# AIR QUALITY ASSESSMENT

on behalf of

# GLADMAN DEVELOPMENTS LTD

for the site at

# NORTH ROAD, GLOSSOP

**REPORT DATE:** 13TH NOVEMBER 2013

**REPORT NUMBER:** 100663

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# Summary

This report is submitted in support of an outline planning application for a residential development off North Road, Glossop in Derbyshire. The proposed development will incorporate up to 150 residential dwellings.

This report provides a review of existing air quality in proximity to the proposed development site. The suitability of the site for residential use is considered with regard to local air quality and the potential local air quality impacts associated with traffic generated by the development are assessed at existing residential receptors.

Background pollutant concentrations ($NO_2$ and $PM_{10}$) for the baseline year (2012) and opening year of development (2018) are predicted to be below the respective air quality objectives without the development.

The impact of traffic emissions on local air quality generated by the development, once operational, has been assessed through detailed atmospheric dispersion modelling. Vehicle exhaust emissions from traffic generated by the proposed development, in 2018, are predicted to have a negligible impact on local air quality at identified sensitive receptor locations in proximity to the road network.

I see no reason why this application should not be allowed on the grounds of air quality.

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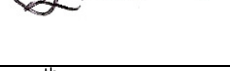
| Prepared By | Lesley Goodall | Reviewed By | Joanne Miller |
| Signed |  | Signed |  |
| Date | 26th March 2013 | Date | 4th April 2013 |

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| 1 | 4th April 2013 | Report issued to client | LG |
| 2 | 5th November 2013 | Reviewed as result of review of scheme. Minor proofing errors corrected. | LG |
| 3 | 13th November | Minor amendments | LG |
| | | | |

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# 1. Introduction

1.1 Miller Goodall Environmental Services Ltd (MGES) has undertaken an assessment of air quality for Gladman Developments Ltd in relation to the development of land off North Road, Glossop ("the site") This assessment is to accompany an outline planning application for a residential development which comprises up to 150 residential dwellings and associated landscaping and car parking. The Local Authority requested that an air quality assessment be carried out due to the scale of the development.

1.2 This report provides a review of the existing air quality in proximity to the proposed development site and the potential impact of the proposed development on local air quality, in accordance with Local Air Quality Management Technical Guidance (Defra, 2009)1. The suitability of the site for residential use is also considered.

1.3 The air quality assessment of the proposed development was undertaken with reference to information from a number of sources, as detailed in Table 1.

**Table 1: Key Information Sources Data Source Reference**

| Data Source | Reference |
|---|---|
| High Peak Borough Council (HPBC) | 2011 Air Quality Progress Report |
| Department for Environment Food and Rural Affairs (Defra) | Defra (2009) *Local Air Quality Management Technical Guidance TG(09)* |
| Environmental Protection UK (EPUK) | EPUK (2010 *Development Control: Planning for Air Quality (2010 Update)* |
| Defra's LAQM Support Tools | Local Air Quality Management 1km x 1km grid background pollutant maps |

1.4 This report is supported by a technical appendix (Appendix A), which presents further details of the methods employed within the air dispersion modelling assessment.

1.5 This report provides an update to the air quality assessment report issued in March 2013 for the same site and reflects the changes to the scheme following consultation with HPBC. In essence the scheme remains the same with the exception of alterations to the Illustrative Framework Plan which will see the PoS and Play Area to the north east of the site removed. The original report, therefore, remains valid.

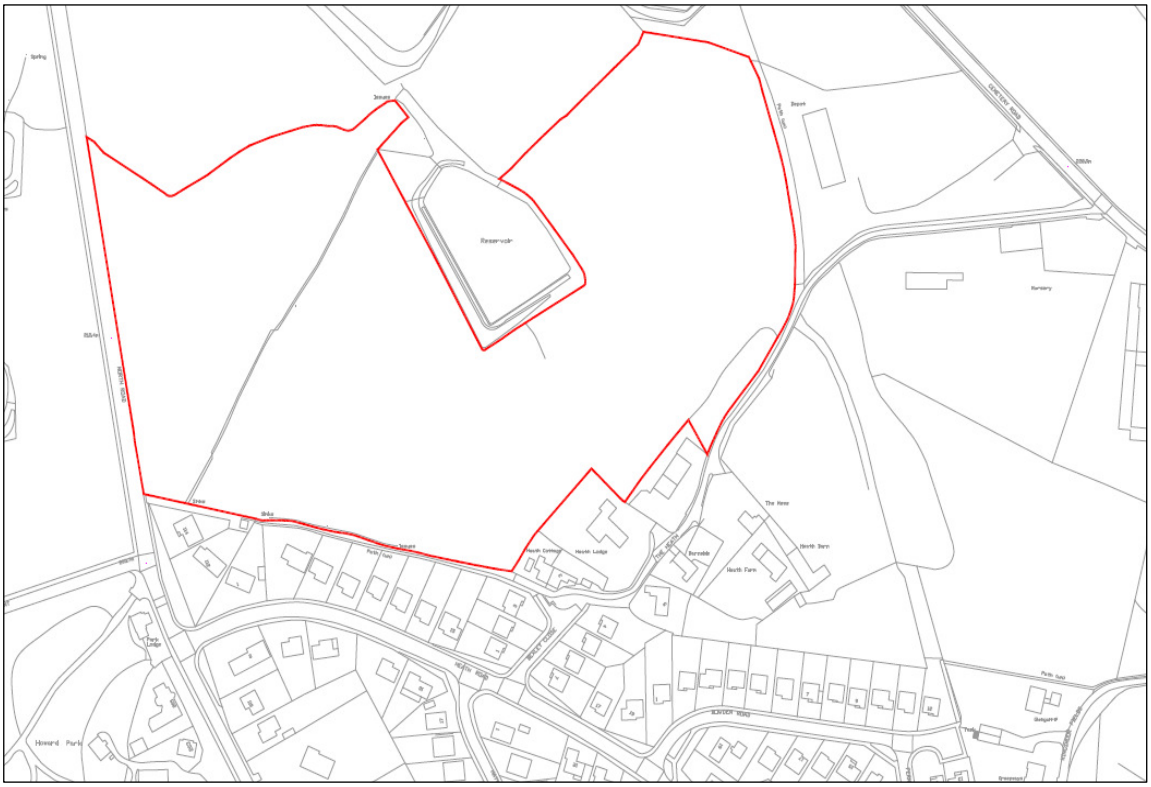
[1] Department for the Environment Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance Document LAQM.TG(09)

# 2. Site Description

2.1 The site lies within the administrative boundaries of High Peak Borough Council (HPBC) and is located to the north of the town of Glossop. The site is currently greenfield land of approximately 5.87 hectares. The western boundary of the site is marked by North Road and the area to the west of the site is predominantly agricultural land. There is residential development to the south of the site along Heath Road, Bexley Close and The Heath. To the east lies Wimberry Hill Garden Centre and Depot which is accessed off Cemetery Road. To the north of the site lies a reservoir and, beyond that, playing fields. The site location is shown outlined in red in Figure 1 below.

