Dodworth Road, Barnsley

Air Quality Impact Assessment

D132927_AQ_01
August 2010

Prepared for

Bellway

Non-Technical Summary

Residential development is proposed at the Polar Ford site on Dodworth Road, Barnsley. The site is located, in part, within the Barnsley MBC Air Quality Management Area No. 2A. This report provides:

- an understanding of the existing local air quality climate in the area;
- an assessment of the site in terms of its suitability for residential accommodation;
- a qualitative assessment of construction phase impacts on local air quality and amenity;
- a quantitative assessment of operational phase impacts on local air quality; and
- an assessment of the overall significance of the effect at local air quality sensitive receptors.

There is no statutory guidance on the appropriate methods to employ within an air quality impact assessment for a development of this type. Therefore the approach taken is justified within the assessment and draws on aspects of the widely accepted approaches set out in the Highways Agency's Advice Note HA207/07 from the Design Manual for Roads and Bridges, Defra's Local Air Quality Management Technical Guidance (LAQM TG(09)) and guidance on the Control of Dust From Construction and Demolition Activities published by The Building Research Establishment.

The approach to the assessment of the significance of effects is consistent with the approach advocated by the Institute of Air Quality Management.

The current (2009) baseline air quality at the site of the development is of a good standard as, on the basis of the available evidence, all air quality standards set for the protection of human health are achieved. Future (2013) baseline air quality in the proposed year of opening for the project is also predicted to be a good standard at this site. Local air quality does not represent a direct constraint to the redevelopment of land at this site for residential use.

With the employment of regular mitigation measures, it is considered that construction phase impacts due to the generation of airborne particulate matter (dust and PM_{10}) can be controlled to within acceptable levels.

The development would increase road vehicle movements along Dodworth Road (A628) between Junction 37 of the M1 to the west of the site and Town End roundabout to the east of the site. The associated increase in vehicle exhaust emissions would increase the magnitude of annual mean concentrations of both nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) by an imperceptible amount at all relevant receptors within Air Quality Management Area No. 2A, in the planned year of completion (2013). There would be no change in the number days on which the 24 hour mean air quality standard for PM_{10} is exceeded as a result of the operation of the development.

Overall the proposed development would have a neutral effect with respect to local air quality.

Revision Schedule

Air Quality Impact Assessment
August 2010

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	25/08/10	Final	**Elisha Williams** Air Quality Specialist	**Garry Gray** Associate, Air Quality	**Garry Gray** Associate, Air Quality

Scott Wilson
12 Regan Way
Chetwynd Business Park
Chilwell
Nottingham
NG9 6RZ

Tel: +44(0)1159077000
Fax +44(0)1159077001

www.scottwilson.com

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1 Introduction

1.1 Overview

1.1.1 Scott Wilson have been commissioned by Bellway to assess the impact on local air quality of the proposed redevelopment of the former Polar Ford garage site at Dodworth Road, Barnsley. The redevelopment would introduce residential units onto the site.

1.1.2 The site is located, in part, within the Barnsley MBC Air Quality Management Area No. 2A. This is one of six locations within the borough where the local authority has particular concerns about the concentration of ambient air pollutants that the local community are exposed to. Consequently an assessment of the significance of the proposed development's effect on local air quality has been requested by the planning officer.

1.2 Scope

1.2.1 A review of the existing ambient air quality forms the basis for prediction of current and existing baseline conditions against which any identified impacts due to the proposed scheme is assessed.

1.2.2 Pollutant concentration predictions have been updated for the following scenarios:

- 2009 Baseline
- 2013 Baseline (year of opening)
- 2013 With Development (year of opening)

1.2.3 The air quality assessment uses predicted traffic flows for the A628 provided by Sanderson Associates.

1.2.4 The potential air quality impacts at sensitive receptors (see Figure A1 in Appendix A) are considered specifically with regard to the effects of changes to annual mean concentration of particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2) as a result of the predicted changes in traffic flows on local road network during the operation of the scheme in 2013.

2 Planning Policy Context

2.1 Legislation

2.1.1 The European Union's (EU) Framework Directive on Ambient Air Quality Assessment and Management (96/62/EC)[1] required the European Commission to propose several Daughter Directives. The first of these was transcribed into UK legislation by the 2001 Air Quality Limit Values Regulations. These limit values are binding on the UK and have been set with the aim of avoiding, preventing or reducing harmful effects on human health and on the environment as a whole.

2.1.2 The Clean Air for Europe (CAFE) programme revisited the management of air quality within the EU with the aim of replacing the EU Framework Directive and the associated Daughter Directives with a single legal act. The Ambient Air Quality and Cleaner Air for Europe Directive came into force when it was published in the Official Journal of the European Union on 11 June 2008[2]. Existing limit values have been retained and new target values for fine particulate matter ($PM_{2.5}$) have been introduced. At the present time, the limit values have been transposed into national legislation through the Air Quality Standards Regulations 2010[3], which came into force on 11th June 2010.

2.2 National Planning Policy

2.2.1 There are both national policies for the control of air pollution and local action plans for the management of local air quality within the Borough of Barnsley. The effect of the proposed development on the achievement of such policies and plans are matters that may be material for consideration by planning authorities in taking decisions on individual planning applications.

