



Rouse Homes

Proposed Residential Development, Oakroyd Drive, Birkenshaw

Air Quality Assessment

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Executive Summary

WYG have undertaken an Air Quality Assessment to support an application for a proposed residential development at Land off Oakroyd Drive, Birkenshaw.

The potential effects during the construction phase include fugitive dust emissions from site activities, such as demolition, earthworks, construction and trackout. The impacts during the operational phase take into account 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 NO₂ exposure is determined to be 'negligible' for all existing and proposed receptors for both assessment scenarios. With respect to predicted PM₁₀ exposure, the significance of the proposed development is determined to be 'negligible' all receptors for both assessment scenarios.

Following consultation with West Yorkshire Fire and Rescue Service, it is understood that all smoke associated with the training centre will be dispersed from a 30m high chimney. It is not predicted that there will be a significant effect from the station on the proposed receptors.

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

Rouse Homes commissioned WYG Environmental Planning and Transport (WYG) to prepare an Air Quality Assessment for a proposed residential development on Oakroyd Drive, Birkenshaw.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is approximately 420200, 427500. The Site is bounded to the north by Marsh Lane, to the east by Bradford Road and to the south and west by West Yorkshire Fire and Rescue Service Training Centre. Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

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

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

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

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

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO₂) and particulate matter with an aerodynamic diameter of less than 10µm (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 (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.gov.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (<http://magic.defra.gov.uk/>);
- Planning Practice Guidance (<http://planningguidance.planningportal.gov.uk/>); and
- Kirklees Metropolitan Council (<https://www.kirklees.gov.uk>)

Site Specific Reference Documents

- Kirklees Local Plan, November 2015;
- Kirklees Metropolitan Council, 2016 Air Quality Annual Status Report, June 2016.



2.2 Air Quality Legislative Framework

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO₂ and oxides of nitrogen, sulphur dioxide, lead and PM₁₀;
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

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

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

UK Legislation

The Air Quality Standards Regulations (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 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	
NO ₂	UK	200µg/m ³ not to be exceeded more than 18 times a year	1-Hour Mean	31 st December 2005	200µg/m ³ not to be exceeded more than 18 times a year	1 st January 2010	Retain Existing
	UK	40µg/m ³	Annual Mean	31 st December 2005	40µg/m ³	1 st January 2010	

Within the context of this assessment, the annual mean objectives are those against which 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

Kirklees Metropolitan Council (KMC) adopted the Local Plan which outlines the Council's broad planning strategy. Following a review of 'saved' policies within the adopted Local Plan, the following was identified as being relevant to the proposed development from an air quality perspective:

Policy DLP 15 Residential use in town centres

Proposals for residential uses (including student accommodation) within the defined town centres as set out on the Policies Map will be supported subject to:

d. the protection of the amenity of existing residents and future occupiers of the proposed residential use in accordance with amenity and design policies within the plan, and will in particular consider matters such as privacy, noise and air quality;

and

Policy DLP 20 Sustainable travel

New development will be located in accordance with the spatial development strategy to ensure the need to travel is reduced and that essential travel needs can be met by forms of sustainable transport other than the private car. The council will support development proposals that can be served by alternative modes of transport such as public transport, cycling and walking and in the case of new residential development is located close to local facilities.

The council will support demand management measures which discourage single occupancy car travel within new development and encourage the use of low emission vehicles to improve areas with low levels of air quality. Proposals should include measures to encourage the use of sustainable travel options, including public transport, the promotion of personal journey planning, walking, cycling, car sharing, electronic communication and home working.

Travel plans will be required for all major planning applications in accordance with current guidance and should set targets and monitoring arrangements to ensure sustainable travel patterns are maintained. Travel plans should include agreed and defined outcomes related to a package of specified measures to be implemented.

and

Policy DLP 51 Protection and improvement of local air quality



Proposals that have the potential to increase local air pollution either individually or cumulatively must be accompanied by evidence to show that the impact of the development has been assessed in accordance with the relevant guidance.

Development which has the potential to cause levels of local air pollution to increase to unsafe levels must incorporate sustainable mitigation measures that reduce this impact to a safe level. If sustainable measures cannot be introduced the development will not be permitted.

Where the development introduces new receptors into Air Quality Management Areas or Areas of Concern or near other areas of relatively poor air quality, for example near roads or junctions, the development must incorporate sustainable measures that protect the new receptors from unacceptable levels of air pollution. Where sustainable measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted.

All development will be carried out in accordance with the most relevant and up to date strategies, guidance, legal requirements and action plans.



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 May 2015. 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 2 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, Kirklees Metropolitan Council (KMC) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO₂ and PM₁₀ are above the relevant AQOs at a number of locations of relevant public exposure within the Council. KMC has designated two Air Quality Management Areas (AQMA):

- Kirklees AQMA: An area encompassing properties along two sections of the A62 Leeds Road, in the vicinity of the junctions with the A6107 Bradley Road, and with the A644.
- Kirklees AQMA No 2: Incorporating a number of properties along part of the Huddersfield Road A644.

The proposed development is situated 7km to the north of both Kirklees AQMAs as such these have not been taken into consideration in this assessment.

Air Quality Monitoring

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

Non - Continuous Monitoring

KMC operates a network of diffusion tubes. NO₂ concentrations were monitored at 40 locations in 2014. The closest diffusion tube is located approximately 118m north from the site boundary.

The representative diffusion tube data is from 2014 which is presented in Table 4.

