of AQAL	Negligible
R8	0.05	0%	>110% of AQAL	Negligible
R9	0.01	0%	76-94% of AQAL	Negligible
R10	0.01	0%	76-94% of AQAL	Negligible
R11	0.14	0%	<75% of AQAL	Negligible
R12	0.05	0%	<75% of AQAL	Negligible
R13	0.02	0%	<75% of AQAL	Negligible
R14	0.02	0%	<75% of AQAL	Negligible
R15	0.07	0%	<75% of AQAL	Negligible
R16	0.15	0%	<75% of AQAL	Negligible
R17	0.11	0%	<75% of AQAL	Negligible
R18	0.07	0%	<75% of AQAL	Negligible
R19	0.05	0%	<75% of AQAL	Negligible
R20	0.06	0%	<75% of AQAL	Negligible
R21	0.06	0%	>110% of AQAL	Negligible
R22	0.02	0%	<75% of AQAL	Negligible
PR1	0.08	0%	<75% of AQAL	Negligible
PR2	0.21	1%	<75% of AQAL	Negligible
PR3	0.19	0%	<75% of AQAL	Negligible
PR4	0.06	0%	<75% of AQAL	Negligible
PR5	0.21	0%	<75% of AQAL	Negligible
PR6	0.27	0%	<75% of AQAL	Negligible
PR7	0.02	0%	<75% of AQAL	Negligible
PR8	0.02	0%	<75% of AQAL	Negligible
PR9	0.01	0%	<75% of AQAL	Negligible
PR10	0.01	0%	<75% of AQAL	Negligible
PR11	0.01	0%	<75% of AQAL	Negligible
PR12	<0.01	0%	<75% of AQAL	Negligible
PR13	0.01	0%	<75% of AQAL	Negligible
PR14	0.01	0%	<75% of AQAL	Negligible
PR15	<0.01	0%	<75% of AQAL	Negligible
PR16	<0.01	0%	<75% of AQAL	Negligible

NO_2 Significance Effects at Key Receptors				
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**% Change in Concentration Relative to AQAL**	**% Annual Mean Concentration in Assessment Year**	**Significance**
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.				

The magnitude of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing residential receptors including those within the AQMA, are determined to be 0%. The significance is determined to be 'negligible' at all receptors, based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

Particulate Matter

Table 6.7 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 'no development' and 'with development' scenarios.

Table 6.7 Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		Baseline 2015	**No development 2019**	**With development 2019**	**Development Contribution**
R1	Athersley South Primary School	16.32	16.31	16.31	0.01
R2	279 Wakefield Road	16.63	16.62	16.63	0.01
R3	26 High Greave	16.26	16.22	16.24	0.01
R4	66 Wakefield Road	17.21	17.10	17.13	0.02
R5	11 Wakefield Road	17.46	17.33	17.35	0.02
R6	97 Harborough Hill Road	18.78	18.69	18.70	0.01
R7	132 Old Mill Lane	17.09	17.00	17.02	0.02
R8	29 Harborough Hill Road	18.55	18.47	18.48	0.01
R9	Queens Road Academy	17.54	17.52	17.53	<0.01
R10	Barnsley College	17.57	17.54	17.54	<0.01
R11	217 Wakefield Road	16.17	16.12	16.15	0.04
R12	211 Wakefield Road	15.69	15.66	15.67	0.01
R13	Roundhouse Medical Centre	16.46	16.44	16.45	0.01
R14	4 Laithes Road	16.73	16.68	16.69	0.01
R15	553 Rotherham Road	15.85	15.81	15.83	0.01
R16	171 Wakefield Road	17.12	17.01	17.04	0.03
R17	1 Carlton Road	16.80	16.72	16.74	0.02
R18	98 Carlton Road	16.81	16.73	16.74	0.01
R19	92 Carlton Road	16.38	16.34	16.35	0.01
R20	381 Rotherham Road	16.65	16.59	16.60	0.01
R21	113 Harborough Hill Road	17.38	17.90	17.92	0.01
R22	338 Wakefield Road	16.45	16.44	16.45	0.01
PR1	Proposed Residential Receptor	15.68	15.65	15.67	0.02
PR2	Proposed Residential Receptor	15.77	15.74	15.79	0.05
PR3	Proposed Residential Receptor	15.78	15.75	15.80	0.04
PR4	Proposed Residential Receptor	15.65	15.63	15.64	0.01