2.2.2 Planning Policy Statement (PPS) 23: Planning and Pollution Control[4] sets out some of the Government's core policies and principles on the most important aspects of land use planning. The following matters are identified in Appendix A of PPS 23, that are of particular relevance to this proposal:

- *"the possible impact of potentially polluting development (both direct and indirect) on land use, including effects on health, the natural environment or general amenity";*
- *"the potential sensitivity of the area to adverse effects from pollution, in particular reflected in landscape, the quality of the soil, air, and ground and surface waters…";*
- *"the environmental benefits that the development might bring";*

[1] Council of European Communities (CEC), 1996. Ambient Air Quality Assessment and management as per Council Directive 1996/62/EC, Official Journal of European Union L 296

[2] Council of European Communities (CEC), 2008. Ambient Air Quality and Clean Air for Europe as per Council Directive 08/50/EC, Official Journal of European Union L 152/1.

[3] H.M. Government, 2010, The Air Quality Standards Regulations 2010, Statutory Instrument 2010 No.1001. The Stationery Office.

[4] ODPM, 2004, Planning Policy Statement 23: Planning and Pollution Control, Office of the Deputy Prime Minister.

- *"the existing, and likely future, air quality in an area, including any Air Quality Management Areas (AQMAs) or other areas where air quality is likely to be poor (including the consideration of cumulative impacts of a number of smaller developments on air quality, and the impact of development proposals in rural areas with low existing levels of background air pollution)";*
- *"the need for compliance with any statutory environmental quality standards or objectives (including the air quality objectives prescribed by the Air Quality 2000 and Amending Regulations 2002 ...";*
- *"existing action and management plans with a bearing on environmental quality including: Air Quality Management Area Action Plans (prepared by local authorities under Part IV of the Environment Act 1995)"; and*
- *"the possibility that (whether or not some aspects of the development are subject to pollution control), emissions of smoke, fumes, gases, dust, steam, smell, ... from the development might nevertheless be seriously detrimental to amenity in addition to constituting a statutory nuisance under Part III of the Environmental Protection Act 1990".*

2.3 Local Planning Policy

2.3.1 The Core Strategy[5] for the Local Development Strategy was published for consultation in February 2010. Core Policy CSP 41 Development in Air Quality Management Areas states that,

"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".

2.3.2 This policy was developed to address a specific action within the borough's Air Quality Action Plan.

2.4 Local Air Quality Management

2.4.1 The UK National Air Quality Strategy[6] was initially published in 2000, under the requirements of the Environment Act 1995. The most recent revision of the strategy[7] was published on 17th July 2007, and sets objective values for key pollutants, as a tool to help local authorities manage local

[5] Barnsley Metropolitan Borough Council, 2010, Local Development Framework Core Strategy.
[6] DETR, 2000, UK National Air Quality Strategy, for England, Scotland, Wales and Northern Ireland, Department for Environment Transport and the Regions.
[7] DEFRA, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum, Department for Environment Food and Rural Affairs.

air quality improvements. Some of these objective values have been laid out within The Air Quality (England) Regulations 2000[8] and later amendments[9].

2.4.2 The air quality objective values referred to above have been set down in regulation solely for the purposes of local air quality management. Under local air quality management Barnsley Metropolitan Borough Council (BMBC) has a duty is to carry out assessment against the objective values and if it is unlikely that the objective values will be met in the given timescale, they must designate an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures set out in a subsequent action plan. Consequently it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective or EU Limit Value.

2.4.3 The UK National Air Quality Objective Values for the pollutants considered in this assessment are displayed in Table 2.1.

Table 2.1: Air Quality Objective Values

Pollutant	Averaging Period	Value	Permitted Exceedances	Compliance Date
Nitrogen dioxide (NO_2)	Annual Mean	40 µg/m^3	None	31/12/05
	Hourly Mean	200 µg/m^3	18 hours per year	31/12/05
Particulate Matter (PM_{10})	Annual Mean	40 µg/m^3	None	31/12/04
	24-hour Mean	*50 µg/m^3*	*35 days per year*	*31/12/04*
Fine Particulate Matter ($PM_{2.5}$)	Annual Mean	25 µg/m^3	None	2020
	Annual Mean	Target of 15 % reduction in concentrations at urban background	None	Between 2010 and 2020

2.4.4 The SBC has designated a corridor of land extending along the Dodsworth Road (A628), from junction 37 of the M1 to Towns End roundabout, as an AQMA. Barnsley MBC Air Quality Management Area No.2A has been declared because annual mean concentrations of NO_2 have been demonstrated to occur at some relevant receptors facing onto the A628, at values that are greater than the air quality objective value10.

2.4.5 SBC have produced an action plan that sets out the local authority's strategy for working towards the achievement of the objective value at receptors within AQMA No. 1, a 200 m wide corridor along the M1. An updated action plan is currently in preparation that will take account of increasing understanding of air quality issues within the borough, including other AQMA11.

[8] H.M. Government, 2000, The Air Quality (England) Regulations 2000, Statutory Instrument 2000 No. 928, The Stationary Office.
[9] H.M. Government, 2002, The Air Quality (England) (amendment) Regulations, 2002. Statutory Instrument 2002 No. 3043, The Stationery Office.
[10] Barnsley Metropolitan Borough Council, 2009, 2009 Updating and Screening Assessment for Barnsley Metropolitan Borough Council.
[11] Barnsley Metropolitan Borough Council, 2007, Air Quality Action Plan Progress Report 2007

3 Methodology and Assessment Criteria

3.1 Overview

3.1.1 There is currently no statutory guidance on the method by which an air quality impact assessment should be undertaken for EIA purposes. Several non-statutory bodies have published their own guidance relating to air quality and development control[12] or to the assessment of the significance of air quality effects[13]. The methods applied to assess the significance of air quality effects associated with the proposed development are based on current best practice tools and techniques.