Table 4 Monitored Annual Mean NO₂ Concentrations

Site ID	X	Y	Site Type	NO ₂ Annual Mean Concentration 2015 (µg/m ³)
D13	420377	427871	Roadside	40.4
D15	420441	427353	Roadside	38.5



Site ID	X	Y	Site Type	NO ₂ Annual Mean Concentration 2015 (µg/m ³)
D37	420356	427810	Roadside	36.4
D38	420222	427764	Roadside	38.7

As indicated in Table 4, all roadside diffusion tubes lie within the extents of the main study area and as such have been utilised for model verification.

4.2 Meteorology

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data. The 2015 meteorological data used in the assessment is derived from Leeds Bradford Airport Meteorological Station. This is the nearest meteorological station which is considered representative of the development site, with all the complete parameters necessary for the ADMS model. Reference should be made to Figure 2 for an illustration of the prevalent wind conditions at the Leeds Bradford Airport Meteorological Station site.

4.3 Emission Sources

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO₂ and PM₁₀.

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 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 and proposed receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

The existing receptor locations are summarised in Table 5 and the spatial locations of all of the receptors are illustrated in Figure 1.



Table 5 Modelled Existing Sensitive Receptor Locations

Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
R1	483 Bradford Road	420252.5	428183.3
R2	673 Bradford Road	420311.3	428065.8
R3	668 Bradford Road	420328.2	427978.5
R4	Half Way House, 1 Whitehall Road East	420351.0	427870.2
R5	11 Whitehall Road East	420434.8	427912.9
R6	620 Bradford Road	420360.0	427812.1
R7	1 Whitehall Road West	420319.2	427794.9
R8	15 Whitehall Road West	420250.8	427759.9
PR1	East of Development Site: Southern Façade	420240.0	428056.5
PR2	East of Development Site: Eastern Façade	420258.7	428060.3
PR3	East of Development Site: Northern Façade	420271.3	428046.9
PR4	East of Development Site: Northern Façade	420262.5	428029.0
PR5	East of Development Site: Northern Façade	420252.1	428020.5



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

5.2 Particulate Matter (PM₁₀)

The UK Air Quality Standards seek to control the health implications of respirable PM₁₀. However, the majority of particles released from construction will be greater than this in size.

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

5.3 Dust

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. 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 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 6 below.

Table 6 Dust Emission Magnitude

Construction Process	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Small
Trackout	Small

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 7.

Table 7 Sensitivity of the Area

Source	Area Sensitivity		
	Dust Soiling	Health Effects of PM ₁₀	Ecological
Demolition	Medium	Low	N/A
Earthworks	Medium	Low	N/A
Construction	Medium	Low	N/A
Trackout	Medium	Low	N/A

The dust emission magnitude determined in Table 6 has been combined with the sensitivity of the area determined in Table 7, 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 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	Low	Negligible	N/A
Earthworks	Medium	Low	N/A
Construction	Low	Negligible	N/A
Trackout	Negligible	Negligible	N/A

Appropriate mitigation measures are detailed and presented in Section 8. 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 NO₂ and PM₁₀ 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 Traffic Assessment (TA), the operational phase assessment has been undertaken with an assumed operational opening year of 2019. The assessment scenarios are therefore:

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

6.1 Existing and Predicted Traffic Flows

Baseline 2015 data and projected 2019 'do minimum' and 'do something' traffic data has been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT).

Baseline traffic data was retrieved from the Department for Transport (DfT) traffic counts and UK traffic data flows and applying a TEMPRO factor to get the 'do-minimum' scenario. While it is expected that the proposed development will generate fewer trips than the existing site use, a worst case assumption of each unit creating additional trips based on a standard TRICS factor 3.5 daily movements per residential parking space has been used to assess the 'do something' scenario.

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 (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 9.



Table 9 Traffic Data

Link	Speed (km/h)	2015		2019			
		AADT	HGV %	Without the Proposed Development		With Development	
				AADT	%HGV	AADT	%HGV
A58 Whitehall Road West	48	15238	2	16457	2	16483	2
A58 Whitehall Road East	48	15746	2	17006	2	17032	2
A651 (Bradford Road, North)	48	9769	2	10551	2	10604	2
A651 (Bradford Road, South)	48	15774	1	17036	1	17089	1
M62	112	147946	13	159782	13	159782	13
Proposed Access Road	48	0	0	0	0	105	0

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), NO₂, PM₁₀ 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 10.

Table 10 Published Background Air Quality Levels (µg/m³)

UK NGR(m)		2015		
X	Y	NO _x	NO ₂	PM ₁₀
420377	427871	39.42	25.67	17.10
420441	427353	39.42	25.67	17.10
420356	427810	39.42	25.67	17.10
420222	427764	39.42	25.67	17.10

6.3 Model Verification

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification



process is in general accordance with that contained in Section 7 of the TG16 guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_x at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_x emissions. These are converted into predicted roadside contribution NO₂ exposure at the relevant receptor locations based on the updated approach to deriving NO₂ from NO_x for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_x to NO₂ worksheet in the online LAQM tools website hosted by DEFRA.

