



Harworth Estates

Rockingham – Phase 1

Barnsley

Air Quality Assessment

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1. Introduction

Harworth Estates commissioned WYG Planning and Environment (WYG) to prepare an Air Quality Assessment for Phase 1 of the proposed development at Birdwell, South Barnsley.

1.1 Site Location and Context

The proposed development site is located to the south of Barnsley, at land to the north of the A6195. The approximate United Kingdom National Grid Reference is 435025, 400853. It is bounded to the north by open grassland, to the south by the A6195, to the east by open grassland and to the west by residential dwellings. Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

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

- Baseline evaluation;
- Assessment of potential air quality impacts during the construction phase;
- Assessment of potential air quality impacts during the operational phase; and,
- Identified 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 'Guidance on the Assessment of Dust from Demolition and Construction' document, published in 2014.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO₂) and particulate matter (PM₁₀) 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.



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(09), DEFRA, 2009
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07 - Air Quality, Highways Agency, 2007
- Development Control: Planning for Air Quality, National Society for Clean Air and Environmental Protection, 2010
- The Control of Dust and Emissions from Construction and Demolition – Best Practice Guide, Greater London Authority and London Councils, 2006
- Guidance on the Assessment of Dust from Demolition and Construction (Institute of Air Quality Management, 2014)
- Defra Local Air Quality Management Note on Projecting NO₂ concentrations (April 2012)

Websites Consulted

- Google maps (maps.google.co.uk)
- The UK National Air Quality Archive (www.airquality.co.uk)
- Department for Transport Matrix (www.dft.gov.uk/matrix)
- emapsite.com
- MAGIC (<http://magic.defra.gov.uk/>)
- Planning Practice Guidance (<http://planningguidance.planningportal.gov.uk/>)
- Barnsley Metropolitan Borough Council (<https://www.barnsley.gov.uk/>)



Site Specific Reference Documents

- Barnsley Metropolitan Borough Council Air Quality Progress Report 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 nitrogen dioxide and oxides of nitrogen, sulphur dioxide, lead and particulate matter;
- **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 2007 No. 64 Regulation 14 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 1 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 1 Air Quality Standards, Objectives, Limit and Target Values

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

Within the context of this assessment, the annual mean objectives are those against which 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) LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of 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 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:

'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) is currently developing a Local Development Framework (LDF) to replace the current Regional Spatial Strategy, Unitary Development Plan and related



Supplementary Planning Guidance. However, the LDF is still under consultation. Current policies consist of the Core Strategy, the Barnsley Education Sites Development Plan Document (DPD) (both of which form part of the LPD), the remaining saved policies of the Unitary Development Plan and the Regional Spatial Strategy.

Following a review of these policies, the following were identified as being relevant from an air quality perspective:

"Core Strategy – 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."

"Core Strategy – 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."



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 their scale (magnitude) and the sensitivity of the receptors.

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

3.1 Predicting Magnitude of Impact

Magnitude (scale of change) is determined by considering the predicted deviation from baseline conditions. Quantifiable assessment of magnitude has been undertaken where possible.

Impacts of the proposed development on air quality have been assessed with reference to the baseline conditions and environmental assessment criteria. The rationale for determining the magnitude of an impact is shown in Table 2. The rationale has been derived in part from the magnitude matrix described in Table 4 of the EPUK non statutory guidance "Development Control: Planning for Air Quality (2010 Update)".

Table 2 Methodology for Assessing Magnitude of Impacts on Air Quality

Magnitude of Impact ⁽¹⁾	Description	Criteria
Large	Impact resulting in a considerable change in baseline environmental conditions with severe undesirable/desirable consequences on the receiving environment.	<ul style="list-style-type: none"> Air quality varies between the do minimum and do something by more than 10% of the air quality objective (Emissions). Substantial risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Medium	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions	<ul style="list-style-type: none"> Air quality varies between the do minimum and do something by 5 - 10% of the air quality objective (Emissions). Moderate risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Small	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated.	<ul style="list-style-type: none"> Air quality varies between the do minimum and do something by 1 - 5% of the air quality objective (Emissions). Slight risk that emissions will generate statutory nuisance complaints, resulting in formal action (Construction).
Imperceptible ⁽²⁾	No discernible change in baseline environmental conditions.	<ul style="list-style-type: none"> Air quality varies between the do minimum and do something by less than 1% of the air quality objective (Emissions). Little or no cause for nuisance complaints to be made (Construction).

NOTE (1) An impacts magnitude can be either positive or negative, except for imperceptible.
 (2) If the assessor is certain that a receptor or attribute of a feature will suffer no impact whatsoever then the term 'No Impact' can be used in the place of 'Imperceptible Impact'. However, it is not usually possible to determine 'No Impact' in many cases with 100% certainty so the term 'Imperceptible' should be used in these cases.



4. Baseline Conditions

4.1 Air Quality review and Assessment

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 facility. 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.