3.1.2 This section will explain the methods used to assess the significance of the:

- The impact of fugitive emissions of particulate matter from construction phase activities;
- The impact of exhaust emissions from future baseline road traffic at the development site; and
- the impact of exhaust emissions from future road traffic with the proposed development in operation.

3.1.3 The potentially affected air quality sensitive receptors are identified for each element of the assessment and the magnitude of the change in air quality statistics at each receptor is considered. The relevant assessment criteria used to determine the significance of effect associated with air quality impacts are described in Section 3.6.

Overview of Assessment Method for Emissions of Particulate Matter

3.1.4 Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions, including;

- demolition work;
- handling, working and storage of materials; and
- movement of vehicles

3.1.5 'Dust' is defined in BS 6069 as particulate matter in the size range 1µm - 75µm in diameter, and is primarily composed of mineral materials and soil particles.

3.1.6 Respirable particulate matter (PM_{10}) is composed of particles with an aerodynamic diameter of less than 10 micrometers (µm) in diameter, and includes the size fractions of greatest concern to impacts on human health. The majority of construction dust is larger than 10 µm in diameter and, therefore, increased levels of dust in the air do not necessarily equate to an increase in levels of PM_{10}. In general construction dusts rarely represent an adverse risk to human health and are more typically associated with causing annoyance to the public through deposited material soiling property.

[12] Environmental Protection UK (2010). Development Control: Planning for Air Quality (2010 Update)
[13] Institute of Air Quality Management (IAQM) (2009). Position on the Description of Air Quality Impacts and their Significance

Overview of Assessment Method for Road Traffic Emissions

3.1.7 The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons (HC) such as benzene and 1,3-butadiene, and carbon monoxide (CO) and PM_{10} in exhaust emissions. In addition, at the high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form NO_X, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere. NO_2 is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle over time.

3.1.8 Although CO, benzene and 1,3-butadiene are present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of this proposal. Road traffic emissions of these substances have been reviewed by Barnsley Metropolitan Council and nowhere within the administrative area is at risk of exceeding these objectives. The development proposals would not be capable of compromising the achievement of the relevant air quality objectives for the protection of human health. Emissions of CO, benzene and 1, 3-butadiene from road traffic are therefore not considered further within this assessment.

3.1.9 The magnitude of road traffic emissions for the baseline and with development scenarios are calculated from traffic flow data using the Highways Agency's current emissions factor database tool EFT4.2. The assessment considers the operational phase impact of road traffic emissions at receptors adjacent to roads in the vicinity of the proposed development.

3.2 Review of Measurement Data

3.2.1 Barnsley Metropolitan Borough Council do not have any monitoring locations at the proposed development site, but they do have a network of passive diffusion tubes located in and around AQMA No. 2A. The data[14] summarised in Table 3.1, shows that annual mean concentrations of nitrogen dioxide have remained at similar concentrations in the past 5 years, except for receptors that have experienced an improvement in air quality due to the opening of the new bypass to the west of the M1.

Table 3.1: Local Authority Monitoring

Reference	Description	Type	Annual Mean NO_2 2006 ($\mu g/m^3$)	Annual Mean NO_2 2007 ($\mu g/m^3$)	Annual Mean NO_2 2008 ($\mu g/m^3$)	Annual Mean NO_2 2009 ($\mu g/m^3$)
Pogmoor	Barnsley A628 Roadside	Continuous Monitor	44	45	46	42
106	53 Dodworth Road	Diffusion Tube	51.8	53.6	55.1	50.0
108	*75 Dodworth Road*	*Diffusion Tube*	*39.7*	*39.5*	*41.9*	*31.9*
109	Traffic Lights, Dodworth Road	Diffusion Tube	55.3	54.8	56.6	54.8

[14] Barnsley Metropolitan Borough Council, 2009, 2009 Updating and Screening Assessment, Chapter 2 New Monitoring Data.

119	Dodworth Road SR Gents	Diffusion Tube	41.4	43.1	42.6	50.4
134	Railway Cottages	Diffusion Tube	34.1	29.8	28.3	25.6

3.2.2 Within the AQMA No.2A annual mean concentrations of nitrogen dioxide have been measured at concentration that are greater than 40 $\mu g/m^3$ at sites associated with congested flow, such as the approaches to traffic light controlled junctions, roundabouts and pedestrian crossings. Residential properties are located very close to the road at some of these locations and this also contributes to the magnitude of the concentrations that receptors were exposed to. Further from these hotspots, traffic is more free flowing and the annual mean concentration of nitrogen dioxide is reported to be below the objective value.

3.2.3 At location where traffic flows are lower, such as Site 134 Railways Cottages, annual mean concentrations of nitrogen dioxide of 26 $\mu g/m^3$ have been measured. In this assessment measured concentration data for Railway Cottages has been used to represent the background contribution to total annual mean concentrations calculated at receptors within the AQMA No. 2A.

3.2.4 Measurements of the hourly mean concentration of nitrogen dioxide reported for the continuous analyser located at Pogmoor junction, have demonstrated that the hourly objective is achieved at the roadside and will therefore be achieved at all relevant receptors, as they are located further from the road.

3.2.5 No new measurements of pollutant concentrations have been taken in support of this application at this time.

3.3 Definition of the Sensitive Receptors

Receptors Affected by Emissions from Construction Phase Works

3.3.1 When assessing the impact of dust emissions generated during demolition and construction works, receptors are defined as the nearest potentially sensitive receptor to the perimeter of the site in each direction. These receptors have the potential to experience impacts of greater magnitude due to dusts generated by the works, when compared with other more distant receptors, or less sensitive receptors, and as such represent examples of worst-case exposure. The identification of sensitive receptors considers residential properties and other potentially sensitive properties such as schools and hospitals or industrial premises.