A model correction factor of 2.455 was applied to roadside predicted NO_x concentrations before converting to NO₂. This figure demonstrates that the model predictions are slightly over predicting the road traffic emissions at the monitoring locations. Table 11 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 11 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
DT13	40.38	41.65	-3.14
DT15	38.47	37.33	2.97
DT37	36.36	38.19	-5.03
DT38	38.66	35.67	7.73

The final model produced data at the monitoring locations to within 10% of the monitoring results, as the 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 12 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 Airport Station , hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	1m representing a typical surface roughness for Cities, Woodlands .
Latitude	Allows the location of the model area to be set	United Kingdom = 53.74
Monin-Obukhov	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its	Small Towns <50,000 = 10m .



Parameter	Description	Input Value
Length	character.	
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.	Rural (Not London) and Motorway (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 were 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 DfT data for verification and baseline operational phase assessment

6.5 ADMS Modelling Results

Traffic Assessment

The ADMS Model has predicted concentrations of NO₂ and PM₁₀ 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.

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 Emissions Factor Toolkit (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 = Existing baseline conditions;
- 2019 "Do Minimum" = Baseline conditions;
- 2019 "Do Something" = Baseline conditions + committed development flows + proposed development flows.

Nitrogen Dioxide

Table 13 presents a summary of the predicted change in NO₂ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.



Table 13 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2015	No development 2019	With development 2019	Development Contribution
R1	483 Bradford Road	23.25	23.72	23.73	0.01
R2	673 Bradford Road	25.02	25.17	25.19	0.02
R3	668 Bradford Road	30.91	31.07	31.08	0.01
R4	Half Way House, 1 Whitehall Road East	37.36	35.85	35.87	0.02
R5	11 Whitehall Road East	33.12	32.66	32.67	0.01
R6	620 Bradford Road	36.47	35.57	35.59	0.02
R7	1 Whitehall Road West	31.71	32.51	32.52	0.01
P8	15 Whitehall Road West	30.99	32.53	32.53	0.00
PR1	East of Development Site: Southern Façade	22.25	23.42	23.48	0.06
PR2	East of Development Site: Eastern Façade	22.61	23.63	23.67	0.04
PR3	East of Development Site: Northern Façade	23.01	23.93	23.99	0.06
PR4	East of Development Site: Northern Façade	22.64	23.76	23.80	0.04
PR5	East of Development Site: Northern Façade	22.43	23.66	23.70	0.04
Annual Mean AQO not to be exceeded		40 µg/m³			

As indicated in Table 13, the maximum predicted increase in the annual average exposure to NO₂ at any existing receptors, due to changes in traffic movements associated with the development, the maximum increase at existing sensitive receptors is 0.02 µg/m³ at 673 Bradford Road (R2), Half Way House, 1 Whitehall Road East (R4) and 620 Bradford Road (R6).

As shown in Table 13, the worst affected proposed receptor is 23.99µg/m³ at PR3. This is well below the National AQO of 40µg/m³ for NO₂.

All modelled receptor locations are predicted to meet the AQO for NO₂ 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 NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 14.

Table 14 Significance of Effects at Key Receptors (NO₂)

NO ₂ Significance Effects at Key Receptors				
Receptor	Change Due to Development (DS-DM) (µg/m ³)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.15	0%	<75% of AQAL	Negligible
R2	0.10	0%	<75% of AQAL	Negligible
R3	0.15	0%	<75% of AQAL	Negligible
R4	0.10	0%	<75% of AQAL	Negligible
R5	0.10	0%	<75% of AQAL	Negligible
R6	0.03	0%	<75% of AQAL	Negligible



NO ₂ Significance Effects at Key Receptors				
Receptor	Change Due to Development (DS-DM) (µg/m ³)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R7	0.05	0%	<75% of AQAL	Negligible
P8	0.03	0%	76-94% of AQAL	Negligible
PR1	0.05	0%	76-94% of AQAL	Negligible
PR2	0.03	0%	76-94% of AQAL	Negligible
PR3	0.05	0%	76-94% of AQAL	Negligible
PR4	0.03	0%	76-94% of AQAL	Negligible
PR5	0.00	0%	76-94% of AQAL	Negligible
0% means a change of <0.5%				

The magnitude of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing residential receptors, 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 15 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'no development' and 'with development' scenarios.

Table 15 Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor	PM ₁₀ (µg/m ³)				
	Baseline 2015	No development 2019	With development 2019	Development Contribution	
R1	483 Bradford Road	16.09	16.26	16.27	0.00
R2	673 Bradford Road	16.40	16.61	16.62	0.01
R3	668 Bradford Road	18.01	18.25	18.26	0.00
R4	Half Way House, 1 Whitehall Road East	19.25	19.55	19.56	0.01
R5	11 Whitehall Road East	18.43	18.68	18.69	0.00
R6	620 Bradford Road	19.10	19.44	19.44	0.01
R7	1 Whitehall Road West	18.14	18.51	18.51	0.00
P8	15 Whitehall Road West	17.98	18.42	18.42	0.00
PR1	East of Development Site: Southern Façade	15.90	16.12	16.14	0.02
PR2	East of Development Site: Eastern Façade	15.96	16.19	16.20	0.01
PR3	East of Development Site: Northern Façade	16.04	16.26	16.28	0.01
PR4	East of Development Site: Northern Façade	15.97	16.20	16.21	0.01
PR5	East of Development Site: Northern Façade	15.93	16.17	16.18	0.01
Annual Mean AQO not to be exceeded		40 µg/m³			

As indicated in Table 15, the maximum predicted increase in the annual average exposure to PM₁₀ at any existing and proposed receptors, due to changes in traffic movements associated with the development, is



0.01µg/m³ at 673 Bradford Road (R2), Half Way House, 1 Whitehall Road East (R4) and 620 Bradford Road (R6).