Receptor		PM_{10} (µg/m³)			
		Baseline 2015	No development 2019	With development 2019	Development Contribution
PR5	Proposed Residential Receptor	15.51	15.50	15.54	0.04
PR6	Proposed Residential Receptor	15.48	15.47	15.53	0.05
PR7	Proposed Residential Receptor	15.45	15.44	15.44	0.01
PR8	Proposed Residential Receptor	15.46	15.45	15.45	<0.01
PR9	Proposed Residential Receptor	15.41	15.40	15.40	<0.01
PR10	Proposed Residential Receptor	15.37	15.37	15.37	<0.01
PR11	Proposed Residential Receptor	15.36	15.36	15.36	<0.01
PR12	Proposed Residential Receptor	15.35	15.35	15.35	<0.01
PR13	Proposed Residential Receptor	15.34	15.34	15.34	<0.01
PR14	Proposed Residential Receptor	15.34	15.33	15.33	<0.01
PR15	Proposed Residential Receptor	15.33	15.33	15.33	<0.01
PR16	Proposed Residential Receptor	15.33	15.32	15.32	<0.01
Annual Mean AQO not to be exceeded		**40 µg/m³**			

As indicated in Table 6.7, the maximum predicted increase in the annual average exposure to PM_{10} at any existing and proposed receptors, due to changes in traffic movements associated with the development, is 0.04µg/m^3 at 217 Wakefield Road (R11).

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

The significance of changes in traffic flow associated with the development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in section 3. The outcomes of the assessment are summarised in Table 6.8.

Table 6.8 Significance of Effects at Key Receptors (Particulate Matter)

PM_{10} Significance Effects at Key Receptors				
Receptor	Change Due to Development (DS-DM) (µg/m³)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.01	0%	<75% of AQAL	Negligible
R2	0.01	0%	<75% of AQAL	Negligible
R3	0.01	0%	<75% of AQAL	Negligible
R4	0.02	0%	<75% of AQAL	Negligible
R5	0.02	0%	<75% of AQAL	Negligible
R6	0.01	0%	<75% of AQAL	Negligible
R7	0.02	0%	<75% of AQAL	Negligible
R8	0.01	0%	<75% of AQAL	Negligible
R9	<0.01	0%	<75% of AQAL	Negligible
R10	<0.01	0%	<75% of AQAL	Negligible
R11	0.04	0%	<75% of AQAL	Negligible
R12	0.01	0%	<75% of AQAL	Negligible
R13	0.01	0%	<75% of AQAL	Negligible
R14	0.01	0%	<75% of AQAL	Negligible
R15	0.01	0%	<75% of AQAL	Negligible
R16	0.03	0%	<75% of AQAL	Negligible

PM_{10} Significance Effects at Key Receptors				
Receptor	Change Due to Development (DS-DM) (µg/m³)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R17	0.02	0%	<75% of AQAL	Negligible
R18	0.01	0%	<75% of AQAL	Negligible
R19	0.01	0%	<75% of AQAL	Negligible
R20	0.01	0%	<75% of AQAL	Negligible
R21	0.01	0%	<75% of AQAL	Negligible
R22	0.01	0%	<75% of AQAL	Negligible
PR1	0.02	0%	<75% of AQAL	Negligible
PR2	0.05	0%	<75% of AQAL	Negligible
PR3	0.04	0%	<75% of AQAL	Negligible
PR4	0.01	0%	<75% of AQAL	Negligible
PR5	0.04	0%	<75% of AQAL	Negligible
PR6	0.05	0%	<75% of AQAL	Negligible
PR7	0.01	0%	<75% of AQAL	Negligible
PR8	<0.01	0%	<75% of AQAL	Negligible
PR9	<0.01	0%	<75% of AQAL	Negligible
PR10	<0.01	0%	<75% of AQAL	Negligible
PR11	<0.01	0%	<75% of AQAL	Negligible
PR12	<0.01	0%	<75% of AQAL	Negligible
PR13	<0.01	0%	<75% of AQAL	Negligible
PR14	<0.01	0%	<75% of AQAL	Negligible
PR15	<0.01	0%	<75% of AQAL	Negligible
PR16	<0.01	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 magnitude of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure, for existing residential including those within the AQMA, is determined to be 'imperceptible'. The significance has been 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'.

6.6 . West Yorkshire Low Emissions Strategy Assessment

The pollutant emissions costs calculation identifies the environmental damage costs associated with the proposal and determine the amount (value) of mitigation that is expected to be spent on measures to mitigate the impacts. The calculation utilises the most recent DEFRA Emissions Factor Toolkit to estimate the additional pollutant emissions from a proposed development and the latest DEFRA IGCB Air Quality Damage Costs for the specific pollutant of interest, to calculate the resultant damage cost.

The Emissions Assessment Calculator has been used in accordance with the methodology described within Appendix 3 of Version 10 of the Low Emissions Strategy as detailed below.

EFT Input:

X 1,047 (trip ratio from transport assessment)

X cars only (0% HGV)

X 48kph (avg. speed)

X 10km (NTS UK avg.)