2.2 The proposed development consists of up to 150 dwellings with access to the site located at the site's frontage with North Road. The mix of property type has not yet been fixed and layout is reserved for consideration at a later date. The Design and Access Statement provides a Framework Plan 5376-L-03.

**Figure 1 Site Location**



2.3 This site does not lie within an Air Quality Management Area (AQMA); there are no AQMAs declared in HPBC.

# 3. Policy Context

## 3.1 The Air Quality Strategy

3.1.1 European Union (EU) legislation forms the basis for current UK air quality policy. The EU Air Quality Framework Directive 96/62/EC on Ambient Air Quality Assessment and Management came into force in September 1996[2]. This is a framework for tackling air quality through European-wide air quality limit values in a series of daughter directives, prescribing how air quality should be assessed and managed by the Member States. Directive 96/62/EC and the first three daughter objectives were combined to form the new EU Directive 2008/50/EC[3] on Ambient Air Quality and Cleaner Air for Europe, which came into force June 2008.

3.1.2 The 1995 Environment Act required the preparation of a national Air Quality Strategy (AQS) which set air quality standards and objectives for specified pollutants. The Act also outlined measures to be taken by local planning authorities (LPAs) in relation to meeting these standards and objectives (the Local Air Quality Management (LAQM) system).

3.1.3 The UK AQS was originally adopted in 1997 and has been reviewed and updated since then to take account of changing EU Legislation, technical and policy developments and the latest information on health effects of air pollution. The strategy was revised and reissued in 2000 as the AQS for England, Scotland, Wales and Northern Ireland. This was subsequently amended in 2003 and was last updated in July 2007[4]. The standards and objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations 2002; the Air Quality Standards Regulations 2010 set out the combined Daughter Directive limit values and interim targets for Member State compliance.

3.1.4 The current air quality standards and objectives are presented in Table 2. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant objectives, however, incorporate target dates and averaging periods which take into account economic considerations, practicability and technical feasibility.

[2] European Parliament (1996) *Council Directive 96/62/EC on Ambient Air Quality Assessment and Management*.

[3] European Parliament (2008) Council Directive 2008/50/EC on *Ambient Air Quality and Cleaner Air for Europe*.

[4] Department for Environment, Food and Rural Affairs (DEFRA) (2007) *'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland'*

**Table 2: Air Quality Strategy Objectives (England) for the Purposes of Local Air Quality Management**

| Pollutant | Air Quality Objective | | To be Achieved by |
|---|---|---|---|
| | Concentration | Measured As* | |
| Benzene | 5 µg/m$^{-3}$ | Annual mean | 31/12/2010 |
| 1,3 Butadiene | 2.25 µg/m$^{-3}$ | Running annual mean | 31/12/2003 |
| Carbon monoxide | 10 mg/m$^{-3}$ | Maximum daily running 8-hour mean | 31/12/2003 |
| Lead | 0.25 µg/m$^{-3}$ | Annual mean | 31/12/2008 |
| Nitrogen dioxide ($NO_2$) | 200 µg/m$^{-3}$ | 1-hour mean not to be exceeded more than 18 times per year | 31/12/2005 |
| | 40 µg/m$^{-3}$ | Annual mean | 31/12/2005 |
| Particles ($PM_{10}$) | 50 µg/m$^{-3}$ | 24-hour mean not to be exceeded more than 35 per year | 31/12/2004 |
| | 40 µg/m$^{-3}$ | Annual mean | 31/12/2004 |
| Particles (PM2.5) | 25 µg/m$^{-3}$ | Annual mean (target) | 2020 |
| | 15% cut in annual mean (urban background exposure) | | 2010-2020 |
| Sulphur Dioxide (SO2) | 350 µg/m$^{-3}$ | 1-hour mean not to be exceeded more than 24 times a year | 31/12/2004 |
| | 125 µg/m$^{-3}$ | 24-hour mean not to be exceeded more than 3 times a year | 31/12/2004 |
| | 266 µg/m$^{-3}$ | 15-minute mean not to be exceeded more than 35 times a year | 31/12/2005 |

Note: *how the objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000).

3.1.5 Where an air quality objective is unlikely to be met by the relevant deadline, local authorities must designate those areas as Air Quality Management Areas (AQMAs) and take action to work towards meeting the objectives. Following the designation of an AQMA, local authorities are required to develop an Air Quality Action Plan (AQAP) to work towards meeting the objectives and to improve air quality locally.

3.1.6 Possible exceedences of air quality objectives are generally assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective.

## 3.2 National Planning Policy Framework

3.2.1 The National Planning Policy Framework[5] (NPPF) refers to the LAQM process and recognises that: "…planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of AQMAs and the cumulative impacts on air quality from individual sites in local areas."

3.2.2 The NPPF identifies that planning departments of local planning authorities should maintain consistency within the LAQM process and states that: "…planning decisions should ensure that any new development within AQMAs are consistent with the local AQAP."

## 3.3 Local Planning Policy

3.3.1 The HPBC Saved Plan contains a number of policies which are relevant to air quality, including;

- CF.1 Waste management and recycling
- EMP.7 Industry and business in the countryside
- GD.5 Amenity
- GD.12 Unstable Land, Landfill & Contaminated Sites
- OC.1 Countryside Development
- TC.1 Town Centre Environment
- TC.3 Large Stores
- TC.4 Large Stores Which Cannot be Located in Existing Town Centres
- EMP.6 Industry & Business Within the Built-up Area Boundaries
- EMP.4 Primary Employment Zones
- EMP.5 Open Storage & Processing
- TR.1 Transport Implications of New Developments
- TR.3 Local road schemes
- TR.4 Traffic Management
- TR.7 New Railway Infrastructure

[5] Department for the Communities and Local Government (DCLG) (2012) National Planning Policy Framework

3.3.2 The policies provide a framework for assessing the impact on air quality of these types of development and the two most relevant policies are reproduced below..

## Policy 4

**GD5 - AMENITY**

Planning Permission will be granted for development provided that:

- It will not create unacceptable loss of, nor suffer from unacceptable levels of, privacy or general amenity, particularly as a result of:
- overlooking;
  - loss of daylight and sunlight;
  - overbearing effects of development;
  - air, water, noise, light and other pollution;
  - risk from hazardous substances and processes;
  - traffic safety and generation
- Where appropriate, conditions will be imposed and/or planning obligations sought, to ensure amelioration measures are taken to adequately address the impacts on amenity.

## Policy 9

**OC1 - COUNTRYSIDE DEVELOPMENT**

The Countryside will cover all land beyond the Built-Up Area Boundaries defined on the proposals map, including the Green Belt and Special Landscape Area.