As shown in Table 13, the worst affected proposed receptor is 16.28µg/m³ at PR3. This is well below the National AQO of 40µg/m³ for NO₂.

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 16.

Table 16 Significance of Effects at Key Receptors (Particulate Matter)

PM ₁₀ Significance Effects at Key Receptors				
Receptor	Change Due to Development (DS-DM) (µg/m ³)	% Change in Concentration Relative to AQAL	% Annual Mean Concentration in Assessment Year	Significance
R1	0.01	0%	<75% of AQAL	Negligible
R2	0.02	0%	<75% of AQAL	Negligible
R3	0.01	0%	<75% of AQAL	Negligible
R4	0.02	0%	<75% of AQAL	Negligible
R5	0.01	0%	<75% of AQAL	Negligible
R6	0.01	0%	<75% of AQAL	Negligible
R7	0.01	0%	<75% of AQAL	Negligible
P8	0.00	0%	<75% of AQAL	Negligible
PR1	0.04	0%	<75% of AQAL	Negligible
PR2	0.03	0%	<75% of AQAL	Negligible
PR3	0.04	0%	<75% of AQAL	Negligible
PR4	0.03	0%	<75% of AQAL	Negligible
PR5	0.03	0%	<75% of AQAL	Negligible

0% means a change of <0.5%

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



7. Smoke Impact Assessment

7.1 Smoke Impact Assessment Methodology

The assessment methodology utilised during the undertaking of this Air Quality Assessment (AQA) is based on that described in the Technical Guidance on the Assessment of Mineral Dust Impacts for Planning issued by the Institute of Air Quality Management, May 2016.

Although the following assessment is with regards to smoke emissions from the West Yorkshire Fire and Rescue Service Training Centre. The methodology associated with dust assessments has been undertaken as meteorological conditions are considered.

Sensitivity of Receptors

Receptors can demonstrate different sensitivities to changes in their environment. For the purpose of this assessment sensitivity is determined as Very High, High, Medium or Low as detailed in Table 17.

Table 17 Methodology for Assessing Sensitivity of Receptor

Sensitivity	Criteria
Very High	<ul style="list-style-type: none"> Receptors of very high sensitivity to dust and / or poor air quality, such as: hospitals and clinics, retirement homes, painting and furnishing, hi-tech industries, car showrooms and food processing. Receptors already predicted to exceed the relevant AQO.
High	<ul style="list-style-type: none"> Receptors of high sensitivity to dust and / or poor air quality, such as: schools, residential areas, food retailers, glasshouses and nurseries, horticultural land, offices and relevant designated and non designated ecological receptors. Receptors predicted to currently be at 90-100% of the relevant AQO.
Medium	<ul style="list-style-type: none"> Receptors of medium sensitivity to dust and / or poor air quality, such as: farms, outdoor storage, light and heavy industry. Receptors predicted to currently be at 75 - 90% of the relevant AQO.
Low	<ul style="list-style-type: none"> All other dust and air quality sensitive receptors not identified above. Receptors predicted to currently be at < 75% of the relevant AQO.

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 dust have been assessed with reference to the baseline conditions and environmental assessment criteria. This assessment methodology is underlined by the Source-Pathway-Receptor (S-P-R) concept, which presents the hypothetical relationship between the source of the pollutant, the pathway by which exposure might occur, and the receptor that could be adversely effected.

Pathway Effectiveness has been defined by the IAQM, as the 'effectiveness' of a defined pathway to transport smoke. This can be determined by the combination of the frequency of winds >5 m/s, and the



receptor distance from the smoke emissions source. This combination semi-qualitatively determined the likelihood of the Aeolian transport of smoke, along a specified pathway between source and receptor.

The process of defining Pathway Effectiveness, as defined in the IAQM 2016 guidance, is outlined in Table 18 below and Smoke Impact Risk is shown in Table 19.

Table 18 Methodology for Assessing Pathway Effectiveness

Receptor Distance Category	Frequency of Potentially Dusty Winds			
	Infrequent	Moderately Frequent	Frequent	Very Frequent
Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

Table 19 Methodology for Assessing Smoke Impact Risk

Pathway Effectiveness	Residual Source Emissions		
	Small	Medium	Large
Highly Effective Pathway	Low Risk	Medium Risk	High Risk
Moderately Effective Pathway	Negligible Risk	Low Risk	Medium Risk
Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

7.2 Baseline Environment

Assessment of Impact Magnitude

Table 20 shows how the combined smoke impact risk and receptor sensitivity used to determine the potential magnitude of smoke effects on the surrounding environment and receptors. If the scale of the impact magnitude is negative then the resulting effect is adverse. If the scale of the impact magnitude is positive then the resulting effect is beneficial. The table has been developed by the IAQM, and is published in the 2016 Mineral Dust Impacts for Planning Guidance.

Table 20 Magnitude of Smoke Impacts Matrix

Dust Impact Risk	Magnitude of Impact		
	Low	Medium	High
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

7.3 Pollutant Sources

The activities which will affect the proposed development is the smoke generated at West Yorkshire Fire and Rescue Service Training Centre located to the south of the proposed development site.



With regards to the activities which have the potential to cause smoke emissions, the residual source emissions have been assessed. The scale of the anticipated emissions are classed as Small, Medium or Large in accordance with the criteria in Appendix 4 of the IAQM Mineral Dust Guidance, 2016. The residual source emissions for individual site operations are outlined below in Table 21.