EFT Output = 933.88kg/annum (NO_X) & 90.48kg/annum (PM_{10})

= 0.93388 tonnes/annum (NO_X) & 0.09045 tonnes/annum (PM_{10})

X £14,646/tonne (NOx) + £33,713/tonne (PM_{10})

= £13,677.61 + £3,049.34

= £16,726.95

X 5 (years)

Total = £83,634.75

This sum is to be put towards the mitigation outlined in Section 7.2.

7. Mitigation

7.1 Construction Phase

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

Using the methodology described in Appendix A, appropriate site specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction. The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout. They are categorised into 'highly recommended' and 'desirable' measures. In the absence of appropriate regional guidance, the development will seek to ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards to ensure there is sufficient mitigation in place during the construction phase.

The mitigation measures for the proposed development are detailed in Table 7.1 and Table 7.2 below:

Table 7.1 Highly Recommended Construction Phase Mitigation Measures

Communications
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
Dust Management
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
Make the complaints log available to the local authority when asked.
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
Avoid site runoff of water or mud.
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable
Ensure all vehicles switch off engines when stationary - no idling vehicles.
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
Use enclosed chutes and conveyors and covered skips
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Avoid bonfires and burning of waste materials.
Earthworks
No action required.
Construction
No action required.

Trackout
No action required.

Table 7.2 Desirable Construction Phase Mitigation Measures

Communication
No action required.
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. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.
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.
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
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.
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)
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
Earthworks
No action required.
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.
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.
Record all inspections of haul routes and any subsequent action in a site log book.
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

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.

7.2 Operational Phase

Traffic

Although an assessment of road traffic exhaust emissions has predicted no exceedances of the AQO, implementing measures to promote sustainable travel could result in fewer vehicle trips and therefore a reduction in associated vehicle emissions. This is likely to result in reductions of the mean roadside concentrations of traffic-related pollutant concentrations.

The following mitigation measures aim to increase the number of residents travelling to and from the site on foot, by cycle and/or by public transport. As such the number of trips to and from the site made by private car, and especially the single occupancy private car, will be reduced. The following measures are considered best practice but should not be regarded as an exhaustive list of potential mitigation options:

- Minimise reliance upon motor vehicle use through a Travel Plan;
- Promote alternative transport options;
- Inclusion of integrated cycle provision into surrounding environments i.e. cycle storage; and,
- Inclusion of pedestrian walkways into surrounding environments.

EV ready domestic installations

Cable and circuitry ratings should be of adequate size to ensure a minimum continuous current demand for the vehicle of 16A and a maximum demand of 32A (which is recommended for Eco developments).

- A separate dedicated circuit protected by an RCBO should be provided from the main distribution board, to a suitably enclosed termination point within a garage, or an accessible enclosed termination point for future connection to an external charge point
- The electrical circuit shall comply with the Electrical requirements of BS7671: 2008 as well as conform to the IET code of practice on Electric Vehicle Charging Equipment installation 2012 ISBN 978-1-84919-515-7 (PDF)
- If installed in a garage all conductive surfaces should be protected by supplementary protective equipotential bonding. For vehicle connecting points installed such that the vehicle can only be charged within the building, e.g. in a garage with a (non-extended) tethered lead, the PME earth may be used. For external installations the risk assessment outlined in the IET code of practice must be adopted, and may require an additional earth stake or mat for the EV charging circuit. This should be installed as part of the EV ready installation to avoid significant on cost later.

8. Conclusions

WYG have undertaken an Air Quality Assessment for a proposed residential development at land off Wakefield Road, Athersley in accordance with the methodology and parameters described within this report.

Prior to the implementation of appropriate mitigation measures, the potential impact significance of dust emissions associated with the construction phase of the proposed development has potential as 'low' at some worst affected receptors without mitigation. However, appropriate site specific mitigation measures have been recommended based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with the 'highly recommended' mitigation measures in place as outlined in Table 7.1, the risk of adverse effects due to emissions from the construction phase will not be significant.

All modelled receptors, including the existing and proposed receptors, are predicted to meet the AQO for NO_2 and PM_{10} in the 'do minimum' and 'do something' scenarios.

The 2019 assessment of the effect of emissions from traffic associated with both committed and proposed developments, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing residential receptors is likely to 0.15 $\mu g/m^3$ at receptor location at 171 Wakefield (R16).. For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be 0.04$\mu g/m^3$ at existing receptor 217 Wakefield Road (R11).

The significance with respect to NO_2 exposure is determined to be 'negligible' at all modelled existing and proposed receptor locations. The significance with respect to PM_{10} exposure is determined to be 'negligible' at all modelled existing and proposed receptor locations.