Air Quality Review

As required under section 82 of the Environment Act 1995, BMBC has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO₂ are above the relevant AQOs at a number of locations of relevant public exposure within the Borough. BMBC has therefore designated 7 Air Quality Management Areas (AQMAs), which are described as:

- AQMA No.1 – M1 Motorway, 100m either side of the central reservation within the Barnsley Borough;
- AQMA No.2a – A628 Dodworth Road;
- AQMA No.3 – Junction of A61 Wakefield Road and Burton Road;
- AQMA No.4 – A61 Harborough Hill Road;
- AQMA No.5 – Junction of A633 Rotherham Road and Burton Road;
- AQMA No.6 – A616 passing through Langsett; and,
- AQMA No.7 – Junction of A61 Sheffield and A6133 Cemetery Road.

The proposed development site is located approximately 700m from AQMA No.1. Given the distance between this AQMA and the proposed development site, the assessment has considered impacts on nitrogen dioxide concentrations within the AQMA. However, it is not predicted that traffic associated with the proposed development will significantly influence the existing flows along the M1.

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 Monitoring

The UK Automatic Urban and Rural Network (AURN) is a country-wide network of air quality monitoring stations operated on behalf of the Department for the Environment Food and Rural Affairs (DEFRA). Monitoring data for AURN sites is available from the UK National Air Quality Archive.

BMBC currently operates five continuous air quality monitoring stations. The closest station is located approximately 5000m from the proposed development site. Annual mean concentrations of NO₂ monitored at the closest site are presented within Table 5.

Table 5 Monitored Annual Mean NO₂ and PM₁₀ Concentrations

Site ID	UK NGR(m)		Location	Site Type	NO ₂ Annual Mean Concentration 2012 (µg/m ³)	NO ₂ Annual Mean Concentration 2013 (µg/m ³)
	X	Y				
AM 2	436298	405691	Barnsley A635	Roadside	34.0	32.0

Non Continuous Monitoring

BMBC also operates a network of diffusion tubes. NO₂ concentrations were monitored at 94 locations in 2013. The closest NO₂ diffusion tube monitoring results are presented in Table 6 below.

Table 6 Nitrogen Dioxide Monitoring Locations

ID	UK NGR(m)		Location	Within AQMA	NO ₂ Annual Mean Concentration 2013 (µg/m ³)
	X	Y			
DT1	434652	400231	Tankersley School	Yes	26.3
DT2	434721	400352	5, Moor Lane, Birdwell	Yes	31.0
DT3	434309	401032	Cock Inn, Birdwell	Yes	31.9
DT4	434559	401274	Sheffield Road, Chapel Street, Birdwell	No	34.5
DT5	435414	404151	Park Road/Blackburn Street, W Bdge	No	30.5
DT97	434595	401107	Sheffield Road, Birdwell	No	33.3
DT111	435876	401392	Doncaster Road, Platts Common	No	34.2
DT112	434989	400362	Doncaster Road, Birdwell	No	48.2
DT113	437923	401668	Doncaster Road, Jump	No	28.1

As Table 6 illustrates, one of the nitrogen dioxide diffusion tube monitoring sites exceeded the National Air Quality Objective of 40µg/m³ in 2013. Diffusion Tubes DT97 and DT112 lie within the extents of the main study area. As such, these monitoring locations have been utilised within the verification process.

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 meteorological data used in the assessment is derived from Sheffield 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 Sheffield 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 nitrogen dioxide and particulate matter.

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. Full details of the traffic data input into the ADMS Roads 3 model can be found in Figure 1 providing a visual illustration of the modelled road sources.

It should be noted that the 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 receptor locations are summarised in Table 7 below and the spatial locations of all of the receptors are illustrated in Figure 1.

Table 7 Modelled Sensitive Receptor Locations

Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
R1*	5 Shortwood Court *	435658.4	401220.7
R2	149 Upper Hoyland Road	436184.0	401410.2
R3	53 Locksley Gardens	434939.6	400713.1
R4*	Hopper - Highways Depot *	434900.8	400447.9
R5	33 Wood View	434857.6	400382.9
R6	227 Sheffield Road	434638.2	400786.3
R7	152 Sheffield Road	434569.6	401168.5
R8	53a Sheffield Road	434558.2	401500.4
R9	2 Sheffield Road	434499.5	401679.6
R10	1 Balk Farm Court	434420.7	402159.7
R11	13 Macnaghten Road	434679.6	400120.8
R12	29 Fenn Road	434543.3	399961.9



Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
R13	9 Jubilee Cottages	435344.1	400349.0
R14	50 Sheffield Road	435501.0	400227.0
R15	Stonehurst, Tankersley Lane	435548.3	400126.4
R16	Lynstone, Sheffield Road	435726.7	399929.4
R17	119 Chapel Street	435836.5	399875.8
R18	Rose Cottage, Black Lane (in AQMA)	435456.9	399042.8
R19	9 Moor Lane (in AQMA)	434702.4	400357.7
R20*	The Cock Inn, The Walk * (in AQMA)	434303.9	400993.3
R21	The Hollies, Rockley Lane	433723.6	401889.2
R22*	Rockingham Community Hall, Sheffield Road *	435163.9	400374.1

Note: *Non-Residential receptors are marked with asterisk

4.5 Ecological Receptors

Air quality impacts associated with the proposed development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2010) require competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas).

A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. Following a search within a 1km radius of the site boundary, the following sites were identified.

