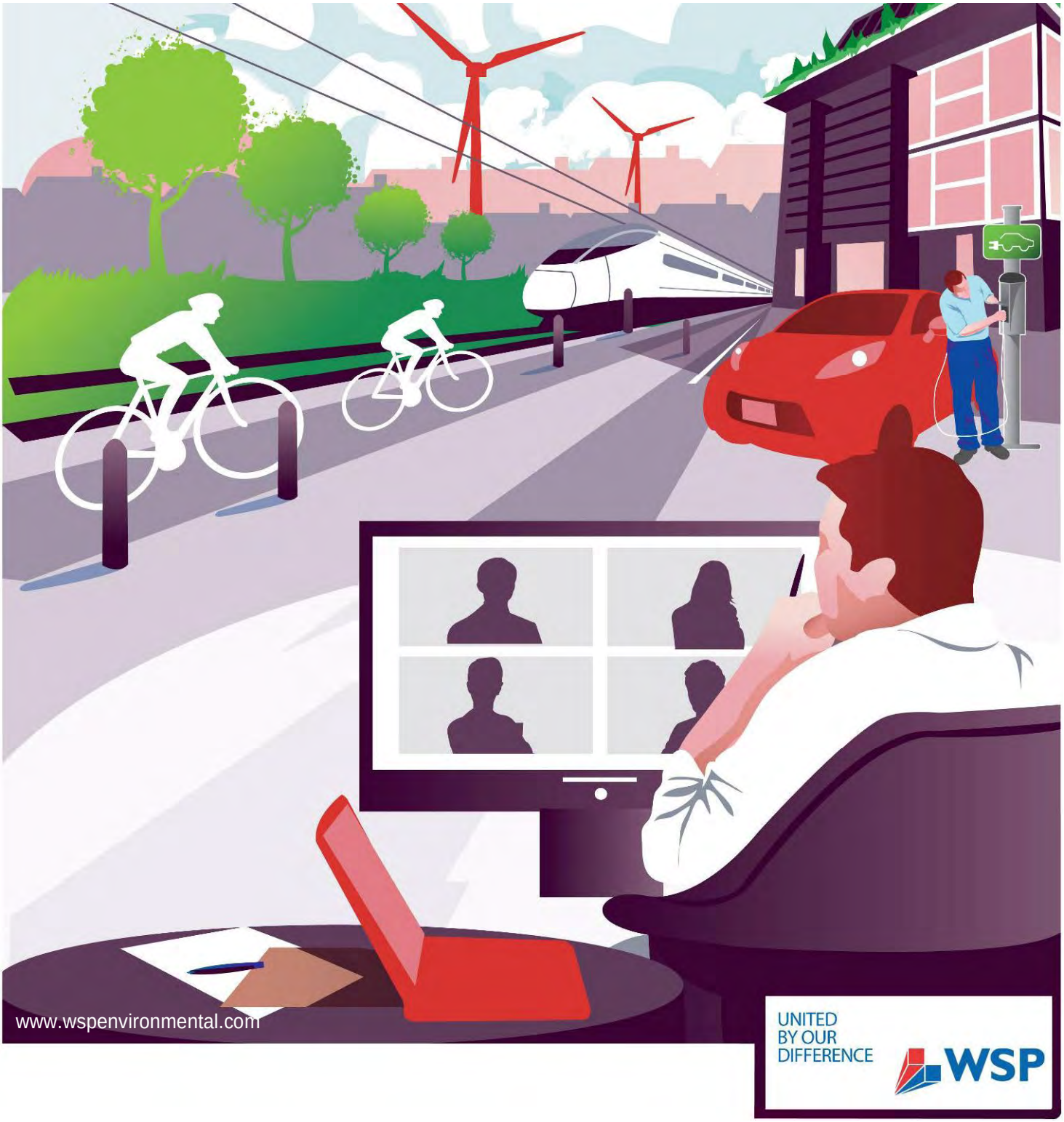

Former Fole Dairy, Fole, Uttoxeter - Air Quality & Odour Assessment Report

The Co-Operative Group

February 2012

QUALITY MANAGEMENT

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

1.1.1 WSP Environmental Ltd (WSPE) has been commissioned to carry out an assessment of the potential air quality impacts arising from the proposed redevelopment of Fole Dairy. It is proposed to develop the site for residential use to accommodate approximately 60 residential two to four bedroom properties, approximately 300m^2 of new workshop space and conversion of the existing mill building to approximately 300m^2 of employment space. The site is located adjacent to a busy local road and approximately 850m to the east of the Checkley Waste Water Treatment Works (WWTW). Due to the size of the proposed development it is considered unlikely that its operation would result in significant emissions to air, however due to the location of the Site adjacent to a busy road and near to a WWTW, the exposure of future occupants to air pollutant concentrations in excess of the UK Air Quality Strategy objective levels and/or odour arising from the WWTW will be investigated in this report.

1.1.2 This report presents the findings of an assessment of the potential impacts arising from the construction phase of the redevelopment, and the potential exposure of future residents to local air pollution. No consideration of the impact of the operation of the proposed redevelopment on local air quality has been included as it is considered that a development of this size is unlikely to generate sufficient traffic flows to significantly impact on the local air quality.