The damage costs assessment has shown that a sum of £83,634.75 In conclusion, following the adoption of the recommended mitigation measures, the development is not considered to be contrary to any of the national and local planning policies.

Figures

Figure 1 **Air Quality Assessment Area**

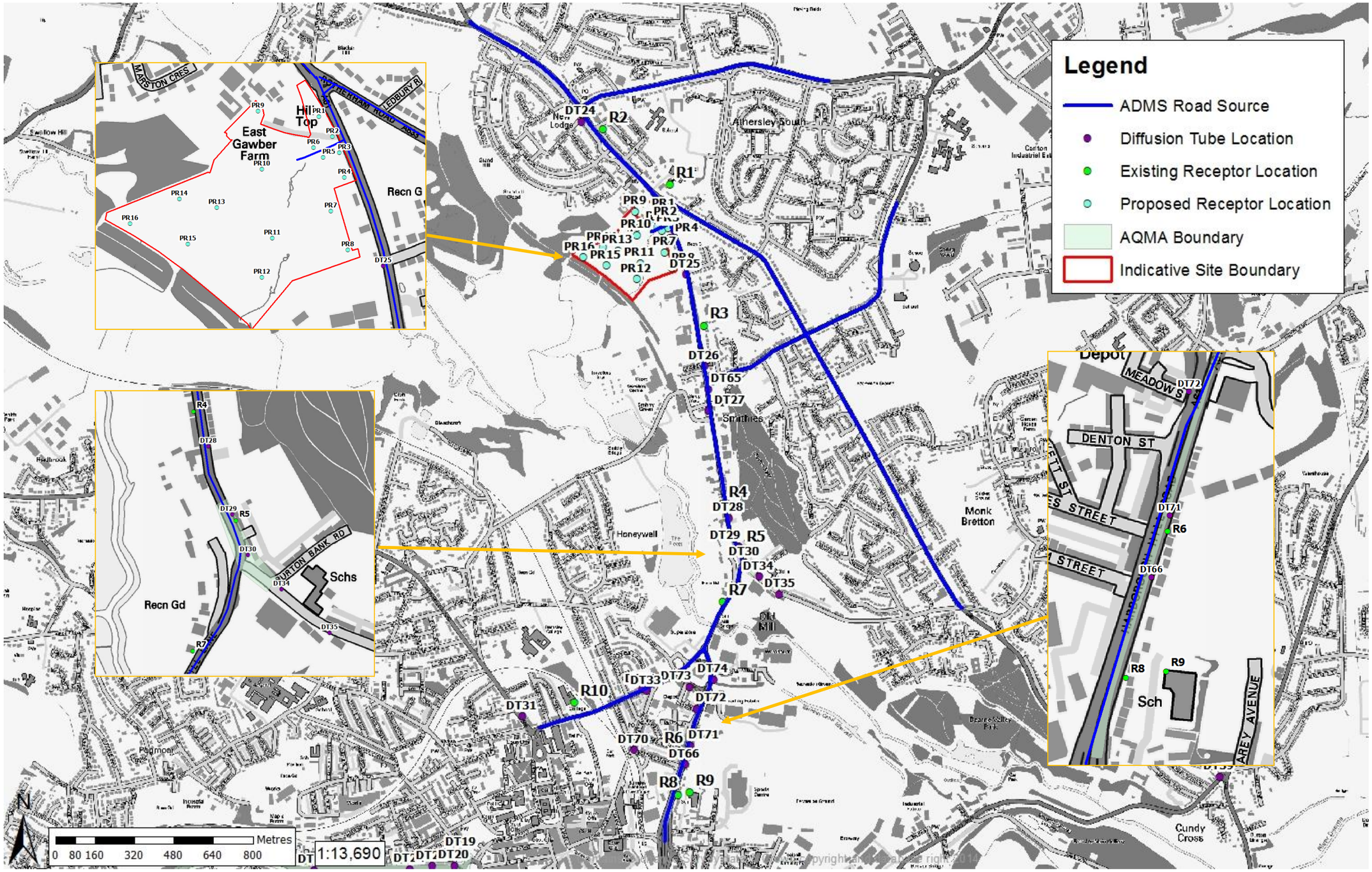


Figure 2 **Leeds Bradford 2015 Meteorological Station Wind Rose**

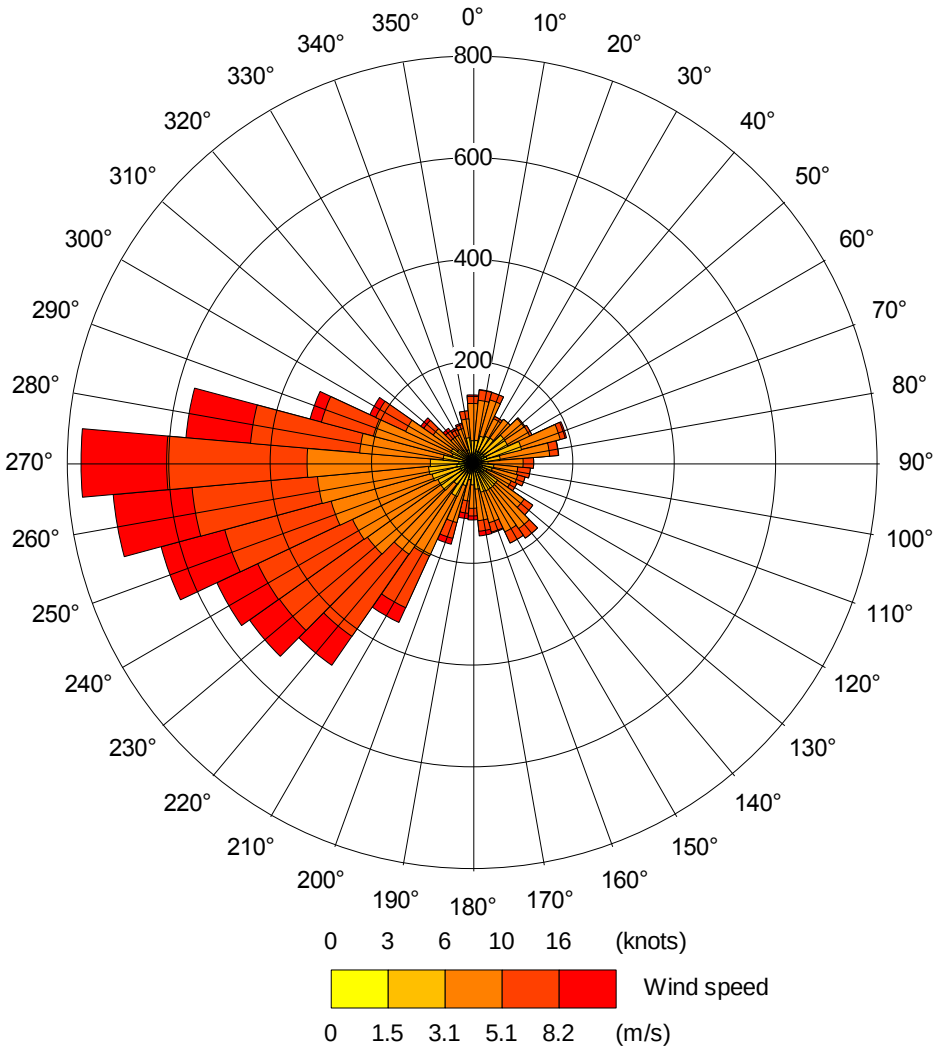
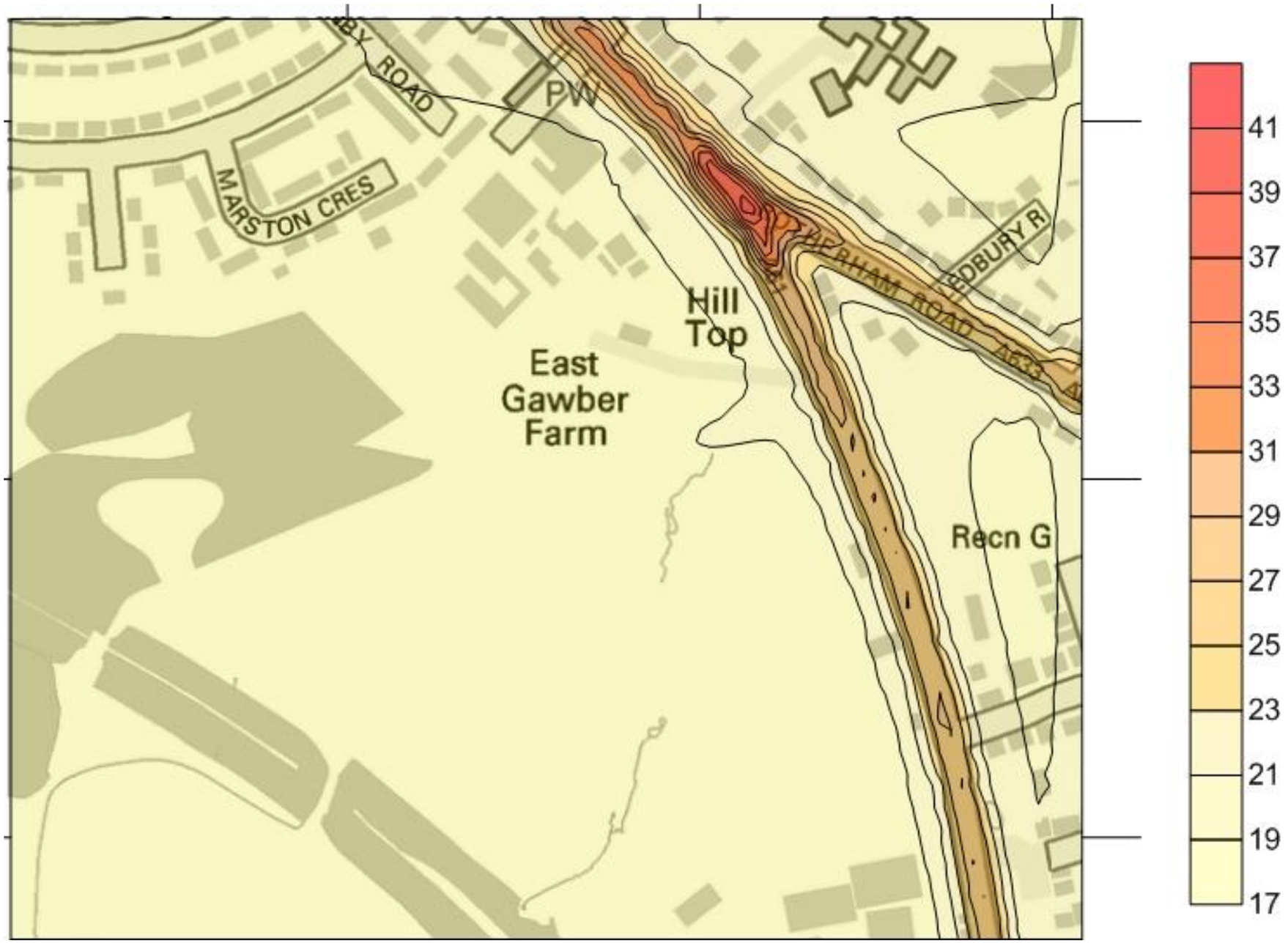