- The Old Park – Ancient and Semi-natural woodland located approximately 1000m north-west of the proposed development site.
- Short Wood – Ancient and Semi-natural woodland located approximately 700m north-east of the proposed development site.

Considering the distance between the proposed site and ecological sites, it is not considered that the development would result in any significant impacts at these locally designated ecological locations. As such these receptor locations are not considered further within this assessment.



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. In respect of fires on site it should be noted that suitable management strategies will be in place to prevent burning of any material during the construction phase. The main potential effects of particulates/dust 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;
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

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

Construction activities can give rise to short-term elevated dust/PM₁₀ concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

5.2 Particulate Matter (PM₁₀)

The UK Air Quality Standards seek to control the health implications of respirable particulate matter PM₁₀ (a standard size fraction where the median diameter is 10 microns). However, the majority of particles released from construction will be greater than this in size.

Construction works on site have the potential to elevate localised PM₁₀ concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

5.3 Dust

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. There are no formal standards or criteria for nuisance caused by deposited particles, however, a deposition rate of 200mg/m²/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast



with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures should 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 2014.

In total 4 processes are considered, namely 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 B.

5.5 Assessment Results

Based on the methodology detailed in Appendix B and prior to the implementation of appropriate mitigation measures, the potential impact significance of dust emissions associated with the construction phase of the proposed development is presented in Table 8 below. The assessment is based on the nearest sensitive receptors to each source activity.

Table 8 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	Medium Risk	Low Risk	n/a
Construction	Medium Risk	Low Risk	n/a
Trackout	Low Risk	Low Risk	n/a

Site specific mitigation measures are 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 nitrogen dioxide and particulate matter 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, as contained within the supporting Transport Assessment, the operational phase assessment has been undertaken with an assumed operational opening year of 2019. The assessment scenarios are therefore:

- 2019 'Do Minimum' = Baseline + committed development
- 2019 'Do Something' Scenario = Baseline + committed development + proposed development

6.1 Existing and Predicted Traffic Flows

Baseline 2014 data and projected 2019 'do minimum' and 'do something' traffic data has been provided by Optima for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT). Traffic flows for the M1 have been taken from the Department for Transport (DfT) website. As an absolute worst case scenario, the total development generated traffic has been added to the M1 in the 'do something' scenario.

Emission factors for the projected 2019 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 6.0 (June 2014).

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. All of the roads within the dispersion model are illustrated in Figure 1. Detailed traffic figures are provided in Table 17, Appendix A.

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 2011 based background maps for NO_x, NO₂, PM₁₀ and PM_{2.5} which incorporate updates to the input data used for modelling. The updated mapped background concentrations used in the assessment, are summarised in Table 9 below.

Table 9 Published Background Air Quality Levels (µg/m³)

UK NGR(m)		2011		
X	Y	NO ₂	NO _x	PM ₁₀
434500	402500	18.10	25.18	17.13
433500	401500	17.81	24.71	17.23
434500	401500	19.57	27.52	17.62
435500	401500	16.28	22.39	16.67
436500	401500	17.64	24.61	17.72
434500	400500	22.57	32.44	19.05
435500	400500	17.73	24.64	16.82
434500	402500	18.10	25.18	17.13
435500	399500	20.61	29.25	19.29
Average		18.71	26.21	17.63

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 Annex 3 of the TG (09) 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 nitrogen oxides (NO_x) at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_x emissions. These are converted into predicted roadside contribution NO₂ exposure at the relevant receptor locations based on the updated approach to deriving NO₂ from NO_x for road traffic sources published in paragraphs 2.22 to 2.27 of Local Air Quality Management TG(09). The calculation was derived using the NO_x to NO₂ worksheet in the online LAQM tools website hosted by DEFRA.

A model correction of 1.4536 was applied to roadside predicted NO_x concentrations before converting to NO₂. This figure demonstrates that the model was under predicting the road traffic emissions at the monitoring locations, probably due to the effects of congestion and stop-start driving behaviour in the study area and the effects of increased tailpipe emissions as traffic accelerates away from the roundabouts and junctions. Table 10 summarises the final model/monitored data correlation following the application of the relevant adjustment factor.



Table 10 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
DT97	33.30	32.91	1.16
DT112	48.20	48.39	-0.39

The final model produced data at the monitoring locations to within 25% of the monitoring results, as recommended within TG(09).

The final verification model correlation coefficient (representing the model uncertainty) is 0.9988. The 'ideal value' correlation coefficient recommended in Box A3.7 of TG(09) is 1.00. The model is therefore considered to be verified and suitably representative of local emissions and exposures. Reference should be made to Figure 3 for a visual illustration of the model correlation coefficient.

6.4 Summary of Model Inputs

Table 11 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), nitrogen dioxide (NO ₂), Ozone (O ₃) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	Sheffield Met 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 open suburbia
Latitude	Allows the location of the model area to be set	United Kingdom = 53°
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Mixed Urban/Industrial = 30m .
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 Road (not London) settings were used
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 DfT database of traffic emission factors.	The EFT Version 6.0 (June 2014) dataset was used.
Year	Predicted DfT emissions rates depend on the year of emission.	2011 data for verification and operational phase assessment



6.5 ADMS Modelling Results

Traffic Assessment

The ADMS Model has predicted concentrations of NO₂ 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.