Within the Countryside, Planning Permission will be granted for development which is an integral part of the rural economy and which can only be carried out in the Countryside provided that individually or cumulatively:

- the development will not detract from an area where the open character of the countryside is particularly vulnerable because of its prominence or the existence of a narrow gap between settlements; and
- the development will not generate significant numbers of people or traffic to the detriment of residential amenity, highway safety, landscape or air quality or otherwise have an unacceptable urbanising influence; and
- the development will not have a significant adverse impact on the character and distinctiveness of the countryside

Policies relating to specific categories of development acceptable in the Countryside can be found under individual topic headings elsewhere in the plan.

# 4. Methodology

## 4.1 Introduction

4.1.1 The impact of traffic related emissions in respect of the site on air quality was assessed using ADMS Roads V3.1 which uses an updated Emission Factors Toolkit (Version 5.2) incorporating updated NOx emission factor and vehicle fleet information.

4.1.2 In order to populate the model, data was collected in relation to baseline air quality conditions at the site, meterological conditions and traffic flow associated with the development. EPUK guidance[6] was used to provides criteria for magnitude of change and related significance of quantified impacts as a result of a development.

4.1.3 Consultation was undertaken with Mike Towers, Principal Environmental Health Officer at High Peak Borough Council. Mr Towers agreed the receptors and road links identified within this assessment.

## 4.2 Baseline Air Quality Conditions

4.2.1 ADMS-Roads requires the derivation of background pollutant concentration data that are factored to the year of assessment, to which the model adds contributions from the assessed roads. Both HPBC data and published DEFRA data were examined to establish baseline air quality concentrations for the base year (2012) and anticipated opening year of development (2018) at the receptor locations considered in the assessment.

4.2.2 HPBC has published a series of Review and Assessment documents in accordance with the local air quality management (LAQM) process. The Authority's latest report, the 2011 Air Quality Progress Report, was obtained and reviewed in order to establish the existing conditions at, and in proximity to, the site.

4.2.3 Existing baseline air quality conditions within the study area were also assessed using UK pollutant maps available from the Department for Environment Food and Rural Affairs (Defra) LAQM Support Tools[7].

4.2.4 Background air pollution concentrations corresponding to the 1km x 1km grid squares, covering the site and receptor locations included in the assessment were obtained from the LAQM support tools provided by Defra for use in air quality assessments. 2010 based background maps are used which update the previously published maps which were based on projections from a base year of 2008, and incorporate updates to the input data used for modelling.

[6] EPUK, (2010) *Development Control: Planning for Air Quality, 2010 Update*
[7] Defra (2012) http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

4.2.5 The revised maps:

- are based on ambient monitoring and meteorological data for 2010 whereas the previous maps were based on 2008 data and projected forwards to 2010;
- incorporate new information on the age distribution of vehicles and emissions factors for NOx for road vehicles, and include improved spatial resolution of underlying information on regional oxidant concentrations used with the 2010 maps;
- for particulate matter incorporate updated information on secondary inorganic aerosols and proportions of $PM_{2.5}$ and $PM_{10}$ based on improved understanding of ambient concentrations available from the wider network of $PM_{2.5}$ monitors within the AURN.

4.2.6 It is recognised by DEFRA that concentrations of $NO_2$ were generally elevated in 2010 compared to more recent years. Analysis across the Automatic Urban and Rural Network (AURN) suggests that NOx concentrations were, on average, approximately 15% higher in 2010 than other recent years. Corresponding $NO_2$ concentrations have been estimated to be about 10% higher in 2010. As the latest available background maps are based and validated using 2010 monitoring data, the effect of the higher concentrations in 2010 mean that projected background concentrations for NOx/$NO_2$ may be higher than expected.

4.2.7 In order to remove road traffic emissions from the background NOx concentration (to avoid double counting in the modelling process) it is not appropriate to use the associated mapped $NO_2$ concentrations. It was therefore necessary to adjust the mapped background $NO_2$ concentration. The adjustment of the mapped $NO_2$ concentrations must be proportionate to the reduction in NOx; however this is not straightforward, since the relationship between NOx and NO2 is not linear. Mapped background $NO_2$ concentrations are calculated from mapped background NOx concentrations. Therefore appropriate $NO_2$ concentrations were calculated from adjusted background NOx concentrations by using the updated Defra methodology'$NO_2$ Background Sector Tool'[8].

## 4.3 Traffic Data

4.3.1 Traffic data was provided by Croft Transport Solutions, the transportation consultants for the project. The company provided peak hour traffic data used in the Transport Assessment for the site. This data was converted to AADT flows broadly following the advice given by Defra LAQM.TG(09)1. The company also provided data regarding traffic speeds and road widths.

## 4.4 Meteorological Data

4.4.1 Hourly sequential meteorological data was obtained from the Woodford meteorological station (NGR: SJ 89805 82479) for the year 2010. This station is the closest recording station to the proposed development at approximately 19 km to the south west of the site. Data from this meteorological station was therefore considered to be representative of the study area, and was used within the ADMS-Roads dispersion modelling assessment.

[8] Defra (2012) http://laqm.defra.gov.uk/maps/maps2010.html

## 4.5 Receptors

4.5.1 Twelve potentially sensitive existing receptor locations were identified within the study area. The receptor locations were selected based on their proximity to road links affected by the proposed development, where the potential effect of development-related traffic emissions on local air pollution would be most significant.

## 4.6 Air Dispersion Model

4.6.1 The dispersion model was used to predict concentrations of $NO_x$ and $PM_{10}$ at selected receptors located adjacent to the affected road network. It was not possible to use the chemical reaction scheme within the model since there was no appropriate data with which to populate the model i.e. hourly sequential background concentrations. In this instance, therefore, the Defra tool "$NO_x$ to $NO_2$ Calculator"[9] was used to convert modelled oxides of nitrogen concentration to equivalent nitrogen dioxide concentrations.

4.6.2 The assessment considered the following scenarios:

- Base year (2012);
- Opening year (2018) without development; and
- Opening year (2018) with development.

## 4.7 Model Verification

4.7.1 Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data. In this study, model uncertainty was minimised following Defra[1] and Environmental Protection UK (EPUK) [6] guidance.

## 4.8 Assessment Significance Criteria

4.8.1 EPUK guidance[6] was used to provide criteria for magnitude of change and related significance of quantified impacts as a result of a development. Table 3 presents the magnitude of change in air pollutant concentration descriptors and Table 4 presents the significance descriptors that take account of the magnitude of changes (both positive and negative) and the concentration in relation to the air quality objectives.