Figure 3 Predicted Environmental Concentration of NO_2 – Contour Map



Appendix A Construction Phase Assessment Methodology

The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance[1].

Step 1 – Screen the Requirement for a more Detailed Assessment

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

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

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

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

Earthworks

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

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

Construction

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

- *Large:* Total building volume >100 000m^3, on site concrete batching; sandblasting
- *Medium:* Total building volume 25 000m^3 – 100 000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and,
- *Small:* Total building volume <25 000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

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

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

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

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

Step 2B - Defining the Sensitivity of the Area

Sensitivities of People to Dust Soiling Effects

- *High:*
  - Users can reasonably expect a enjoyment of a high level of amenity;
  - The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably expect to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; and,
  - Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.
- *Medium:*
  - Users can reasonably expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
  - The appearance, aesthetics or value of their property could be diminished by soiling;
  - The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land; and,
  - Indicative examples include parks and places of work.
- *Low:*
  - The enjoyment of amenity would not reasonably be expected;
  - Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling;
  - There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land; and,
  - Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

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

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

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

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

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

- *High:*
  - Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the

case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);

- Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

- *Medium:*
  - Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day); and,
  - Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

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

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

Table A2 - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 ·g/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32 ·g/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 – 28 ·g/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 ·g/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

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

Sensitivities of Receptors to Ecological Effects

- *High:*
  - Locations with an international or national designation and the designated features may be affected by dust soiling;
  - Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain; and,
  - Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

- *Medium:*

- Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;
- Locations with a national designation where the features may be affected by dust deposition; and,
- Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

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

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

Table A3 - Sensitivity of the Area to Ecological Impacts

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

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

Step 2C - Defining the Risk of Impacts

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

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

Demolition

Table A4 - Risk of Dust Impacts, Demolition

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

Earthworks

Table A5 - Risk of Dust Impacts, Earthworks

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

Construction

Table A6 - Risk of Dust Impacts, Construction

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

Trackout

Table A7 - Risk of Dust Impacts, Trackout

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

Step 3 – Site Specific Mitigation

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

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

Appendix B Theoretical Scenario Results

Scenario 2 (Theoretical Scenario) Results

For Scenario 2, using the 2015 emission factors, the assessment has determined that all modelled existing receptors, except R6 and R8 are predicted to meet the AQO, in both the 'no development' and 'with development' scenario for NO_2. All receptor locations are expected to meet the AQO, in both the 'no development' and 'with development' scenario for PM_{10}. This assessment can be seen as 'worst case' and for information only and the findings in the main body of the report should be used for informing appropriate mitigation.