Nitrogen Dioxide

Table 12 presents a summary of the predicted change in nitrogen dioxide concentrations at relevant receptor locations, in the projected opening year of 2019, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 12 Predicted 2019 Annual Average Concentrations of NO₂ at Sensitive Receptor Locations (µg/m³)

Receptor		Nitrogen Dioxide (µg/m ³)		
		2019 Do Minimum	2019 Do Something	Development Contribution
R1*	5 Shortwood Court *	24.26	24.42	0.16
R2	149 Upper Hoyland Road	22.12	22.21	0.09
R3	53 Locksley Gardens	24.37	24.81	0.44
R4*	Hopper - Highways Depot *	29.39	29.58	0.19
R5	33 Wood View	38.17	38.40	0.23
R6	227 Sheffield Road	37.43	37.60	0.17
R7	152 Sheffield Road	31.79	31.86	0.07
R8	53a Sheffield Road	32.66	32.78	0.12
R9	2 Sheffield Road	35.21	35.27	0.06
R10	1 Balk Farm Court	26.07	26.09	0.02
R11	13 Macnaghten Road	32.11	32.41	0.30
R12	29 Fenn Road	30.41	30.60	0.19
R13	9 Jubilee Cottages	29.90	30.03	0.13
R14	50 Sheffield Road	32.17	32.23	0.06
R15	Stonehurst, Tankersley Lane	26.76	26.83	0.07
R16	Lynstone, Sheffield Road	27.16	27.23	0.07
R17	119 Chapel Street	25.39	25.44	0.05
R18	Rose Cottage, Black Lane (in AQMA)	38.90	39.30	0.40
R19	9 Moor Lane (in AQMA)	42.63	43.05	0.42
R20*	The Cock Inn, The Walk * (in AQMA)	46.20	46.70	0.50
R21	The Hollies, Rockley Lane	24.18	24.29	0.11
R22*	Rockingham Community Hall, Sheffield Road *	32.17	32.35	0.18
Annual Mean Air Quality Objective not to be exceeded (residential)		40 µg/m³		
Annual Mean Air Quality Objective not to be exceeded (non-residential)		60 µg/m³		

Note: *Non-Residential receptors are marked with asterisk



As indicated in Table 12, the maximum predicted increase in the annual average exposure to nitrogen dioxide at any existing residential receptor, due to changes in traffic movements associated with the development, is 0.44µg/m³, at 53 Locksley Gardens (R3).

All modelled receptor locations outside the AQMA are predicted to meet the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

The maximum predicted increase in the annual average exposure to nitrogen dioxide at any existing receptor inside the AQMA is 0.50µg/m³, at The Cock Inn (R21).

The significance of changes in traffic flow associated with the development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 13.

Table 13 Significance of Effects at Key Receptors in 2019 (Nitrogen Dioxide)

NO ₂ Significance Effects at Key Receptors				
Receptor	Change (% of AQO)	Magnitude	Sensitivity	Significance
R1*	0.40	Imperceptible	Low	Negligible
R2	0.23	Imperceptible	Low	Negligible
R3	1.10	Small	Low	Negligible
R4*	0.48	Imperceptible	Low	Negligible
R5	0.58	Imperceptible	High	Negligible
R6	0.43	Imperceptible	High	Negligible
R7	0.18	Imperceptible	Medium	Negligible
R8	0.30	Imperceptible	Medium	Negligible
R9	0.15	Imperceptible	Medium	Negligible
R10	0.05	Imperceptible	Low	Negligible
R11	0.75	Imperceptible	Medium	Negligible
R12	0.48	Imperceptible	Medium	Negligible
R13	0.33	Imperceptible	Low	Negligible
R14	0.15	Imperceptible	Medium	Negligible
R15	0.18	Imperceptible	Low	Negligible
R16	0.18	Imperceptible	Low	Negligible
R17	0.13	Imperceptible	Low	Negligible
R18	1.00	Small	High	Slight
R19	1.05	Small	Very High	Slight
R20*	1.25	Small	Very High	Slight
R21	0.28	Imperceptible	Low	Negligible
R22*	0.45	Imperceptible	Medium	Negligible

In 2019 the magnitude of the effects of changes in traffic flow as a result the proposed development, with respect to NO₂ exposure, is determined to be 'small' to 'imperceptible'. The significance is determined to be 'slight' to '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'.



It should be noted that this assessment presents a worst case scenario of the proposed development in that it makes a number of worst case assumptions. Firstly, it assumes that there will be no reduction in background air quality concentrations beyond 2011. Secondly, it does not assume improvement in emission rates associated with road traffic, as such 2011 emission rates were utilised for future year predictions. It has also been assumed that 100% of the development generated traffic will be added to the M1 motorway.