Table 3.2: Zone for Potentially Significant Construction Dust Impacts from Construction Activities, with Standard Mitigation in Place

Source	Zone within which Potentially Significant Effects may Occur (Distance from Source)	
	Soiling at levels likely to cause annoyance	Exposure to PM_{10} at levels that could exceed the 24-hour air quality objective*

Visible emissions of dust, likely to occur at the source on a regular basis	100 m	25 m – 50 m
Visible emissions of dust, likely to occur at the source on an infrequent basis	50 m	15 m – 30 m
Short-lived limited emissions of dust, occurring at the source on an irregular basis	25 m	10 m – 20 m

* Significance is based on the objective for 2004, contained within the Air Quality (England) Regulations 2000, which allow 35 exceedences / year of 50 $\mu g/m^3$ and take into account existing concentrations in the area. A range has been specified as it is difficult to assess specific PM_{10} impacts, especially in an area with high baseline concentrations.

Adapted from the Air Quality Impact Assessment for the Thames Gateway Bridge

3.3.2 The distances in Table 3.2 are based on professional experience drawn from assessments of many different types of project, discussions with practitioners in the field, and from published reports. They assume that standard control measures will be in place.

3.3.3 Although dust emissions from potential dust generating sources would be present throughout the construction programme, they would not be expected to affect the same location on a regular basis. For this reason, existing or proposed receptors located within 50 m of the Proposed Development site boundary for phased works would be at an increased risk of experiencing a measurable increase in rates of surface soiling. The equivalent distance for the risk of a potentially significant increase in annual mean exposure to PM_{10} is 30 m.

3.3.4 There are a number of potentially sensitive receptors in the immediate vicinity of the proposed development site. These receptors comprise the existing residential properties adjacent to the development sites and proposed properties that are occupied following the completion of earlier phases of the development.

Receptors Affected by Emissions from Road Traffic

3.3.5 The air quality objective values for nitrogen dioxide and for particulate matter have been set by the Expert Panel of Air Quality Standards at a level below the lowest concentration at which the more sensitive members of society have been observed to be adversely affected by exposure to each pollutant. Therefore all receptors that represent exposure of the public are of equal sensitivity as any member of the public could be present at those locations.

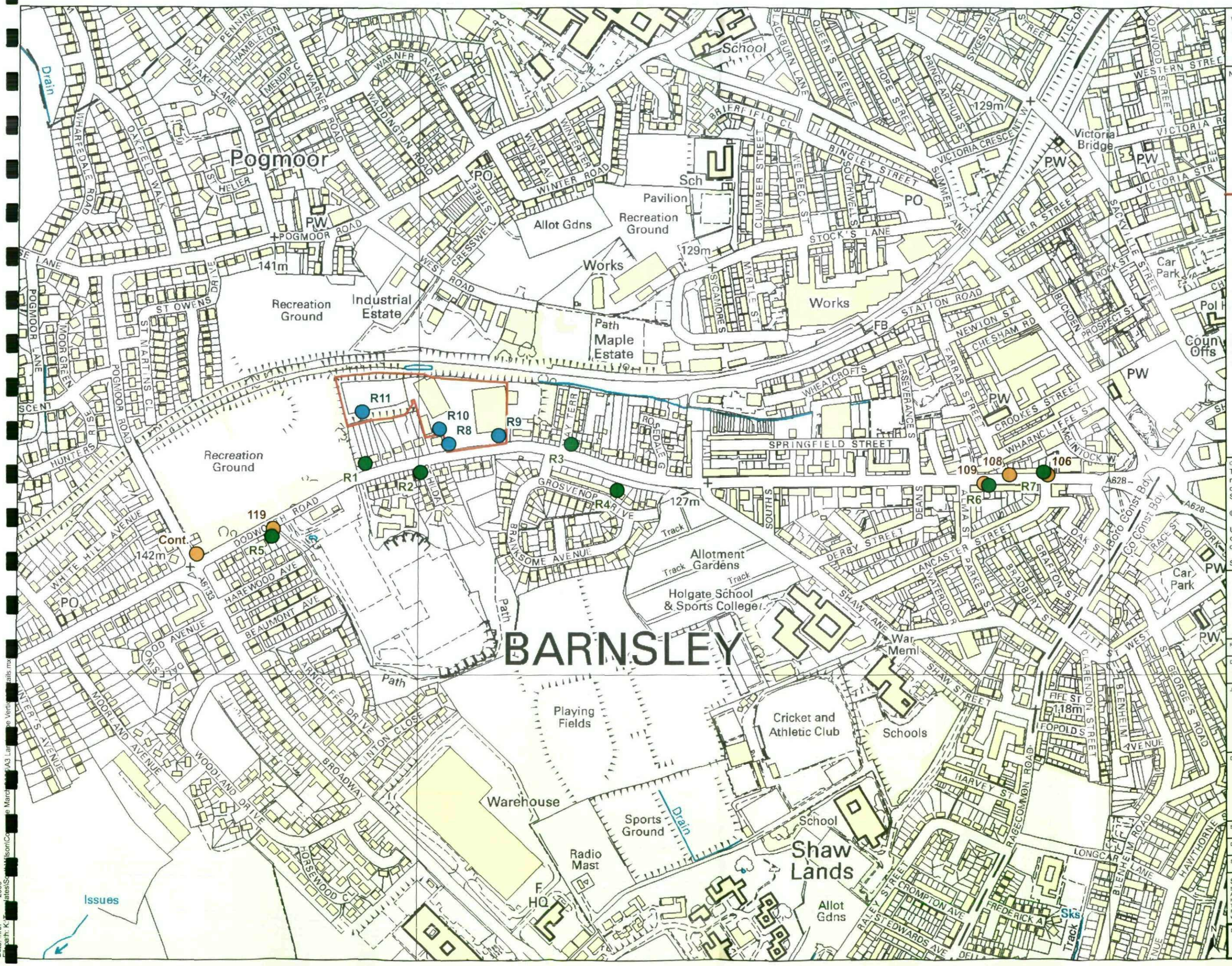
3.3.6 Impacts from road traffic emissions are quantified at existing and proposed receptors facing onto the roads adjoining the development sites. The receptors are listed in Table 3.2 and their locations are displayed in Figure 1.