Table B1 Theoretical Scenario NO_2 Results

Receptor		NO_2 (µg/m^3)			
		Baseline 2015	No development 2019	With development 2019	Development Contribution
R1	Athersley South Primary School	20.11	20.20	20.25	0.05
R2	279 Wakefield Road	21.39	21.62	21.65	0.04
R3	26 High Greave	22.00	22.08	22.16	0.08
R4	66 Wakefield Road	29.59	29.69	29.80	0.12
R5	11 Wakefield Road	31.23	31.37	31.51	0.14
R6	97 Harborough Hill Road	61.66	62.21	62.28	0.07
R7	132 Old Mill Lane	28.88	29.04	29.14	0.09
R8	29 Harborough Hill Road	60.36	61.97	62.03	0.06
R9	Queens Road Academy	36.78	36.93	36.95	0.02
R10	Barnsley College	36.99	37.16	37.17	0.01
R11	217 Wakefield Road	24.59	24.73	24.94	0.21
R12	211 Wakefield Road	19.43	19.50	19.56	0.06
R13	Roundhouse Medical Centre	20.66	20.78	20.79	0.01
R14	4 Laithes Road	22.55	22.73	22.75	0.02
R15	553 Rotherham Road	21.16	21.32	21.41	0.09
R16	171 Wakefield Road	27.82	28.03	28.25	0.22
R17	1 Carlton Road	25.67	25.78	25.94	0.16
R18	98 Carlton Road	25.13	25.25	25.37	0.12
R19	92 Carlton Road	22.24	22.30	22.37	0.07
R20	381 Rotherham Road	23.74	23.85	23.93	0.08
R21	113 Harborough Hill Road	42.73	45.38	45.48	0.09
R22	338 Wakefield Road	20.45	20.60	20.62	0.02
PR1	Proposed Residential Receptor	19.55	19.62	19.74	0.12
PR2	Proposed Residential Receptor	19.88	19.96	20.26	0.30
PR3	Proposed Residential Receptor	19.90	19.98	20.25	0.27
PR4	Proposed Residential Receptor	19.19	19.25	19.33	0.08
PR5	Proposed Residential Receptor	18.49	18.52	18.83	0.30
PR6	Proposed Residential Receptor	18.37	18.41	18.77	0.36
PR7	Proposed Residential Receptor	18.14	18.17	18.20	0.02
PR8	Proposed Residential Receptor	18.27	18.30	18.32	0.02
PR9	Proposed Residential Receptor	17.96	18.00	18.02	0.02
PR10	Proposed Residential Receptor	17.75	17.77	17.80	0.02
PR11	Proposed Residential Receptor	17.67	17.69	17.70	0.01
PR12	Proposed Residential Receptor	17.61	17.62	17.63	0.01

Receptor		NO_2 (µg/m³)			
		Baseline 2015	No development 2019	With development 2019	Development Contribution
PR13	Proposed Residential Receptor	17.58	17.59	17.60	0.01
PR14	Proposed Residential Receptor	17.52	17.53	17.54	0.01
PR15	Proposed Residential Receptor	17.51	17.52	17.53	0.01
PR16	Proposed Residential Receptor	17.46	17.47	17.47	<0.01
Annual Mean AQO not to be exceeded		**40 µg/m³**			

Table B2 Significance of Effects at Key Receptors (NO_2)

NO_2 Significance Effects at Key Receptors				
Receptor	Change Due to Development (DS-DM) (µg/m³)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.05	0%	<75% of AQAL	Negligible
R2	0.04	0%	<75% of AQAL	Negligible
R3	0.08	0%	<75% of AQAL	Negligible
R4	0.12	0%	<75% of AQAL	Negligible
R5	0.14	0%	<75% of AQAL	Negligible
R6	0.07	0%	>110% of AQAL	Negligible
R7	0.09	0%	<75% of AQAL	Negligible
R8	0.06	0%	>110% of AQAL	Negligible
R9	0.02	0%	76-94% of AQAL	Negligible
R10	0.01	0%	76-94% of AQAL	Negligible
R11	0.21	1%	<75% of AQAL	Negligible
R12	0.06	0%	<75% of AQAL	Negligible
R13	0.01	0%	<75% of AQAL	Negligible
R14	0.02	0%	<75% of AQAL	Negligible
R15	0.09	0%	<75% of AQAL	Negligible
R16	0.22	1%	<75% of AQAL	Negligible
R17	0.16	0%	<75% of AQAL	Negligible
R18	0.12	0%	<75% of AQAL	Negligible
R19	0.07	0%	<75% of AQAL	Negligible
R20	0.08	0%	<75% of AQAL	Negligible
R21	0.09	0%	>110% of AQAL	Negligible
R22	0.02	0%	<75% of AQAL	Negligible
PR1	0.12	0%	<75% of AQAL	Negligible
PR2	0.30	0%	<75% of AQAL	Negligible
PR3	0.27	0%	<75% of AQAL	Negligible
PR4	0.08	0%	<75% of AQAL	Negligible
PR5	0.30	0%	<75% of AQAL	Negligible
PR6	0.36	0%	<75% of AQAL	Negligible
PR7	0.02	0%	<75% of AQAL	Negligible
PR8	0.02	0%	<75% of AQAL	Negligible
PR9	0.02	0%	<75% of AQAL	Negligible
PR10	0.02	0%	<75% of AQAL	Negligible
PR11	0.01	0%	<75% of AQAL	Negligible
PR12	0.01	0%	<75% of AQAL	Negligible
PR13	0.01	0%	<75% of AQAL	Negligible
PR14	0.01	0%	<75% of AQAL	Negligible
PR15	0.01	0%	<75% of AQAL	Negligible