Particulate Matter

Table 14 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations in the projected opening year of 2019, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 14 Predicted 2019 Annual Average Concentrations of PM₁₀ at Modelled Receptor Locations (µg/m³)

Receptor		Particulate Matter (µg/m ³)		
		2019 Do Minimum	2019 Do Something	Development Contribution
R1*	5 Shortwood Court *	18.60	18.63	0.03
R2	149 Upper Hoyland Road	18.21	18.23	0.02
R3	53 Locksley Gardens	18.52	18.59	0.07
R4*	Hopper - Highways Depot *	19.35	19.39	0.04
R5	33 Wood View	21.09	21.14	0.04
R6	227 Sheffield Road	21.06	21.11	0.04
R7	152 Sheffield Road	19.94	19.97	0.03
R8	53a Sheffield Road	20.16	20.18	0.01
R9	2 Sheffield Road	20.69	20.72	0.03
R10	1 Balk Farm Court	18.91	18.92	0.01
R11	13 Macnaghten Road	19.81	19.86	0.04
R12	29 Fenn Road	19.70	19.73	0.03
R13	9 Jubilee Cottages	19.52	19.54	0.01
R14	50 Sheffield Road	19.96	19.97	0.01
R15	Stonehurst, Tankersley Lane	18.95	18.96	0.02
R16	Lynstone, Sheffield Road	19.02	19.04	0.01
R17	119 Chapel Street	18.72	18.73	0.01
R18	Rose Cottage, Black Lane (in AQMA)	21.05	21.14	0.09
R19	9 Moor Lane (in AQMA)	21.82	21.92	0.10
R20*	The Cock Inn, The Walk * (in AQMA)	22.56	22.68	0.12
R21	The Hollies, Rockley Lane	18.47	18.50	0.02
R22*	Rockingham Community Hall, Sheffield Road *	19.90	19.93	0.03
Annual Mean Air Quality Objective not to be exceeded (residential)		40 µg/m³		

As indicated in Table 14, the maximum predicted increase in the annual average exposure to particulate matter at any existing residential receptor, due to changes in traffic movements associated with the development, is 0.07µg/m³, at 53 Locksley Gardens (R3).



All modelled receptor locations are predicted to meet the AQO for PM₁₀ 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 PM₁₀ exposure has been assessed with reference to the criteria in section 3. The outcomes of the assessment are summarised in Table 15.

Table 15 Significance of Effects at Key Receptors in 2019 (Particulate Matter)

PM ₁₀ Significance Effects at Key Receptors				
Receptor	Change (% of AQO)	Magnitude	Sensitivity	Significance
R1*	0.07	Imperceptible	Low	Negligible
R2	0.04	Imperceptible	Low	Negligible
R3	0.17	Imperceptible	Low	Negligible
R4*	0.11	Imperceptible	Low	Negligible
R5	0.11	Imperceptible	Low	Negligible
R6	0.11	Imperceptible	Low	Negligible
R7	0.07	Imperceptible	Low	Negligible
R8	0.04	Imperceptible	Low	Negligible
R9	0.07	Imperceptible	Low	Negligible
R10	0.02	Imperceptible	Low	Negligible
R11	0.11	Imperceptible	Low	Negligible
R12	0.07	Imperceptible	Low	Negligible
R13	0.04	Imperceptible	Low	Negligible
R14	0.04	Imperceptible	Low	Negligible
R15	0.04	Imperceptible	Low	Negligible
R16	0.04	Imperceptible	Low	Negligible
R17	0.03	Imperceptible	Low	Negligible
R18	0.22	Imperceptible	Low	Negligible
R19	0.25	Imperceptible	Low	Negligible
R20*	0.29	Imperceptible	Low	Negligible
R21	0.05	Imperceptible	Low	Negligible
R22*	0.07	Imperceptible	Low	Negligible

The magnitude of the effects of changes in traffic as a result the proposed development, with respect to annual mean PM₁₀ exposure in 2019, 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'.

It should be noted that this assessment presents a worst case scenario of the proposed development in that it makes a number of worst case assumptions. Firstly, it assumes that there will be no reduction in background air quality concentrations beyond 2011. Secondly, it does not assume improvement in emission rates associated with road traffic, as such 2011 emission rates were utilised for future year predictions. It has also been assumed that 100% of the development generated traffic will be added to the M1 motorway.



7. Mitigation

7.1 Construction Phase

Using the methodology described in Appendix B, 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.

Mitigation measures will form part of a Construction Management Plan, which will be submitted and approved pursuant to a condition of the planning permission.

Mitigation measures for Phase 1 of the proposed development are detailed in Table 16 below:

Table 16 Site Specific Mitigation Measures

Highly Recommended	Desirable
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	-
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	-
Display the head or regional office contact information	-
Dust Management	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. 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.
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.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced 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)
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.	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
Agree dust deposition, dust flux, or real-time PM ₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase	-



Highly Recommended	Desirable
commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	-
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	-
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	-
Fully enclose site or specific operations where there is a high potential for dust production and the site is active 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.	-
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.	-
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.	-
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	-
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	-
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	-
Use enclosed chutes and conveyors and covered skips.	-
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate	-
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	-
Avoid bonfires and burning of waste materials	-
Earthworks	
-	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
-	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable
-	Only remove the cover in small areas during work and not all at once.
Construction	
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	Avoid scabbling (roughening of concrete surfaces) if possible
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable



Highly Recommended	Desirable
measures are in place.	emission control systems to prevent escape of material and overfilling during delivery.
-	For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
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).