3.3.7 Table 3.3 describes the representative air quality sensitive receptors of road traffic emissions for this assessment and existing receptors located within AQMA No. 2A and proposed new receptors.

Table 3.3: Air Quality Sensitive Receptors

Receptor	Description	UK National Grid Reference
R1	Existing residential property at 245 Dodworth Road	432924, 406307
R2	Existing residential property at 164 Dodworth Road	433003, 406294
R3	Existing residential property at 207 Dodworth Road	433221, 406335
R4	Existing residential property at 21 Grosvenor Drive	433288, 406269
R5	Existing residential property at 188 Dodworth Road	432789, 406202
R6	Existing residential property at 68 Dodworth Road	433824, 406276
R7	Existing residential property at 55 Dodworth Road	433904, 406294
R8	Proposed new residential property	433043, 406336
R9	Proposed new residential property	433115, 406348
R10	Proposed new residential property	433030, 406357
R11	Proposed new residential property	432918, 406383

[a] Coordinates have been rounded to nearest metre for presentation in this table.



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NOTES

- Existing Receptors
- Proposed Receptors
- Monitoring Locations
- Site boundary

Revision Details	By	Check	Date	Suffix

Drawing Status: FINAL

Job Title: D132927 Dodworth Road Barnsley

Drawing Title: Air Quality Study Area

Scale at A3	1:5,000		
Drawn: EW		Approved: GG	
Stage 1 check: GG	Stage 2 check: GG	Originated: 9511NM	Date: 25/08/10

Scott Wilson
Scott House
Alençon Link, Basingstoke
Hampshire, RG21 7PP
Telephone (01256) 310200
Fax (01256) 310201
www.scottwilson.com

Drawing Number: FIGURE 1 Rev

Date: ##th ******** 2009
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3.4 Road Traffic Emissions Assessment Method

3.4.1 This assessment has used the latest version of dispersion model software 'ADMS-Roads' (v 2.3) to quantify the magnitude of the impact at selected receptors. ADMS-Roads is an advanced dispersion model that has an extensive published track record of use in the UK, for the assessment of local air quality impacts, including model validation studies[15].

3.4.2 The general model conditions used in the assessment are summarised in Table 3.4. Other aspects needed to model the dispersion of emissions are considered briefly in turn.

Table 3.4: General ADMS Model conditions

Variable	Definition
Surface roughness at source	0.5 m
Minimum Monin-Obukhov length for stable conditions	30 m
Terrain type	Flat
Receptor location	x,y coordinates determined by GIS. z = 1.5 m at all receptors
Emissions	NO_x, PM_{10}
Emission factors	EFT4.2 emission factor dataset
Meteorological data	1 year hourly sequential data file
Emissions profiles	generic urban profile
NO_x to NO_2 conversion	Road NO_x output only. Post processing to NO_2 values using TG(09) tools.
Receptors	Selected receptors only
Model output	Long term, Annual mean PM_{10} conc. ($\mu g/m^3$) Long term, Annual mean NO_x conc. ($\mu g/m^3$)

Traffic Data

3.4.3 The 24-hour Annual Average Daily Traffic (AADT) flows for baseline and with development scenarios have been provided by Urban Initiatives and are used in the assessment. The 24-hour AADT, which is available in the Transport Assessment, is the average of road traffic vehicles in 7 days including weekdays and weekends. Therefore AADT flows would not be representative to the traffic flow for each hour in the day. In order for the emission rates to be representative to each hour of the day, hourly profiles have been utilised to calculate the rates from the AADT flow on each road. The hourly profiles are based on a generic profile for urban areas.

3.4.4 The traffic flow data used for the assessment is :

- Baseline 2009, AADT flow of 21180 veh/day
- Baseline 2013, AADT flow of 22749 veh/day

[15] CERC 2009, ADMS validation papers, Accessed at: http://www.cerc.co.uk/software/publications.htm, Date Accessed: 30/10/2009

- With Development 2013, AADT flow of 22874 veh/day
- A percentage HDV value for 2% has been applied for all scenarios

Meteorological Data

3.4.5 One year (2009) of hourly sequential data from Sheffield has been used in the assessment as it is considered representative of conditions experienced within the study area.

Background Pollutant Concentrations

3.4.6 Background pollutant concentrations in the vicinity of the study area have been obtained in each 1km x 1km cell in order to give an indication of existing background concentrations of PM_{10} and $PM_{2.5}$ in the area around the site. Background concentrations for NO_2 are based on 2009 measurements at the Railway Cottages. The total concentrations of NO_2 and PM_{10} at the receptors are the sum of the background concentrations and the contribution of pollutants generated by the local road emissions to the receptors. The background pollutant concentrations at the area would be the main contributor to the annual mean concentrations of pollutants at each receptor, determined from the dispersion model.

3.4.7 Defra provides annual mean background NO_x, NO_2, PM_{10} and $PM_{2.5}$ concentrations[16] from 2008 to 2020. For years of 2009 and 2013, the background concentrations for all of the selected receptors for all of the modelled pollutants are presented in Table 3.5.