NO_2 Significance Effects at Key Receptors				
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**% Change in Concentration Relative to AQAL**	**% Annual Mean Concentration in Assessment Year**	**Significance**
PR16	0.00	0%	<75% of AQAL	Negligible
0% means a change of <0.5%				

Table B3 Theoretical Scenario PM_{10} Results

Receptor		PM_{10} (µg/m³)			
		Baseline 2015	**No development 2019**	**With development 2019**	**Development Contribution**
R1	Athersley South Primary School	16.32	16.34	16.34	0.01
R2	279 Wakefield Road	16.63	16.68	16.69	0.01
R3	26 High Greave	16.26	16.27	16.29	0.01
R4	66 Wakefield Road	17.21	17.23	17.25	0.02
R5	11 Wakefield Road	17.46	17.49	17.51	0.03
R6	97 Harborough Hill Road	18.78	18.87	18.88	0.01
R7	132 Old Mill Lane	17.09	17.12	17.14	0.02
R8	29 Harborough Hill Road	18.55	18.63	18.64	0.01
R9	Queens Road Academy	17.54	17.57	17.57	<0.01
R10	Barnsley College	17.57	17.59	17.59	<0.01
R11	217 Wakefield Road	16.17	16.20	16.24	0.04
R12	211 Wakefield Road	15.69	15.70	15.71	0.01
R13	Roundhouse Medical Centre	16.46	16.48	16.49	0.01
R14	4 Laithes Road	16.73	16.76	16.76	0.01
R15	553 Rotherham Road	15.85	15.88	15.89	0.02
R16	171 Wakefield Road	17.12	17.16	17.19	0.03
R17	1 Carlton Road	16.80	16.83	16.85	0.02
R18	98 Carlton Road	16.81	16.83	16.85	0.02
R19	92 Carlton Road	16.38	16.39	16.40	0.01
R20	381 Rotherham Road	16.65	16.67	16.68	0.01
R21	113 Harborough Hill Road	17.38	18.14	18.15	0.01
R22	338 Wakefield Road	16.45	16.48	16.49	0.01
PR1	Proposed Residential Receptor	15.68	15.69	15.71	0.02
PR2	Proposed Residential Receptor	15.77	15.79	15.84	0.05
PR3	Proposed Residential Receptor	15.78	15.80	15.84	0.05
PR4	Proposed Residential Receptor	15.65	15.66	15.67	0.02
PR5	Proposed Residential Receptor	15.51	15.52	15.57	0.05
PR6	Proposed Residential Receptor	15.48	15.49	15.55	0.06
PR7	Proposed Residential Receptor	15.45	15.45	15.46	0.01
PR8	Proposed Residential Receptor	15.46	15.47	15.47	0.01
PR9	Proposed Residential Receptor	15.41	15.41	15.42	<0.01
PR10	Proposed Residential Receptor	15.37	15.38	15.38	<0.01
PR11	Proposed Residential Receptor	15.36	15.36	15.37	<0.01
PR12	Proposed Residential Receptor	15.35	15.35	15.35	<0.01
PR13	Proposed Residential Receptor	15.34	15.35	15.35	<0.01
PR14	Proposed Residential Receptor	15.34	15.34	15.34	<0.01
PR15	Proposed Residential Receptor	15.33	15.34	15.34	<0.01
PR16	Proposed Residential Receptor	15.33	15.33	15.33	<0.01
Annual Mean AQO not to be exceeded		**40 µg/m³**			

Scenario 2 Results

All modelled receptors, except R4 and R8 are predicted to meet the AQO for NO_2 in the 'do minimum' and 'do something' scenarios. All modelled receptors, are predicted to meet the AQO for PM_{10} in the 'do minimum' and 'do something' scenarios.

The 2019 assessment of the effect of emissions from traffic associated with both committed and proposed developments, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing residential receptors is likely to be 0.22µg/m^3 at receptor 171 Wakefield Road (R16). For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be 0.08µg/m^3 at receptor 217 Wakefield Road (R11).