7.2 Operational Phase

Traffic

Implementing traffic management measures will 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 Framework Travel Plan;
- Promote alternative transport options; and,
- Inclusion of pedestrian walkways into surrounding environments.

Reference can also be made to the 'Transport Assessment and Travel Plan' prepared by Optima Highways LTD for traffic management measures, which was submitted with the application



8. Conclusions

WYG have undertaken an Air Quality Assessment (AQA) for the proposed Phase 1 development at Birdwell, south Barnsley, in accordance with the methodology and parameters previously described within this report.

Prior to the implementation of appropriate mitigation measures, the significance of emissions from the construction phase has been assessed as 'medium risk' at the worst affected receptors. Site specific mitigation measures have been recommended according to the IAQM Guidance on the Assessment of Dust from Demolition and Construction. It is anticipated that with these mitigation measures in place, the risk of adverse effects on amenity of nearby residents due to emissions from the construction phase will be low.

The 2019 assessment of the effects of emissions from the proposed traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to nitrogen dioxide at any existing residential receptor is likely to be $0.44\mu\text{g}/\text{m}^3$, at 53 Locksley Gardens (R3).

The maximum predicted increase in the annual average exposure to particulate matter at any existing residential receptor due to changes in traffic movements associated with the scheme is $0.07\mu\text{g}/\text{m}^3$, at 53 Locksley Gardens (R3).

All modelled residential receptor locations outside of the AQMA are predicted to meet the national AQOs for NO_2 in both the 'do minimum' and 'do something' scenarios.

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

The significance of the effects of the proposed development with respect to NO_2 exposure is determined to be 'slight' to 'negligible'. With respect to predicted PM_{10} exposure, the significance of the proposed development is determined to be 'negligible', based on assumptions detailed throughout the report.

Following the adoption of the recommended mitigation measures, the development is not considered to be contrary to any of the national, regional or local planning policies. The potential air quality impacts of NO_2 from the proposed development are 'slight' and below the National Objective for nitrogen dioxide, below which there are no known health effects.