**Table 3: Magnitude of Change Descriptor in Relation to Changes in Concentrations of $NO_2$ and $PM_{10}$**

| Magnitude of Change | Annual Mean $NO_2$/$PM_{10}$ | Days $PM_{10}$>50 µg/m$^3$ |
|---|---|---|
| **Large** | Increase/decrease >4 µg/m$^3$ | Increase/decrease >4 days |
| **Medium** | Increase/decrease >2-4 µg/m$^3$ | Increase/decrease 2-4 days |
| **Small** | Increase/decrease >0.4-2 µg/m$^3$ | Increase/decrease 1-2 days |
| **Imperceptible** | Increase/decrease <0.4 µg/m$^3$ | Increase/decrease >1 day |

[9] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

**Table 4 Air Quality Impacts Descriptors for Changes to Annual Mean $No_2$ and $PM_{10}$**

| Absolute Concentration in Relation to Objective/Limit Value | Change in Concentration | | |
|---|---|---|---|
| | Small | Medium | Large |
| **Increase With Scheme** | | | |
| **Above overview/Limit *With* Scheme (>40 µg/m$^3$)** | Minor Adverse | Moderate Adverse | Major Adverse |
| **Just Below Objective/Limit Value *With* Scheme (36 – 40 µg/m$^3$)** | Minor Adverse | Moderate Adverse | Major Adverse |
| **Below Objective/Limit Value *With* Scheme (30 – 36 µg/m$^3$)** | Negligible | Minor Adverse | Minor Adverse |
| **Well Below Objective/Limit Value *With* Scheme (<30 µgm$^3$)** | Negligible | Negligible | Minor Adverse |
| **Decrease *With* Scheme** | | | |
| **Above Objective/Limit Value *Without* Scheme (>40 µgm$^3$)** | Minor Beneficial | Moderate Beneficial | Major Beneficial |
| **Just Below Objective/Limit Value *Without* Scheme (36 – 40 µg/m$^3$)** | Minor Beneficial | Moderate Beneficial | Moderate Beneficial |
| **Just Below Objective/Limit Value *Without* Scheme (36 – 40 µg/m$^3$)** | Minor Beneficial | Moderate Beneficial | Moderate Beneficial |
| **Below Objective/Limit Value *Without* Scheme (30 – 36 µg/m$^3$)** | Negligible | Minor Beneficial | Minor Beneficial |
| **Well Below Objective/Limit Value *Without* Scheme <30 µg/m$^3$** | Negligible | Negligible | Minor Beneficial |

## 4.9 Construction Phase Impacts

4.9.1 The proposed development of the site has the potential to generate emissions to air, including the emission of dust and vehicle exhaust releases of $NO_2$ and $PM_{10}$, from movements of non-road mobile machinery (NRMM), during the construction process. The emission of dust and exhaust releases will be prevented or minimised as far as possible through the application of best practice operating procedures that could be conditioned through a Construction and Environmental Management Plan (CEMP). Generic mitigation measures that could be included in the CEMP are detailed in Appendix C of this report.

# 5. Description of Baseline Air Quality

## 5.1 HPBC Data

5.1.1 There is currently one automatic monitoring station within the boundaries of HPBC. The location of this unit is not representative of air quality conditions at the site or receptor locations considered in the assessment.

5.1.2 HPBC operates diffusion tubes for nitrogen dioxide at 11 locations across the local authority area. One such tube was located in North Road at SJ 403243 394543, approximately 650 m to the south of the site, until March 2012. This tube was an urban background site and this type of site is normally located at distances of more than 50 m from a busy road. Thus $NO_2$ concentrations will have been diluted to the local urban background concentration and is therefore considered representative of background concentrations in the general area to the south of the site. The results of monitoring at this site is shown in Table 5 below.

**Table 5: $NO_2$ Concentrations ($\mu g/m^3$) at North Road, Glossop SJ 403243 394543**

| Grid Reference | Pollutant | 2009 ($\mu g/m^{-3}$) | 2010 ($\mu g/m^{-3}$) |
|---|---|---|---|
| SJ 403243 394543 | $NO_2$ | 10 | 13 |

## 5.2 Background Concentrations from Defra sources

5.2.1 Background $NO_x$, $NO_2$ and $PM_{10}$ concentrations were obtained from the Defra background maps for the 1km x 1km grid squares covering the proposed development site and receptor locations for the years of assessment (2012 and 2018). The background concentrations for the assessment years are detailed in Table 6. Adjusted background concentrations of NOx and $NO_2$ with appropriate road traffic sectors removed using the Defra methodology'*NO2 Background Sector Tool*'[10] are also shown.

**Table 6: Background Pollutant Concentrations ($\mu g/m^3$) Obtained for 1 km x 1 km Grid Squares Covering the Site and Receptor Locations**

| Grid Square | Pollutant | 2012* ($\mu g/m^{-3}$) | Adjusted 2012 ($\mu g/m^{-3}$) | 2018* ($\mu g/m^{-3}$) | Adjusted 2018 ($\mu g/m^{-3}$) |
|---|---|---|---|---|---|
| 403500 394500 | $NO_x$ | 24.21 | 16.80 | 18.81 | 13.50 |
| | $NO_2$ | 16.99 | 12.27 | 13.68 | 10.10 |
| | $PM_{10}$ | 13.78 | 12.98 | 12.91 | 12.25 |

** All background concentrations obtained from the latest 2010 based background maps*

[10] Defra (2012) http://laqm.defra.gov.uk/maps/maps2010.html

5.2.2 Tables 5 and 6 indicate that all background concentrations are well below the respective annual mean air quality objectives for both $NO_2$ and $PM_{10}$ in 2012 (base year) and 2018 (opening year).

5.2.3 The background concentrations produced via Defra are slightly higher in 2012 than measured in either 2009 or 2010. This is probably due to the year of data from which the data was derived as discussed in section 4.2.5 and 4.2.6 above. In order to produce a conservative estimate of future levels the data in Table 6 were used within the model.

## 5.3 Identification of Receptor Locations

5.3.1 The receptor locations considered in the assessment are presented in Table 7 and their locations depicted in Figure 2 of Appendix B.

**Table 7: Existing Sensitive Receptor Locations**

| Receptor Number | X | Y | Modelled Height above ground level (m) |
|---|---|---|---|
| 1 | 402871 | 395814 | 1.5 |
| 2 | 403313 | 395652 | 1.5 |
| 3 | 403049 | 395620 | 1.5 |
| 4 | 403160 | 395172 | 1.5 |
| 5 | 403143 | 395131 | 1.5 |
| 6 | 403278 | 394320 | 1.5 |
| 7 | 403296 | 394343 | 1.5 |
| 8 | 403315 | 394309 | 1.5 |
| 9 | 403262 | 394251 | 1.5 |
| 10 | 403154 | 394094 | 3.0 |
| 11 | 403188 | 394094 | 3.0 |
| 12 | 403287 | 394753 | 1.5 |

## 5.4 Baseline Assessment

5.4.1 The ADMS-Roads model and the Defra $NO_x$ to $NO_2$ conversion tool was used to estimate contributions of vehicle exhaust emissions to annual and short term $NO_2$ and $PM_{10}$ concentrations for the 'baseline' and 'without development' scenarios considered in the assessment. The results of the base year (2012) and opening year (2018) 'without development' are detailed in Table 8. There are no known committed developments in the vicinity of the site.