Table 21 Site Operations Residual Source Emissions Classification

Activity	Residual Source Emissions
Smoke Emissions	Moderately Effective/Ineffective

7.4 Likely Significant Environmental Effects

During operation of the Fire and Rescue Training Centre, the potential for smoke to be emitted would be directly from the flue to the south of the training centre, adjacent to the A58 (Whitehall Road, West).

It is likely that smoke levels may arise on an intermittent basis as part of the operations at the site. This is more likely when the smoke flue is active during dry and/or wind meteorological conditions, especially to the north.

Although, as the smoke is being emitted from a flue, which is greater in height than the proposed houses to the north of the development site, the impact of the smoke is 'medium'.

To assume a worst case assessment, it has been assumed that dry meteorological conditions occur 365 days of the year as it is expected that training will only be taken on dry days.

Results of Semi-Qualitative Assessment

A wind rose of meteorological data for 2016 from Leeds Bradford Station is presented in Figure 3. This indicates that the prevailing winds are mainly from the West. An assessment of the significance of smoke emission from Training Centre, shown in Figure 1, has been undertaken based on the methodology described in Section 3 to Section 4 and presented in Table 22 and Table 23.

Table 22 Relative Period during which Meteorological Conditions are Conducive to Smoke

Receptor		Type	Sensitivity Category	Direction of wind from site affecting receptor	Distance from Nearest Site Smoke Source	% Dry Day Winds >5 m/s	Pathway Effectiveness
ID	Description						
R1	Proposed	Residential	High	North	124	6.9	Moderately Effective
R2	Proposed	Residential	High	North	128	6.9	Moderately Effective
R3	Proposed	Residential	High	North	157	6.9	Moderately Effective
R4	Proposed	Residential	High	North	153	6.9	Moderately Effective
R5	Proposed	Residential	High	North	192	6.9	Moderately Effective



Receptor		Type	Sensitivity Category	Direction of wind from site affecting receptor	Distance from Nearest Site Smoke Source	% Dry Day Winds >5 m/s	Pathway Effectiveness
ID	Description						
R6	Proposed	Residential	High	North	218	6.9	Ineffective
R7	Proposed	Residential	High	North	263	6.9	Ineffective

Table 23 Potential Impact Significance of Smoke Generating Activities

Receptor		Receptor Sensitivity	Smoke Impact Risk	Magnitude of Smoke Effects
R1	Proposed Residential Receptor	High	Low Risk	Slight Effect
R2	Proposed Residential Receptor	High	Low Risk	Slight Effect
R3	Proposed Residential Receptor	High	Low Risk	Slight Effect
R4	Proposed Residential Receptor	High	Low Risk	Slight Effect
R5	Proposed Residential Receptor	High	Low Risk	Slight Effect
R6	Proposed Residential Receptor	High	Negligible	Negligible Effect
R7*	Proposed Residential Receptor	High	Negligible	Negligible Effect

The potential for smoke impacts has been assessed as being 'negligible' to 'slight' risk at all identified receptors in accordance with the stated assessment methodology. This is not considered to be significant. Additionally, it is understood that the training site is only used infrequently.



8. Mitigation

8.1 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 'medium 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 24 and Table 25 below:



Table 24 Highly Recommended Construction Phase Mitigation Measures

Communications
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
Dust Management
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. 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.
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.
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 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
Avoid site runoff of water or mud.
Keep site fencing, barriers and scaffolding clean using wet methods.
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
Cover, seed or fence stockpiles to prevent wind whipping.
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.
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.
Demolition
Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
Avoid explosive blasting, using appropriate manual or mechanical alternatives.
Bag and remove any biological debris or damp down such material before demolition.



Earthworks
n/a
Construction
n/a
Trackout
n/a

Table 25 Desirable Construction Phase Mitigation Measures

Communications
n/a
Dust Management
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.
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)
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
Demolition
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
Earthworks
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
Only remove the cover in small areas during work and not all at once
Construction
Avoid scabbling (roughening of concrete surfaces) if possible.
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Trackout
n/a

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

8.2 Operational Phase

Traffic

Although an assessment of road traffic exhaust emissions has predicted no exceedances of the AQO, implementing traffic management measures 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.

- Improved pedestrian links to public transport stops.

Oakroyd Drive, Birkenshaw Air Quality Assessment



- Provision of new bus stops infrastructure including shelters, raised kerbing, information displays.
- Provision of subsidised or free ticketing (Corporate and residential Metrocards, Student Metrocards).
- Site layout to include improved pedestrian pathways to encourage walking.
- Improved convenient and segregated cycle paths to link to local cycle network.



9. Conclusions

WYG have undertaken an Air Quality Assessment for an outline application for residential development at Heathfield Lane, Birkenshaw 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 'medium' at some worst affected receptors without mitigation. However, appropriate site specific mitigation measures have been recommended based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to emissions from the construction phase will not be significant.

All modelled receptors, including the existing and proposed receptors, are predicted to meet the AQO for NO₂ and PM₁₀ in the 'do minimum' and 'do something' scenarios operational year scenarios. Therefore, no additional mitigation is required.

The significance with respect to NO₂ exposure is determined to be 'negligible' at all modelled existing and proposed receptor locations, based on the methodology outlined in section 3.

With respect to predicted PM₁₀ exposure, the significance of the proposed development is determined to be 'negligible'.