Table 3.5: Average Background Annual Mean Concentrations

Receptors	NO_2 (µg/m^3)		PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3	
	2009	2013	2009	2013	2009	2013
R1	25.6	25.6	15.4	15.4	10.2	10.2
R2	25.6	25.6	15.6	15.6	10.3	10.3
R3	25.6	25.6	15.6	15.6	10.3	10.3
R4	25.6	25.6	15.6	15.6	10.3	10.3
R5	25.6	25.6	15.4	15.4	10.2	10.2
R6	25.6	25.6	15.6	15.6	10.3	10.3
R7	25.6	25.6	15.6	15.6	10.3	10.3
R8	25.6	25.6	15.6	15.6	10.3	10.3
R9	25.6	25.6	15.6	15.6	10.3	10.3
R10	25.6	25.6	15.6	15.6	10.3	10.3
R11	25.6	25.6	15.6	15.6	10.3	10.3

[16] Defra, Local Air Quality Management Website, Accessed at: URL http://www.defra.gov.uk , Accessed on 19/08/2010.

Model Verification and NO_x to NO_2 Conversion

3.4.8 Model verification has been carried out following the procedure as described in LAQM. TG (09). The result is that two separate adjustment factors have been achieved for different groups of receptors.

3.4.9 NO_X concentrations at receptors likely to be affected by emissions from traffic experiencing congested driving conditions close to junctions and crossings (R5-R7) have been adjusted using a factor calculated from the verification of model performance at diffusion tubes 106, 109 and 119.

3.4.10 For all of the remaining receptors (R1-R4 and R8-R11), adjustment has been made using a factor calculated from the verification of model performance at diffusion tube 108, which is situated within an area of the AQMA No.2A, where traffic is more free flowing.

3.4.11 These corrected road NO_x concentrations are then processed in the LAQM.TG (09) spreadsheet along with background concentrations to obtain roadside NO_2 contributions. The roadside NO_2 contributions are then added to the background concentrations of NO_2 to obtain the total predicted NO_2 concentrations.

3.4.12 In the absence of monitoring data for PM_{10}, the adjustment factors used for the primary pollutant NO_x are also used for to adjust for bias in the modelled concentrations of the primary pollutant PM_{10}. This approach is consistent with methods described in LAQM TG(09)[17].

3.5 Method for Assessment of Significance

The Assessment Methodology for Construction Phase Impacts

Construction Dust Emissions

3.5.1 At present, there is no statutory UK or EU standards relating to the assessment or control of nuisance dust. The emphasis of the regulation and control of demolition and construction dust should therefore be the adoption of best working practices on site.

3.5.2 Due to the limitations in quantifying likely deposition rates of nuisance dust or any changes in fugitive PM_{10} levels, a qualitative assessment has been undertaken to assess the significance of any effects on nearby sensitive receptors. This is based on the nature of construction activities being carried out, the risk of significant effects occurring as a result of these activities, their likely duration and proximity to the nearest sensitive receptors. The assessment presumes that current best-practice mitigation and abatement measures[18] would be applied to minimise any impacts on nearby sensitive receptors.

Construction Phase Road Traffic Emissions

3.5.3 The construction phase of the proposed development is likely to lead to a small increase in the number of vehicles on the local highway network, for the duration of the construction works only. It is unlikely that a development of this size would lead to sufficient number of vehicle

[17] Department for the Environment Food and Rural Affairs (DEFRA) (2009), Technical Guidance LAQM, TG(09)
[18] Building Research Establishment (BRE) (2003), Control of Dust from Construction and Demolition Activities.

movements to cause a significant increase in pollutant emissions. Therefore, construction phase road traffic emissions are not considered further.

Assessment Criteria

3.5.4 Any dust incidents are highly dependent upon local weather, with extended periods of dry weather combined with winds blowing from the source of dust to the receptor being the conditions in which significant dust related impacts are most likely to occur. These conditions would need to be combined with an activity creating dust close enough to the receptor for increases in dust soiling rates to be perceptible. However, this would only be the case when there is an inadequate application of the mitigation measures being employed on site, which is unlikely.

3.5.5 The risk of dust affecting a sensitive location will also depend on distance. Concentrations and deposition rates decline rapidly on moving away from the source. This is reflected in the distance criteria used to assess the potential for construction dust impacts.

3.5.6 There is a relationship between the magnitude of dust impacts and the willingness of members of the public to formally complain about an adverse effect. Consequently, complaints from members of the public have historically been used as a measure of the magnitude of dust impacts. For example, an increase in dust surface soiling rates that is unlikely to result in any complaints, would be considered to be a low magnitude impact. The effect of exposure to a low magnitude impact would be insignificant for all receptors.

The Assessment Methodology for Operational Phase Impacts

3.5.7 The change in pollutant concentrations with respect to baseline concentrations has been quantified at receptors that are representative of exposure to impacts on local air quality within the study area. The absolute magnitude of pollutant concentrations in the baseline and with development scenario is also quantified and this is used to consider the risk of the air quality limit values being exceeded in each scenario.

3.5.8 For a change of a given magnitude (Table 3.6), the Institute of Air Quality Management have published recommendations for describing the magnitude of impacts at individual receptors and describing the significance of such impacts [8].

3.5.9 A change in predicted annual mean concentrations of NO_2 or PM_{10} of less than 0.4 $\mu g/m^3$ is considered to be so small as to be imperceptible. A change (impact) that is imperceptible, given normal bounds of variation, would not be capable of having a direct effect on local air quality that could be considered to be significant.