**Table 8: Baseline Predicted Annual Mean $NO_2$ and $PM_{10}$ Concentrations (µg/m$^3$) at Identified Sensitive Receptors**

| Receptor | Base Year (2012) (µg/m$^3$) | | Opening Year (2018) 'Without Development' (µg/m$^3$) | |
|---|---|---|---|---|
| | $NO_2$ | $PM_{10}$ | $NO_2$ | $PM_{10}$ |
| 1 | 14.18 | 13.40 | 11.4 | 12.63 |
| 2 | 13.19 | 13.19 | 10.75 | 12.44 |
| 3 | 13.33 | 13.20 | 10.78 | 12.45 |
| 4 | 13.45 | 13.19 | 10.86 | 12.44 |
| 5 | 13.48 | 13.20 | 10.89 | 12.44 |
| 6 | 14.99 | 13.43 | 11.95 | 12.64 |
| 7 | 15.12 | 13.43 | 12.08 | 12.65 |
| 8 | 14.11 | 13.28 | 11.35 | 12.51 |
| 9 | 15.48 | 13.54 | 12.17 | 12.75 |
| 10 | 18.56 | 13.98 | 13.98 | 13.13 |
| 11 | 17.84 | 13.85 | 13.54 | 13.02 |
| 12 | 13.63 | 13.24 | 11.03 | 12.48 |

5.4.2 The results of the ADMS modelling assessment for both 2012 and 2018 without the development show that annual mean concentrations of $NO_2$ and $PM_{10}$ are below their respective objectives, at all receptor locations.

5.4.3 In accordance with Defra guidance[1], it may be assumed that exceedences of the 1-hour mean objective for $NO_2$ are unlikely as the predicted annual mean concentrations are less than 60 µg/m$^3$. The 24 hour $PM_{10}$ objective of 50 µg/m$^3$, is predicted to be met at all modelled locations with no predicted exceedences.

# 6. Air Quality Impact Assessment

## 6.1 Predicted impact of the development

6.1.1 Predicted annual mean $NO_2$ and $PM_{10}$ concentrations for 2018 With Development are outlined in Table 9. Predicted annual mean concentrations for 2018 Without Development and the predicted increase in $NO_2$ and $PM_{10}$ concentrations at the identified receptor locations are also given.

**Table 9: Annual Mean Dispersion Modelling Results and Impact of Development for 2018 With Development at Receptor Locations**

| Receptor | Scenario | 2018 (µg.m$^{-3}$) | |
|---|---|---|---|
| | | $NO_2$ | $PM_{10}$ |
| 1 | Without Development | | 12.63 |
| | With Development | | 12.65 |
| | *Impact* | 0.1 | 0.02 |
| 2 | Without Development | | 12.44 |
| | With Development | | 12.44 |
| | *Impact* | 0.01 | 0.00 |
| 3 | Without Development | | 12.45 |
| | With Development | | 12.46 |
| | *Impact* | 0.13 | 0.02 |
| 4 | Without Development | | 12.44 |
| | With Development | | 12.47 |
| | *Impact* | 0.24 | 0.03 |
| 5 | Without Development | | 12.44 |
| | With Development | | 12.47 |
| | *Impact* | 0.24 | 0.03 |
| 6 | Without Development | | 12.64 |
| | With Development | | 12.68 |
| | *Impact* | 0.36 | 0.04 |
| 7 | Without Development | | 12.65 |
| | With Development | | 12.69 |
| | *Impact* | 0.45 | 0.04 |
| 8 | Without Development | | 12.51 |
| | With Development | | 12.53 |
| | *Impact* | 0.17 | 0.02 |
| 9 | Without Development | | 12.75 |
| | With Development | | 12.78 |
| | *Impact* | 0.28 | 0.03 |
| 10 | Without Development | | 13.13 |
| | With Development | | 13.16 |
| | *Impact* | 0.25 | 0.03 |
| 11 | Without Development | | 13.02 |
| | With Development | | 13.04 |
| | *Impact* | 0.19 | 0.02 |
| 12 | Without Development | | 12.48 |
| | With Development | | 12.51 |
| | *Impact* | 0.23 | 0.03 |

6.1.2 The results of the air dispersion modelling indicate that annual mean concentrations of $NO_2$ and $PM_{10}$ would be well below the respective air quality objectives in 2018, both 'without' and 'with' the proposed development in place.

6.1.3 All predicted $NO_2$ concentrations are well below 60 µg/m$^3$ and therefore, in accordance with Defra guidance[1], the 1-hour mean objective is unlikely to be exceeded (see Table 1).

6.1.4 Changes in predicted pollutant concentrations between the without development scenario and the with development scenario were compared to the significance criteria detailed in EPUK guidance[7] and contained within Table 3 and Table 4. The predicted changes in pollutant concentrations are summarised in Table 10 and Table 11.

**Table 10: Magnitude and Impact of Development on Annual $NO_2$ Concentrations at Sensitive Receptor Locations**

| Receptor | Opening Year (2018) 'With Development' | |
|---|---|---|
| | Magnitude of Change | Impact Descriptors |
| 1 | **Imperceptible** | **Negligible** |
| 2 | **Imperceptible** | **Negligible** |
| 3 | **Imperceptible** | **Negligible** |
| 4 | **Imperceptible** | **Negligible** |
| 5 | **Imperceptible** | **Negligible** |
| 6 | **Imperceptible** | **Negligible** |
| 7 | **Small** | **Negligible** |
| 8 | **Imperceptible** | **Negligible** |
| 9 | **Imperceptible** | **Negligible** |
| 10 | **Imperceptible** | **Negligible** |
| 11 | **Imperceptible** | **Negligible** |
| 12 | **Imperceptible** | **Negligible** |

6.1.5 All receptors, excepte one (recpetor 7) are predicted to experience a negligible impact on annual $NO_2$ concentrations with the proposed development in place. At receptor 7 the impact on annual $NO_2$ concentrations is predicted to be small.

**Table 11: Magnitude and Impact of Development on Annual $PM_{10}$ Concentrations at Receptor Locations**

| Receptor | Opening Year (2018) 'With Development' | |
|---|---|---|
| | Magnitude of Change | Impact Descriptors |
| 1 | **Imperceptible** | **Negligible** |
| 2 | **Imperceptible** | **Negligible** |
| 3 | **Imperceptible** | **Negligible** |
| 4 | **Imperceptible** | **Negligible** |
| 5 | **Imperceptible** | **Negligible** |
| 6 | **Imperceptible** | **Negligible** |
| 7 | **Imperceptible** | **Negligible** |
| 8 | **Imperceptible** | **Negligible** |
| 9 | **Imperceptible** | **Negligible** |
| 10 | **Imperceptible** | **Negligible** |
| 11 | **Imperceptible** | **Negligible** |
| 12 | **Imperceptible** | **Negligible** |

6.1.6 All receptors are predicted to experience an imperceptible increase in annual $PM_{10}$ concentrations with the proposed development in place.