Figures

Figure 1 Air Quality Assessment Area

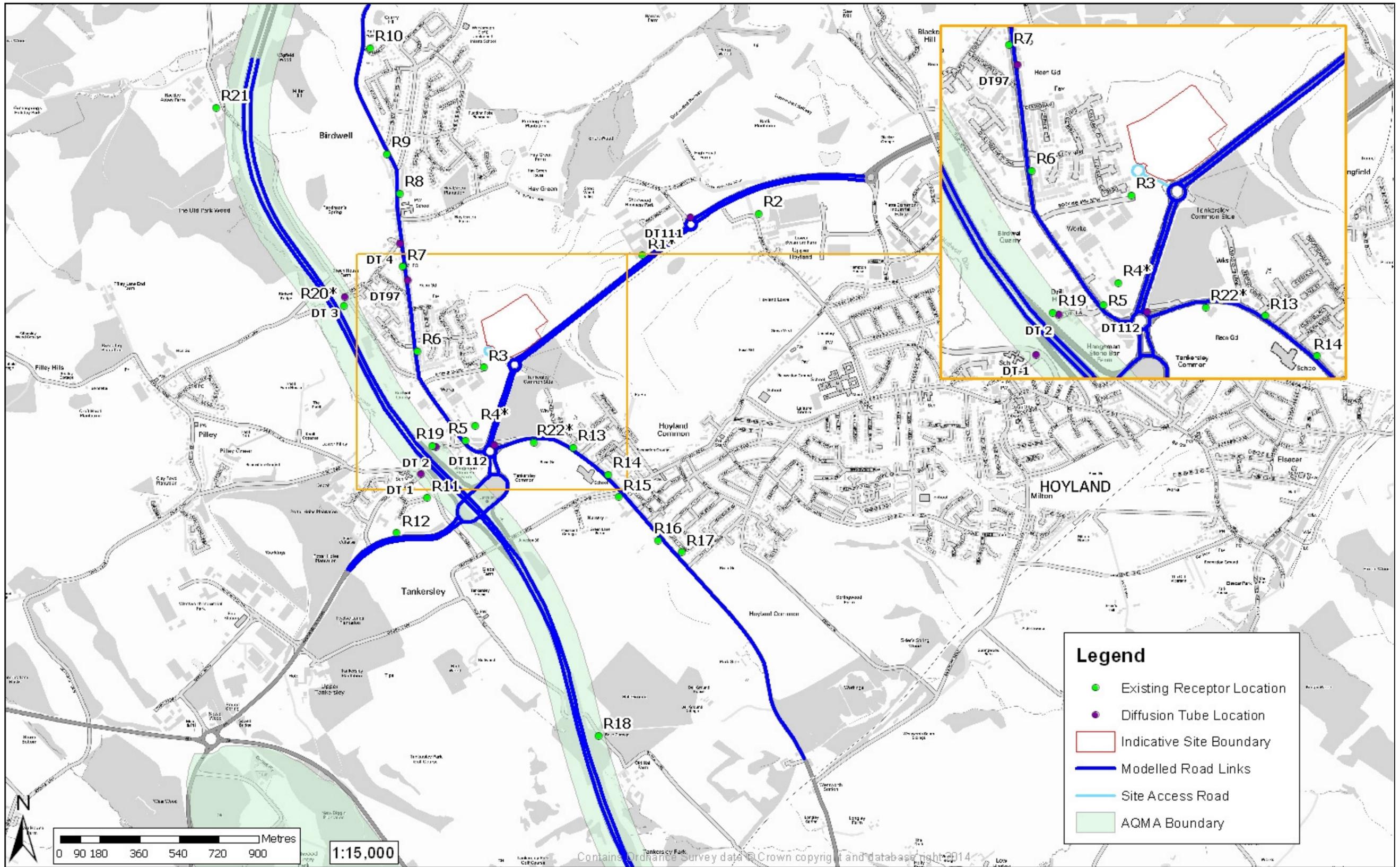




Figure 2 Sheffield Meteorological Station Wind Rose

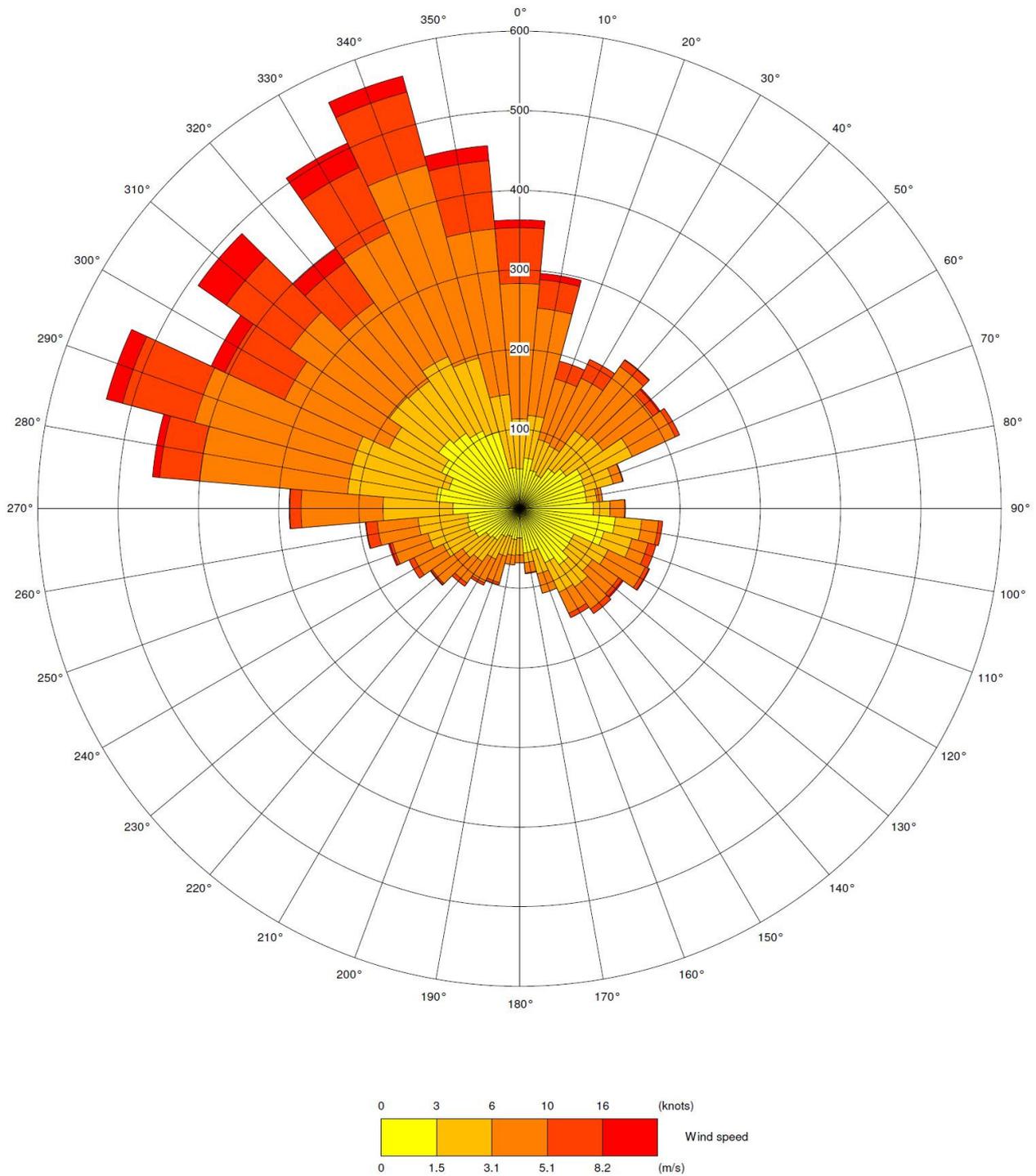
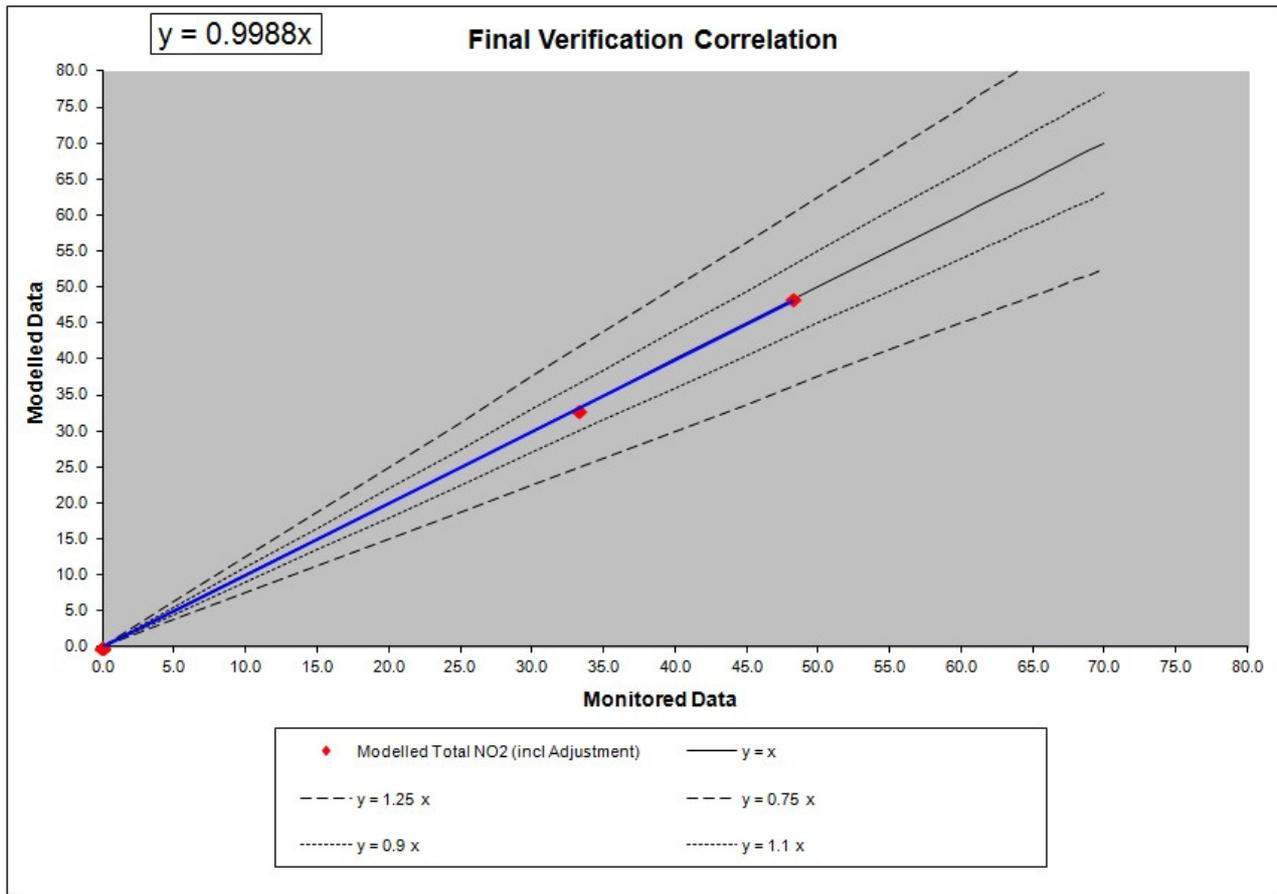