Table 3.6: Magnitude of Changes in Air Quality Statistics

Magnitude of Change	Annual Mean Concentration for NO_2 ($\mu g/m^3$)	Annual Mean Concentration for PM_{10} ($\mu g/m^3$)	Exceedences of the 24hr mean objective for PM_{10} (days)
Large	>4	>4	> 4
Medium	2 - 4	2 - 4	2 to 4

Small	0.4 - 2	0.4 - 2	1 to 2
Imperceptible	< 0.4	< 0.4	< 1

3.5.10 All relevant receptors that have been selected to represent locations where people are likely to be present are based on impacts on human health. The air quality objective values have been set at concentrations that provide protection to all members of society, including more vulnerable groups such as the very young, elderly or unwell. As such the sensitivity of receptors was considered in the definition of the air quality objective values and therefore no additional subdivision of human health receptors on the basis of building or location type is necessary.

Table 3.7: Air Quality Impact Descriptors for Changes to Annual Mean concentrations of Nitrogen Dioxide or Particulate Matter (PM_{10}) at an Individual Receptor

Absolute Concentration in Relation to Objective/Limit Value	**Change in Concentration**		
	Small	**Medium**	**Large**
Increase with Scheme			
Above Objective/Limit Value *With* Scheme (>40 µg/m^3)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value *With* Scheme (36-40 µg/m^3)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value *With* Scheme (30-36 µg/m^3)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value *With* Scheme (<30 µg/m^3)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value *Without* Scheme (>40 µg/m^3)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value *Without* Scheme (36-40 µg/m^3)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value *Without* Scheme (30-36 µg/m^3)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value *Without* Scheme (<30 µg/m^3)	Negligible	Negligible	Slight Beneficial

3.5.11 For individual receptors that are predicted to experience a perceptible change, the effect of the change on local air quality and the risk of exceeding the air quality objective value is

summarised in Table 3.7. A small increase in annual mean concentrations, at receptors exposed to baseline concentrations that just below the objective value (36 µg/m^3 to 40 µg/m^3) is considered to have a slight adverse effect as the slight increase in the risk of exceeding the objective value is significant. However, a small increase in annual mean concentration at receptors exposed to baseline concentrations that are below or well below (< 36 µg/m^3) is not likely to directly affect the achievement of the objective value and is therefore not a significant effect (negligible).

3.5.12 The significance of all of the reported impacts is then considered for the development in overall terms. The potential for the scheme to contribute to or interfere with the successful implementation of policies and strategies for the management of local air quality are considered if relevant, but the principal focus is any change to the likelihood of future achievement of the air quality objective values set out in Table 3.7.

Assessment Criteria

3.5.13 The principle assessment criteria are the air quality Objective Values for the following pollutants:

- Annual mean nitrogen dioxide (NO_2) concentration of 40 µg/m^3
- Annual mean particulate matter (PM_{10}) concentration of 40 µg/m^3
- Annual mean fine particulate matter ($PM_{2.5}$) concentrations of 25 µg/m^3
- *24-hour mean PM_{10} concentration of 50 µg/m^3 not to be exceeded on more than* 35 days per year

3.5.14 The achievement of local authority goals for local air quality management are directly linked to the achievement of the air quality objective values described above and as such this assessment focuses on the likelihood of future achievement of the air quality objective values.

4 Baseline Conditions

4.1 Baseline Concentrations

4.1.1 The predicted annual mean concentrations of NO_2 and PM_{10} at the selected receptors close to the development site and at other existing receptors within the AQMA No.2A, in Table 4.1 for the baseline scenarios in 2009 and 2013.

Table 4.1: Air Quality Statistics Predicted for Baseline Scenarios in 2009 and 2013

Receptor	Year	Annual Mean Concentration (µg/m^3)		
		NO_2	PM_{10}	$PM_{2.5}$
R1	2009	29.9	16.2	10.8
	2013	28.9	16.1	10.7
R2	2009	32.6	16.9	11.3
	2013	31.1	16.8	11.2
R3	2009	30.8	16.6	11.1
	2013	29.7	16.5	11.0
R4	2009	29.7	16.3	10.9
	2013	28.8	16.3	10.8
R5	2009	49.1	21.0	14.3
	2013	45.5	20.4	13.6
R6	2009	58.1	24.3	16.6
	2013	54.3	23.4	15.6
R7	2009	50.1	21.6	14.7
	2013	46.5	20.9	14.0
R8	2009	30.0	16.4	11.0
	2013	29.1	16.3	10.9
R9	2009	29.8	16.4	10.9
	2013	28.9	16.3	10.8
R10	2009	27.6	15.9	10.6
	2013	27.1	15.9	10.6
R11	2009	26.4	15.7	10.5
	2013	26.2	15.7	10.4
Air Quality Objectives		**40**	**40**	**25**

4.1.2 For receptors at the development site (R8 to R11) baseline annual mean concentrations of nitrogen dioxide for years 2009 and 2013 are predicted to be below the air quality objective. Baseline annual mean concentrations of nitrogen dioxide at existing properties (R1 to R4) facing onto Dodworth Road currently (2009) meet the air quality limit value, except where traffic congestion caused by delays at junctions results in localised exceedances (R5 to R7).

4.1.3 Baselines annual mean concentrations of PM_{10} and $PM_{2.5}$ at all receptors within the study area in years 2009 and 2013 are well below the current air quality objective for annual mean PM_{10} concentration. The daily mean PM_{10} concentration at all receptors is highly unlikely to exceed the objective for annual mean concentrations of this magnitude.