**Table 12: Dispersion Modelling Results for Opening Year (2018) 'Without' and 'With' Development Scenarios $PM_{10}$ 90.4th Percentiles**

| Receptor | Scenario | Opening Year 2018 |
|---|---|---|
| 1 | Without Development | 12.92 |
| | With Development | 12.94 |
| | *Impact* | *0.03* |
| 2 | Without Development | 12.59 |
| | With Development | 12.59 |
| | *Impact* | *0.00* |
| 3 | Without Development | 12.65 |
| | With Development | 12.69 |
| | *Impact* | *0.04* |
| 4 | Without Development | 12.59 |
| | With Development | 12.64 |
| | *Impact* | *0.05* |
| 5 | Without Development | 12.68 |
| | With Development | 12.75 |
| | *Impact* | *0.07* |
| 6 | Without Development | 12.93 |
| | With Development | 13.00 |
| | *Impact* | *0.07* |
| 7 | Without Development | 12.98 |
| | With Development | 13.06 |
| | *Impact* | *0.08* |
| 8 | Without Development | 12.73 |
| | With Development | 12.76 |
| | *Impact* | *0.03* |
| 9 | Without Development | 13.20 |
| | With Development | 13.27 |
| | *Impact* | *0.07* |
| 10 | Without Development | 13.67 |
| | With Development | 13.71 |
| | *Impact* | *0.04* |
| 11 | Without Development | 13.55 |
| | With Development | 13.58 |
| | *Impact* | *0.03* |
| 12 | Without Development | 12.68 |
| | With Development | 12.74 |
| | *Impact* | *0.05* |

AQ Objective 24-hour mean (50µg.m-3) not to be exceeded more than 35 times per year*

** Approximate equivalent percentile to 24 hour PM10 air quality objective = 90.4%*

6.1.7 No predicted exceedences of the 24 hour air quality objective for $PM_{10}$ are predicted to occur for with or without the development in 2018.

6.1.8 The results indicate that annual mean concentrations of $NO_2$ and $PM_{10}$ would be below the respective objectives in 2018, at the proposed receptor locations within the development site. All predicted $NO_2$ concentrations are also well below 60 µg/m$^3$ and therefore, in accordance with Defra guidance[1], the 1-hour mean $NO_2$ objective is unlikely to be exceeded (see Table 1). No exceedences of the 24-hour air quality objective for $PM_{10}$ are predicted to occur in 2018 at the receptor locations. The site can therefore be considered to be suitable for residential development with regard to local air quality.

# 7. Mitigation Measures

## 7.1 Construction Phase

7.1.1 The development of the site has the potential to impact on air quality during the construction phase of the development. This will be a short term issue which can be mitigated to a great extent by careful site management. The recommendations in Appendix C should be detailed in a Construction and Environmental Management Plan (CEMP) to prevent or minimise the release of dust entering the atmosphere and/or being deposited on nearby receptors during the construction phase of the development. Particular attention should be paid to operations which must unavoidably take place close to the site boundary.

## 7.2 Vehicle Exhaust Emissions

7.2.1 The detailed air dispersion modelling undertaken indicates that development-generated vehicle exhaust emissions are predicted to have a negligible impact on local air quality at receptor locations. Pollutant concentrations at receptor locations are also predicted to be below the respective air quality objectives for all scenarios assessed.

7.2.2 The dispersion modelling assessment was based on measured traffic data provided by the transportation consultants for the project. Background maps for 2010 and meteorological data for 2010 were used in the assessment. As such, the assessment of air quality effects was conservative in respect of generated local traffic emissions, and no specific mitigation is therefore proposed.

# 8. Summary of Impacts and Conclusion

8.1 This assessment has considered the potential for the proposed development to impact on local air quality at existing receptor locations.

8.2 The impacts of the increase in road traffic as a result of the proposed development were calculated using the atmospheric dispersion model ADMS-Roads. The change in ambient annual mean concentrations of $NO_2$ was predicted to be, at worst, +0.45 µg/m$^3$, and changes in ambient concentrations of annual mean $PM_{10}$ concentrations were predicted to be, at worst, +0.04 µg/m$^3$, with all predicted concentrations below the relevant air quality objectives. In accordance with EPUK

guidance on air quality significance criteria, the local air quality impact of emissions from traffic generated by the proposed development is predicted to be negligible.

8.3 I see no reason why this application should not be allowed on the grounds of air quality.

# APPENDICES

## APPENDIX A: Air Dispersion Modelling Technical Appendix

## APPENDIX B:

Figure B1 – Existing Sensitive Receptor Location Plan

## APPENDIX C: Construction Dust – General Mitigation Measures

## APPENDIX D: Glossary of Terms

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# APPENDIX A: Air Dispersion Modelling Technical Appendix

**Air Dispersion Model**

The effect on local air quality of emissions from changes to traffic movements as a result of the operation of the proposed development was assessed using an advanced atmospheric dispersion model, ADMS-Roads v3.1.4. The ADMS-Roads model is a tool for investigating air pollution in relation to road networks. The model uses algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions. It can predict long-term and short-term concentrations, as well as calculations of percentile concentrations.

The ADMS-Roads model has been validated in a number of studies by the software manufacturer CERC (Cambridge Environmental Research Consultants). This includes comparisons with data from the UK's Automatic Urban Network (AUN) and specific validation exercises using standard field, laboratory and numerical data sets. CERC is also involved in European programmes on model harmonisation, and their models have been compared favourably against other EU and US EPA systems. Further information in relation to this is available from the CERC web site at www.cerc.co.uk.

**Air Dispersion Modelling Process**

The procedures involved in undertaking the atmospheric dispersion modelling were as follows:

- Collation of input data – traffic data (flows, speeds, percentage HGVs), road network mapping, background pollutant concentrations and meteorological data;
- Input of data in to the ADMS-Roads model for the scenarios to be modelled (base year of 2012 and opening year of 2018 'without' and 'with' proposed development);
- Running the model for 2012 and 2018 'without' and 'with' the proposed development in place;
- Comparison of predicted $NO_2$ and $PM_{10}$ concentrations with the relevant air quality objectives; and
- Comparison of changes in pollutant concentrations between 'without' and 'with' development scenarios to relevant significance criteria to determine the impact of the proposed development on air quality at receptor locations.

**Traffic Flow Data**

Traffic flow data comprising annual average daily traffic (AADT) flows, traffic composition (percentage HGVs) and link speeds (kph) to account for the presence of traffic signals / junctions / roundabouts were used in the modelling as provided for the surrounding road network.

Traffic flow data and assumptions were provided by Croft Transport Solutions, the transportation consultants for the project. Data were provided for the base year (2012) and opening year (2018) *'without'* and *'with'* the proposed development. The spatial scope for the assessment focussed on those routes affected by the proposed development is shown in Figure 2 of Appendix B.