Figure 3 Model Verification Correlation





Appendix A Traffic Data



Table 17 Traffic Data

Link	Speed (km/h)	2019 Do Minimum		2019 Do Something	
		AADT	%HGV	AADT	%HGV
A61 – South of Birdwell Roundabout	20	37776	2.0	38334	2.0
Sheffield Road - West	48	20672	3.2	20759	3.2
Sheffield Road - East	48	12832	4.2	12910	4.1
A6195 – West of site	113	22305	3.4	23084	3.4
A6195 – East of site	113	22462	1.7	23030	1.8
Site Access	20	0	0	3181	1.8
M1	113	93752	9.2	96933	8.9



The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance¹.

Step 1 – Screen the Requirement for a more Detailed Assessment

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

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

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

- *Large:* Total building volume >50 000m³, potentially dusty construction (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;
- *Medium:* Total building volume 20 000m³ – 50 000m³, potentially dusty construction material, demolition activities 10-20m above ground level; and
- *Small:* Total building volume <20 000m³, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks

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

- *Large:* Total site area >10 000m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100 000 tonnes.
- *Medium:* Total site area 2 500m² – 10 000m², moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m-8m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
- *Small:* Total site area <2 500 m², soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction

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

- *Large:* Total building volume >100 000m³, on site concrete batching; sandblasting

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



- *Medium:* Total building volume 25 000m³ – 100 000m³, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- *Small:* Total building volume <25 000m³, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

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

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

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;
 - * 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;
 - * 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;
- * 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 18 – 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

Sensitivities of People to the Health Effects of PM₁₀

- *High:*
 - * Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);
 - * Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- *Medium:*
 - * Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);
 - * Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.
- *Low:*
 - * Locations where human exposure is transient;
 - * 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 19 - Sensitivity of the Area to Human Health Impacts

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

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;
 - * 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;
 - * 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;
 - * 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 20 - Sensitivity of the Area to Ecological Impacts

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

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 21 - 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 22 - 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 23 - 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 24 - 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.