5 Potential Air Quality Impacts

5.1 Construction Dust Emissions

5.1.1 The types of site activity expected to generate coarse dusts and PM_{10} include the following:

- Site clearance;
- Excavations and landscaping;
- Cutting and grinding;
- Removal of waste materials from site;
- Vehicle movements on un-surfaced ground; and
- Transfer and storage of dusty materials.

5.1.2 The construction period is anticipated to be phased over a number of years. The nature and duration of specific aspects of the construction works are not yet known, but a development of this size and duration has the potential to adversely affect amenity at existing receptors if the site is not managed to an acceptable standard.

5.1.3 The application of the standard dust control measures included in the BRE guidance[18] are normal working practice on all well managed construction sites in England. Therefore, it is assumed in this assessment that standard mitigation will be in place, based on a dust management plan agreed with the local authority air quality/pollution control officer. It is recognised, however, that even with these measures, there is still a risk of infrequent impacts arising. The role of the dust management plan is to define the actions that can reasonably be taken to mitigate impacts should they occur, as well as in defining routine controls and checks to be employed.

5.1.4 During each phase of the works, if dust generating activities are subject to standard dust suppression measures of the type normally associated with sites operating under the Considerate Contractor Scheme or similar, then the impacts on residential receptors would be small under normal atmospheric conditions, producing an effect of negligible significance. Residential properties within 50 m of the site boundary may however experience an occasional increase in local soiling rates during times when activities are carried out in extremely dry and windy weather. Any such impacts would be restricted to short-term episodes affecting a small number of properties and would be of minor significance. These impacts are most likely to take the form of increased soiling of property surfaces and are not normally associated with a general risk to health.

5.2 Operational Phase Emissions

5.2.1 The screening assessment has predicted air quality statistics for the current and future year baseline scenarios (Table 4.1) that demonstrate that the national air quality standards are achieved at all receptors within the application site, but not at all receptors within the AQMA No. 2A. The predicted pollutant concentrations (Table 5.1) for the with development scenario show that this would remain unchanged once the development is completed.

5.2.2 The additional road traffic emissions associated with the completion of the Development would increase the air quality statistics (Table 5.2) by an imperceptible amount. The largest increase in annual mean concentration of nitrogen dioxide at receptors located at receptors on Dodworth Road, would be less than 0.1 $\mu g/m^3$. The changes in annual mean concentrations of PM_{10} and $PM_{2.5}$ at all receptors are 0.1 $\mu g/m^3$ or less. No additional days exceedance of the 24 hour mean objective for PM_{10} are predicted to occur due to the completion of the scheme in 2013.

Table 5.1: Air Quality Statistics Predicted for Operational Scenario 2013

Receptor	Annual Mean Concentration ($\mu g/m^3$)		
	NO_2	PM_{10}	$PM_{2.5}$
R1	29.0	16.1	10.7
R2	31.1	16.8	11.2
R3	29.7	16.5	11.0
R4	28.8	16.3	10.8
R5	45.6	20.5	13.6
R6	54.3	23.5	15.7
R7	46.5	21.0	14.0
R8	29.1	16.3	10.9
R9	28.9	16.3	10.8
R10	27.2	15.9	10.6
R11	26.2	15.7	10.4
Air Quality Objectives	**40**	**40**	**25**

5.2.3 The volume of additional emissions of oxides of nitrogen and particulate matter associated with the operation would not be sufficiently large to have a perceptible impact on air quality at any relevant receptor in the study area. The effect of impacts of this magnitude would not be significant and the development would be neutral with respect to local air quality.

Table 5.2: Changes in Air Quality Statistics Predicted for Existing Receptors in 2013

Receptor	Annual Mean Concentration ($\mu g/m^3$)		
	NO_2	PM_{10}	$PM_{2.5}$
R1	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)
R2	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)
R3	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)
R4	<+0.1 (N)	<+0.01 (N)	<+0.1 (N)
R5	<+0.1 (N)	+0.1 (N)	<+0.1 (N)
R6	<+0.1 (N)	+0.1 (N)	<+0.1 (N)
R7	<+0.1 (N)	+0.1 (N)	<+0.1 (N)
R8	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)
R9	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)
R10	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)
R11	<+0.1 (N)	<+0.1 (N)	<+0.1 (N)

The significance of the effect at the individual receptor is described for each pollutant in parenthesis next to the magnitude of the predicted impact. Where significant effects are described as M for a major effect, Mo for a moderate effect, Mi for a minor effect and effects that are not significant are described as N for negligible.

6 Conclusions

Demolition and Construction Activities

6.1.1 With the employment of regular mitigation measures, it is considered that construction phase impacts due to the generation of airborne particulate matter (dust and PM_{10}) can be controlled to within acceptable levels.

Operational

6.1.2 The current (2009) baseline air quality at the site of the development is of a good standard as, on the basis of the available evidence, all air quality standards set for the protection of human health are achieved. Future (2013) baseline air quality in the proposed year of opening for the project is also predicted to be a good standard at this site. Local air quality does not represent a direct constraint to the redevelopment of land at this site for residential use.

6.1.3 The development would increase road vehicle movements along Dodworth Road (A628) between Junction 37 of the M1 to the west of the site and Town End roundabout to the east of the site. The associated increase in vehicle exhaust emissions would increase the magnitude of annual mean concentrations of both nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) by an imperceptible amount at all relevant receptors within Air Quality Management Area No. 2A, in the planned year of completion (2013). There would be no change in the number days on which the 24 hour mean air quality standard for PM_{10} is exceeded as a result of the operation of the development.

Assessment of Overall Significance

6.1.4 Overall the proposed development would have a neutral effect with respect to local air quality.

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