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# APPENDIX B: Figures

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**Figures B1a and B1b – Assessment Routes and Receptor Location Plans**

**Figure B1a - Receptors and routes to the north of the site**

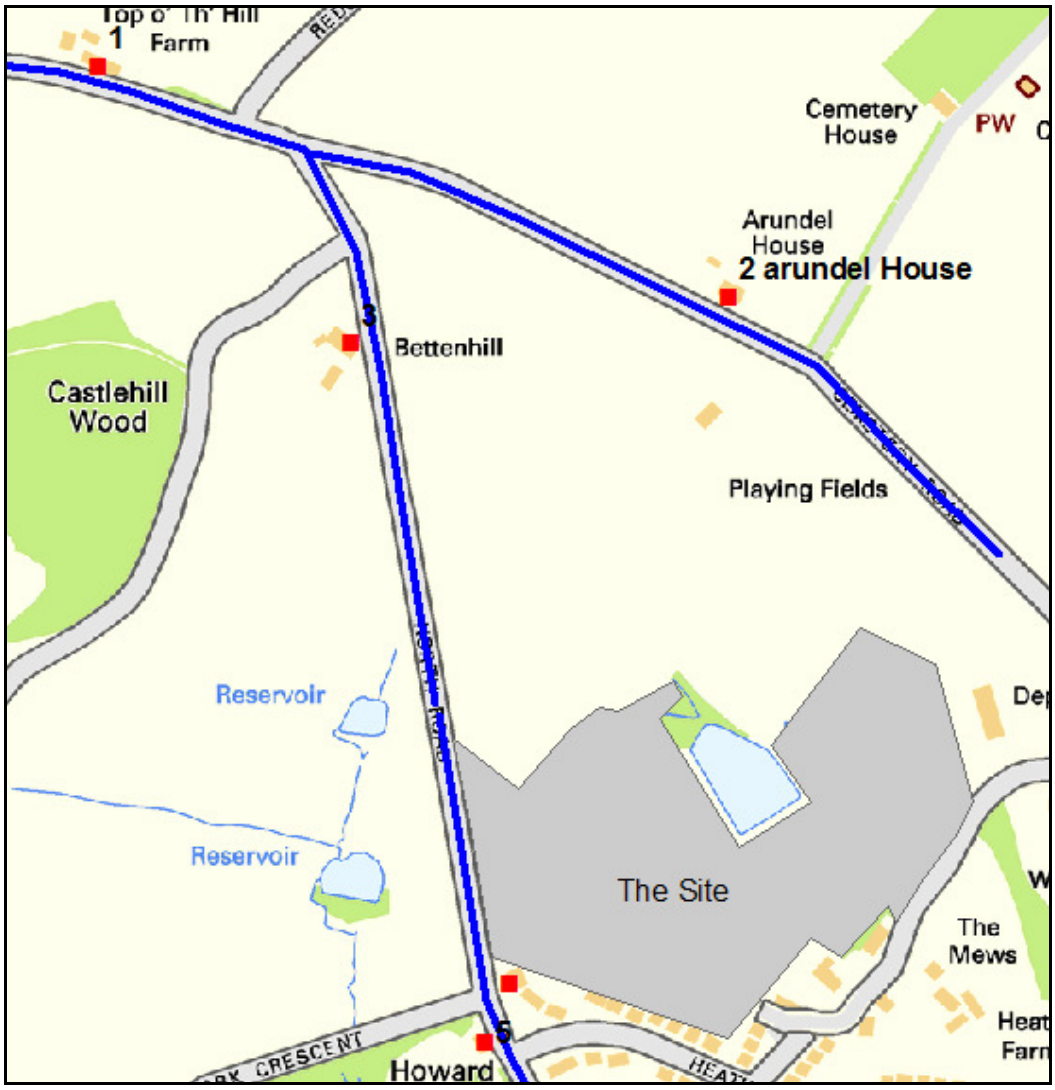

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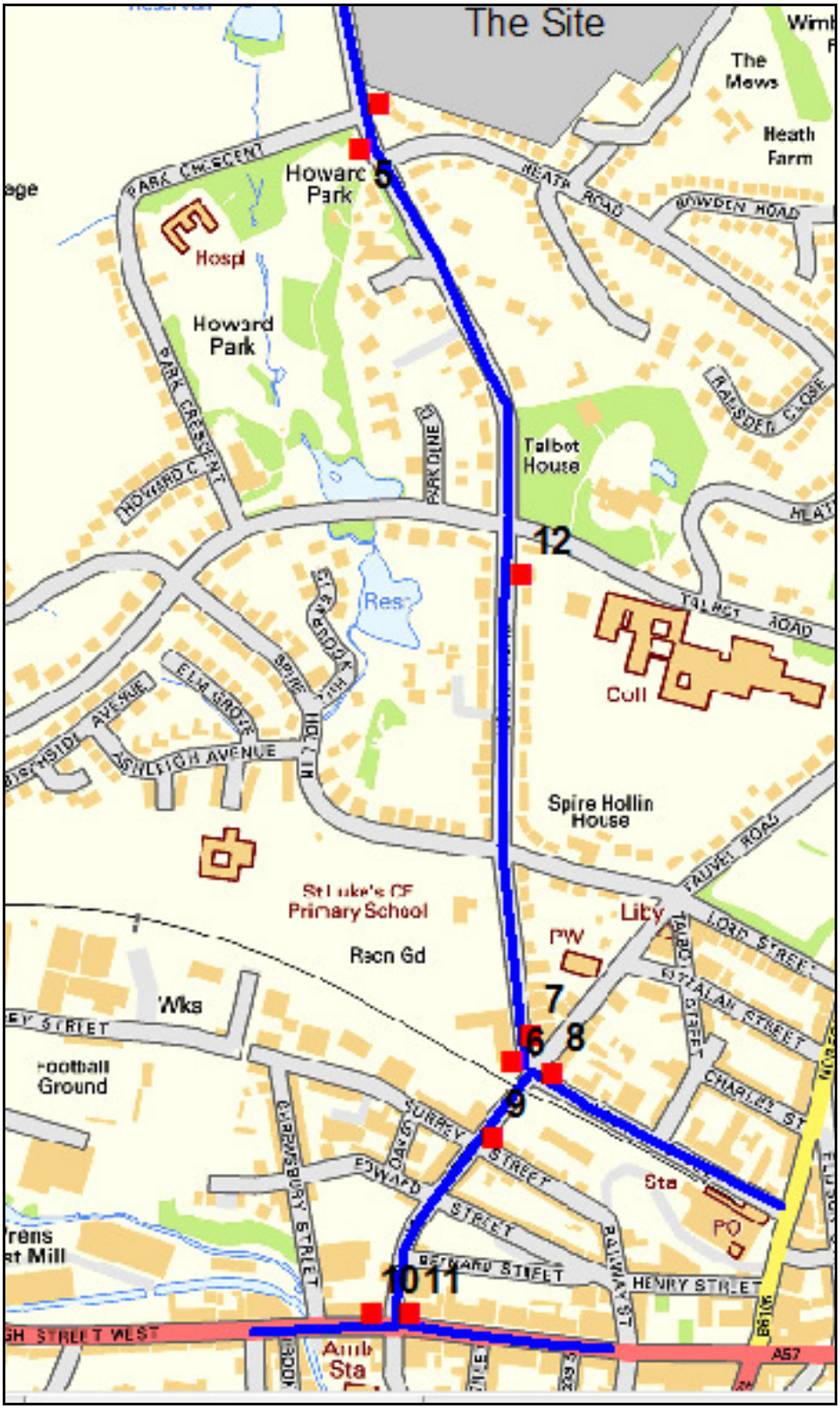
**Figure B1b - Receptors and routes to the south of the site**