The smoke assessment shows that there will not be a significant risk at the proposed development from training activities at the West Yorkshire Fire and Rescue Service Training Centre.



Figures

Heathfield Lane, Birkenshaw Air Quality Assessment



Figure 1 Air Quality Assessment Area

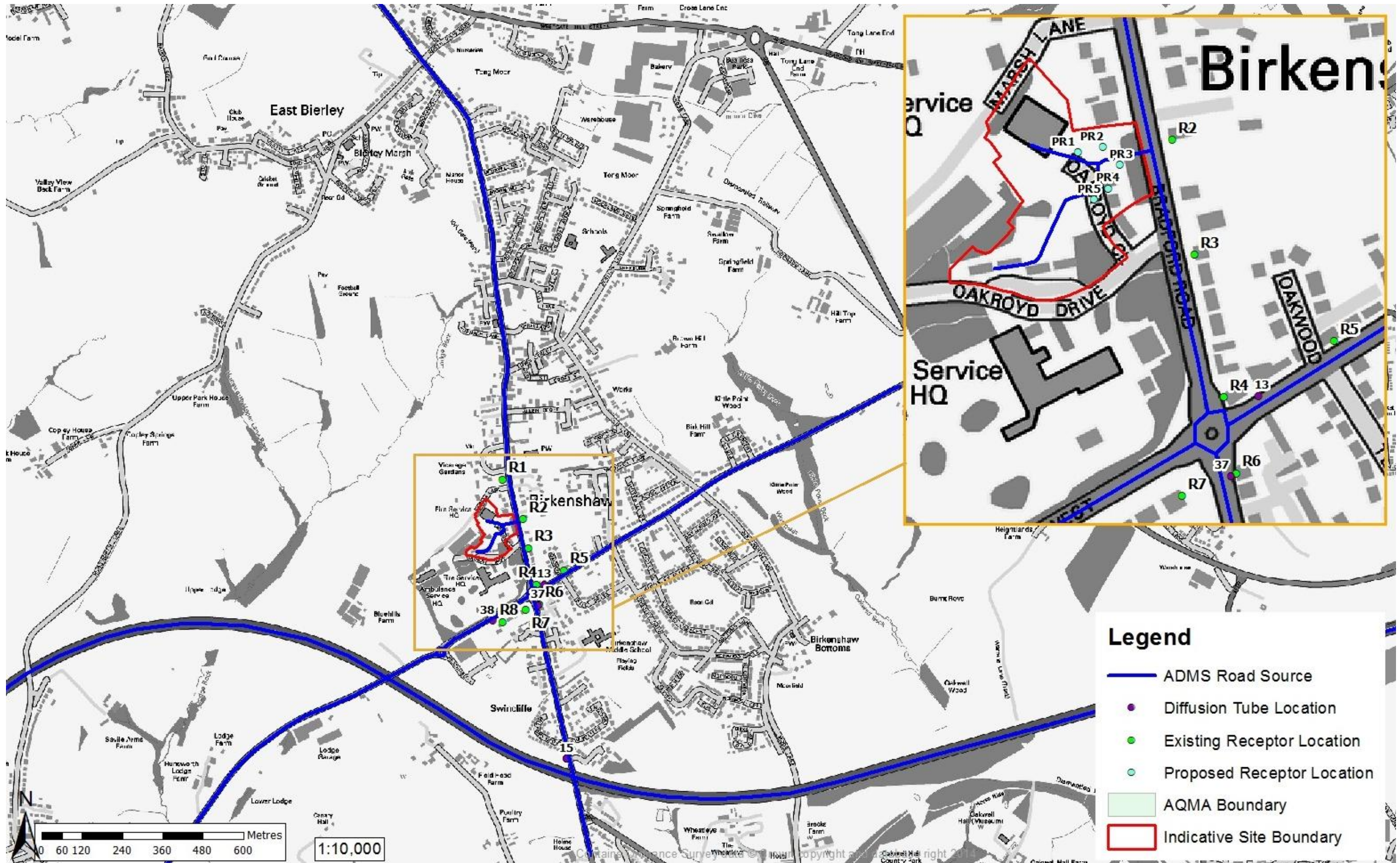




Figure 2 Leeds Bradford Airport 2014 Meteorological Station Wind Rose

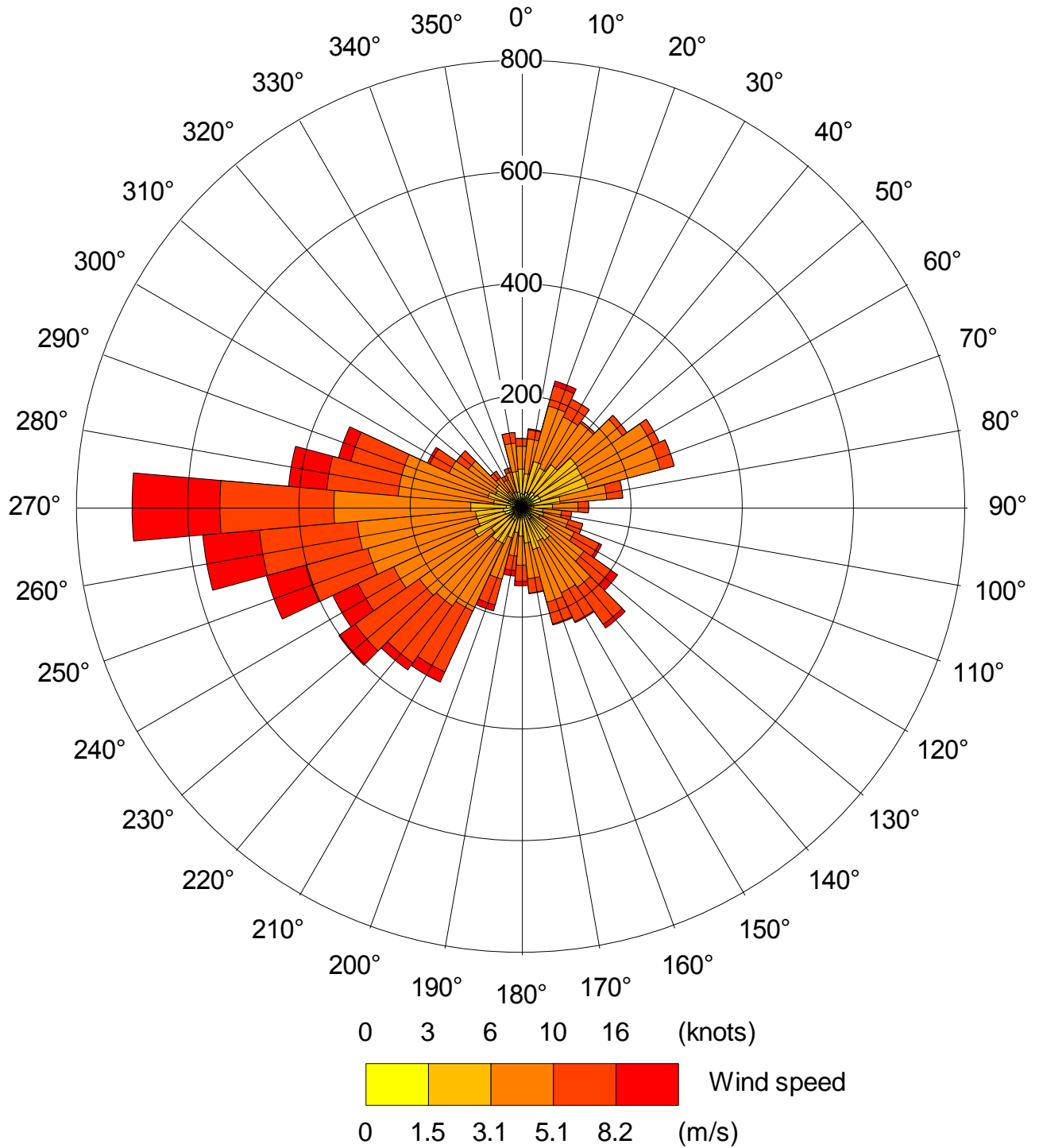
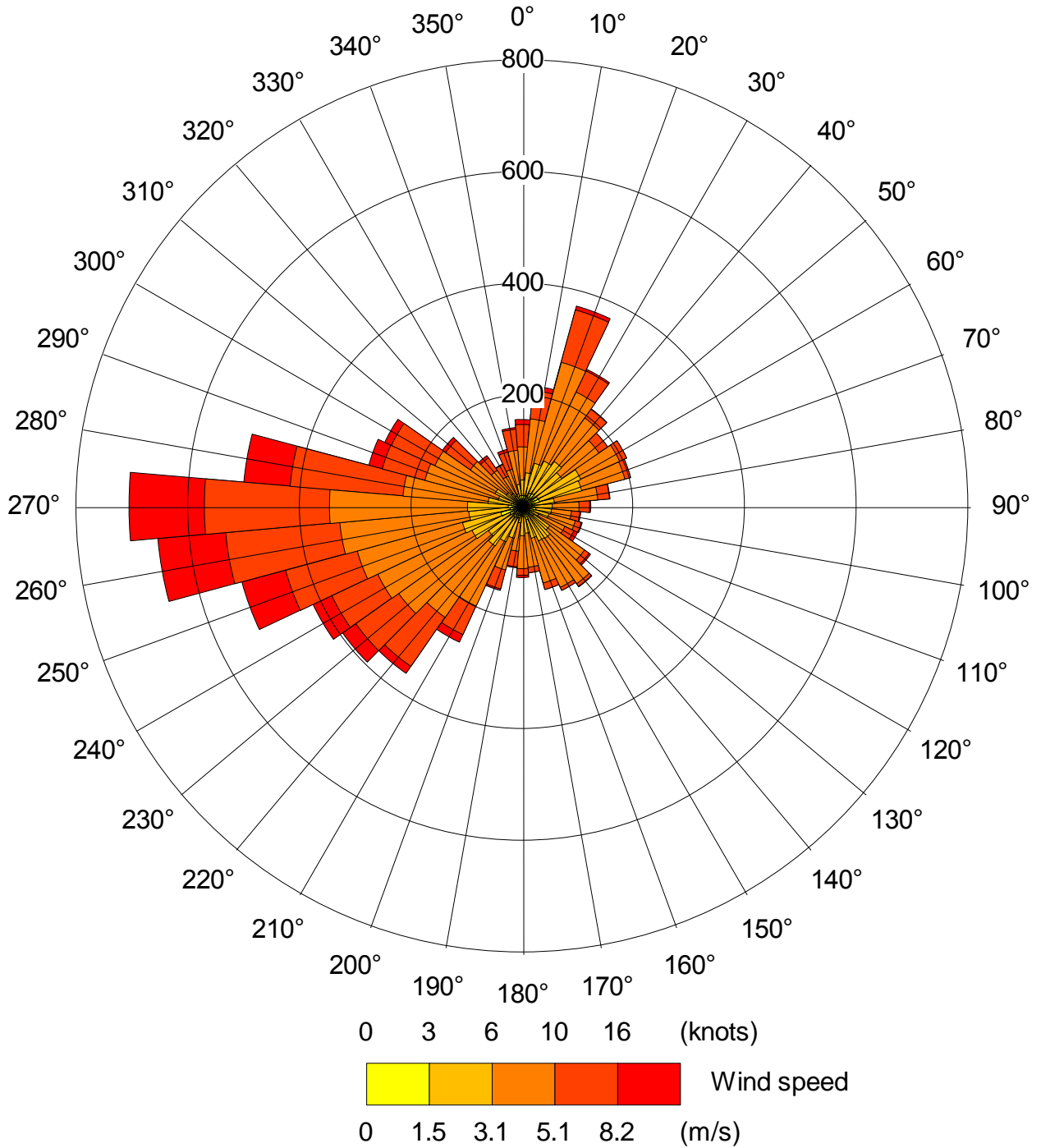