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# APPENDIX C: Construction Dust – General Mitigation Measures

**General Mitigation Measures**

- Implement a stakeholders communications plan that includes community engagement before and during work on site;
- Implement a Dust Management Plan, approved by the local planning authority;
- 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;
- Display the head or regional office contact information;
- 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 log available to the local authority when asked;
- Record any exceptional incidents that cause dust and / or air emissions, either onsite or offsite, and the action taken to resolve the situation should be recorded in the log book;
- Plan the site layout so that machinery and dust causing activities are located away from receptors, as far as is possible; use intelligent screening where possible;
- Undertake daily onsite and offsite inspection, where receptors (including roads) are nearby, to monitor compliance with the Dust Management Plan, record inspection results and make the log available to the local authority when asked; and
- Avoid bonfires and burning of waste materials.

**Earthworks and Construction**

- Damping down all dusty activities and surfaces, especially during dry, windy weather;
- Temporary covering of earthworks, or if possible secure covering during dry, windy weather;
- Re-vegetation of earthworks and other exposed areas to stabilise surfaces;
- Reuse hard core material where possible;
- Implementation of hessian, mulches or tackifiers where it is not possible to revegetate or cover with topsoil;
- Erection of appropriate hoarding and / or fencing, particularly adjacent to the site boundaries, to reduce dust dispersion and restrict public access;
- Sheeting of buildings, chutes, skips and vehicles removing wastes;
- Appropriate handling and storage of materials;
- Prevention of dust contaminated runoff water from the site;
- Use of gas powered generators rather than diesel if possible;
- Ensuring that all plant and vehicles are well maintained so that exhaust emissions do not breach statutory emission limits;
- Use of dust extraction techniques where available;
- Minimisation of drop heights to control the fall of materials;
- Fitting all equipment (e.g. for cutting, grinding, crushing) with dust control and / or water suppressant measures such as water sprays wherever possible;
- Use of a wheel wash, limiting of vehicle speeds onsite, avoidance of unnecessary idling of engines and routing of site traffic as far from residential and commercial properties as possible;
- Avoid dry sweeping of large areas;

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Use of a road sweeper to clean mud and other deposited particulates from hardstanding roads and footpaths; and
- Use of hard surface haul routes where possible.

The effective implementation of the CEMP will ensure that any potential dust releases or vehicle exhaust emissions associated with the construction phase will be negligible.

**Non Road Mobile Machinery**

Non Road Mobile Machinery (NRMM)[11] and plant will be well maintained. If any emissions of dark smoke occur then the relevant machinery will stop immediately and any problem rectified. In addition, the following controls will apply to NRMM:

- All NRMM should use fuel equivalent to ultra-low sulphur diesel (fuel meeting the specification within EN590:2004);
- All NRMM should comply with either the current or previous EU Directive Staged Emission Standards (97/68/EC, 2002/88/EC, 2004/26/EC). As new emission standards are introduced the acceptable standards will be updated to the previous and most current standard;
- All NRMM should be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- The ongoing conformity of plant retrofitted with DPF, to a defined performance standard, shall be ensured through a programme of on-site checks; and
- Implementation of energy conservation measures including instructions to throttle down or switch off idle construction equipment; switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded, ensure equipment is properly maintained to ensure efficient energy consumption.

Successful implementation of the above mitigation measures would ensure that emissions from the construction phase and NRMM used during construction are not significant.

Such measures are routinely and successfully applied to construction projects throughout the UK. They are capable of significantly reducing the potential for adverse nuisance dust effects associated with the various stages of construction work.

[11] Non-Road Mobile Machinery is mobile machinery, transportable industrial equipment or vehicle fitted with an internal combustion engine not intended for passenger or goods transport by road. Explanatory Memorandum to the UK Non Road Mobile Machinery (Emissions of Gaseous & Particulate Pollutants) (Amendment) Regulations (2006)

# APPENDIX D: Glossary of Terms

**AADT** Annual Average Daily Traffic flow

**Air Quality Standard** Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health and the environment

**Air Quality Objective** Pollutant Objectives incorporate future dates by which a standard is to be achieved, taking into account economic considerations, practicability and technical feasibility

**Annual Mean** A mean pollutant concentration value in air which is calculated on a yearly basis, yielding one annual mean per calendar year. In the UK air quality regulations, the annual mean for a particular substance at a particular location for a particular calendar year is:

(a) in the case of lead, the mean of the daily levels for that year;
(b) in the case of nitrogen dioxide, the mean of the hourly means for that year;
(c) in the case of PM10, the mean of the 24-hour means for that year.

**AQAP** Air Quality Action Plan

**AQEG** Air Quality Expert Group

**AQMA** Air Quality Management Area

**AQMP** Air Quality Management Plan

**AQO** Air Quality Objective

**AQS** Air Quality Strategy for England, Scotland, Wales and Northern Ireland

**Background Concentrations** The term used to describe pollutant concentrations which exist in the ambient atmosphere, excluding local pollution sources such as roads and stacks

**CO** Carbon monoxide

**Defra** Department for Environment, Food and Rural Affairs

**DMRB** Design Manual for Roads and Bridges

**EPAQS** Expert Panel on Air Quality Standards

**EPUK** Environmental Protection UK

**HGV** Heavy Goods Vehicle

**IAQM** Institute of Air Quality Management

**LAQM** Local Air Quality Management

**LDF** Local Development Framework

**LGV** Light Goods Vehicle

**µg.m$^{-3}$** Microgrammes (of pollutant) per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1 µg.m-3 means that one cubic metre of air contains one microgramme (millionth of a gramme) of pollutant

**$NO_2$** Nitrogen Dioxide

**NOx** A collective term used to represent the mixture of nitrogen oxides in the atmosphere, as nitric oxide (NO) and nitrogen dioxide ($NO_2$)

**NPPF** National Planning Policy Framework

**PM2.5** The fraction of particles with a mean aerodynamic diameter equal to, or less than, 2.5 µm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of PM2.5, EN 14907, with a 50% efficiency cut-off at 2.5µm aerodynamic diameter

**PM10** The fraction of particles with a mean aerodynamic diameter equal to, or less than, 10 µm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of PM10, EN 12341, with a 50% efficiency cut-off at 10 µm aerodynamic diameter

**RSS** Regional Spatial Strategy

**Running Annual Mean** A mean pollutant concentration value in air which is calculated on an hourly basis, yielding one running annual mean per hour. The running annual mean for a particular substance at a particular location for a particular hour is the mean of the hourly levels for that substance at that location for that hour and the preceding 8759 hours