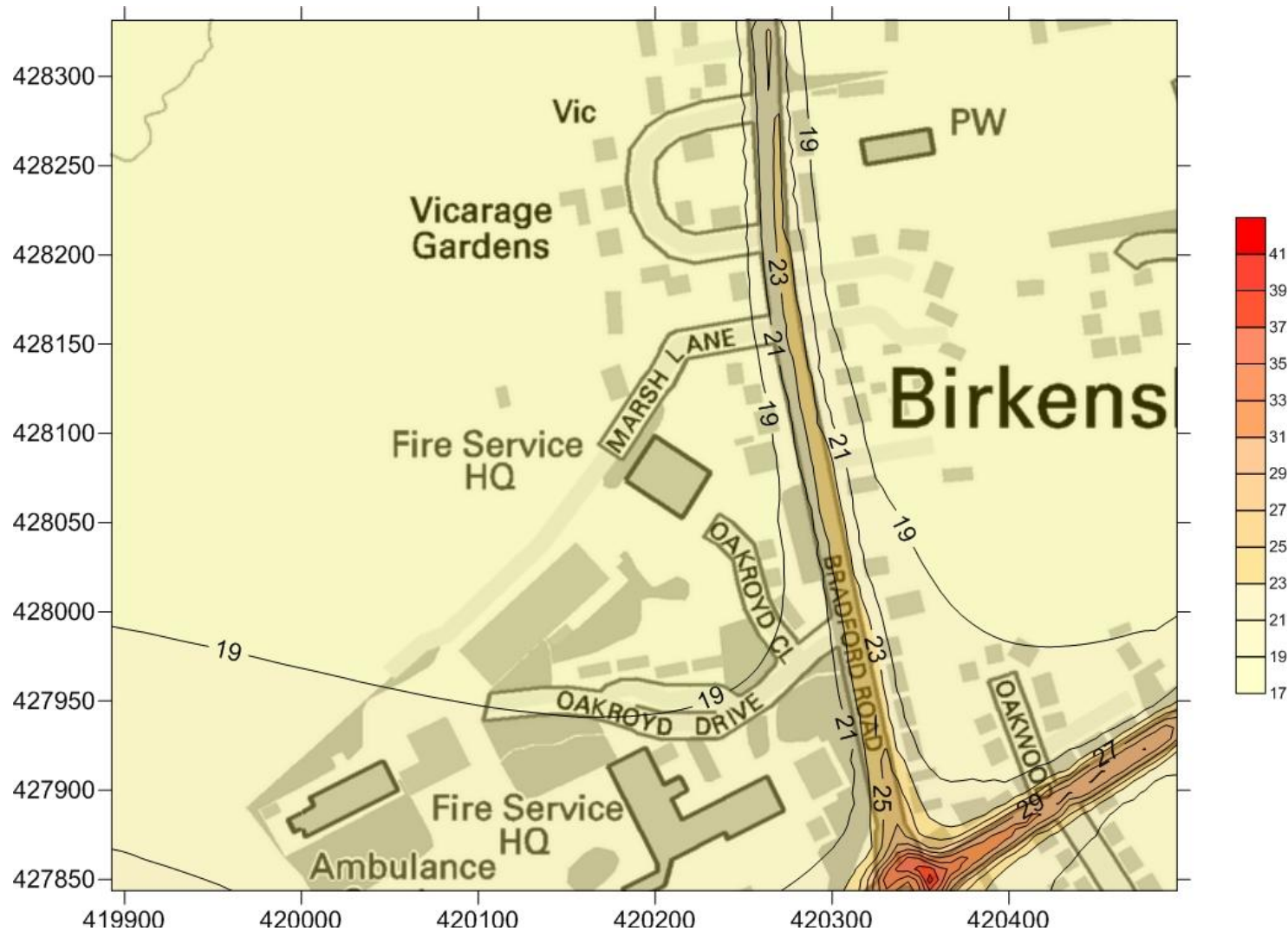
Figure 3 Leeds Bradford Airport 2015 Meteorological Station Wind Rose



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Figure 4 Predicted Environmental Concentration of NO₂ – 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 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
- *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,

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

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- *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 PM₁₀

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



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

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

- *Medium:*

- * Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day); and,
- * Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.

- *Low:*

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

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.