1.1.3 A glossary of terms used is provided in **Appendix A**.

2 RELEVANT LEGISLATION AND GUIDANCE

2.1 AIR QUALITY STRATEGY FOR ENGLAND, SCOTLAND, WALES & NORTHERN IRELAND

2.1.1 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007[1]. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

2.1.2 The AQS sets standards and objectives for nine main air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs).

2.1.3 The air quality standards are concentration limits which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). Above these limits sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

2.1.4 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedences of the standard over a given period.

2.1.5 For some pollutants, (e.g. NO_2), there is both a long-term (annual mean) standard and a short-term standard. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.

2.1.6 The AQS contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health affects than PM_{10}. For $PM_{2.5}$ the objectives will take the form of a limit value ('backstop objective') and an 'exposure reduction' target. Although a target for $PM_{2.5}$ is included in the AQS, these objectives have not yet been incorporated into the Regulations. Consequently there is currently no requirement for local authorities to assess this pollutant as part of their statutory obligations.

2.1.7 Of the pollutants included in the AQS, NO_2 and PM_{10} will be particularly relevant to this assessment as road traffic is a major source and concentrations of these pollutants tend to be close to air quality objectives. Local authorities undertaking review and assessments of air quality are finding that, where road traffic is the dominant source of air pollution, the objectives for these pollutants are likely to be the most difficult to achieve. It is also generally considered that, where concentrations of NO_2 and PM_{10} meet their respective objectives, and there are no other local sources of air pollution, such as from industrial processes, objectives for the other pollutants included in the regulations will also be achieved.

2.2 AIR QUALITY (ENGLAND) REGULATIONS

2.2.1 Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000[2] and the Air Quality (England) (Amendment) Regulations 2002[3] for the purpose of Local Air Quality Management (LAQM). The standards and objectives for each pollutant in the AQS and the Regulations are given in **Appendix B**.

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) – July 2007.

[2] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

[3] The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

2.3 THE ENVIRONMENTAL PROTECTION ACT 1990 - CONTROL OF DUST AND ODOUR ASSOCIATED WITH CONSTRUCTION

2.3.1 Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and odour:

- 'Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance', and
- 'any accumulation or deposit which is prejudicial to health or a nuisance'.

2.3.2 Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.3.3 There are no statutory limit values for dust deposition and odour above which 'nuisance' is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

2.4 ENVIRONMENT AGENCY HORIZONTAL GUIDANCE NOTE H4[4]

2.4.1 The horizontal guidance note H4 produced by the Environment Agency provides guidance and advice to operators on controlling and monitoring odour from their operations.

2.4.2 Currently, in the UK there are no statutory standards for assessing odour nuisance. Even outside the UK, few standards exist owing to the difficulty in defining odour nuisance and problems associated with the measurement of odour and assessing compliance with any odour nuisance standards that may be applied.

2.4.3 An odour concentration that has been used previously in the UK to assess nuisance is 5 Odour Units (OU) per m^3 as the 98th percentile of hourly average concentrations, as used by Northumbrian Water Limited at Public Inquiry[5] (*i.e.* the concentration should not exceed 5 OU/m^3 for more than 2% of the time, or 175 hours per year). It is not possible to monitor odours continually over extended time periods and, therefore, it is impossible to determine compliance with this odour nuisance standard using monitoring techniques. The standard may, however, be used to assess the effectiveness of various emission controls using dispersion models to predict ground level concentrations.

2.4.4 The odour nuisance standard of 5 OU/m^3 as the 98th percentile of hourly mean concentrations can be used to determine the locations where odour annoyance is *likely* to occur for the normal population. An additional standard that has been widely used is 3 OU/m^3 as the 98th percentile of hourly mean concentrations to represent the concentration that *may* result in odour annoyance depending upon the tolerance of the local community.

2.4.5 However, the assessment criterion selected for use in this study is 1.5OU_E/m^3 as the 98th percentile of hourly mean concentrations. This criterion has been taken from Appendix 6 of draft guidance published by the Environment Agency (EA) in 2002[6] to provide advice regarding the assessment and control of odours. This guidance was revised in 2009 but the revised guidance does not contain criterion for odour exposure and offensiveness.

2.4.6 The criterion of 1.5OU_E/m^3 as the 98th percentile of hourly mean concentrations is generally applied in the assessment of odour from WWTWs, particularly when there are sensitive receptors located close to a Works, where there may be greater uncertainty in dispersion modelling predictions. This criterion also assumes there is a high potential for annoyance due to odorous emissions from the WWTW.

2.4.7 The use of the 98th percentile is common practice in the assessment of impacts from odorous sources allows for unusual conditions, which may give rise to odour concentrations above the chosen assessment criteria, to occur within 2% of the time in a given year.

[4] Horizontal Guidance Note H4 Odour Management. How to comply with your environmental permit. (April 2011)

[5] Appeal Against Refusal of Outline Planning Permission for Sewage Treatment Works, Land at Spital Burn, Newbiggin-by-the-Sea, Proof of Evidence of C R Clarkson (March 1993).

[6] Environment Agency, Integrated Pollution Prevention and Control (IPPC) Draft Horizontal Guidance for Odour, Part 1 – Regulation and Permitting. Technical Guidance Note: IPPC H4. Consultation Draft (October 2002).

Code of Practice on Odour Nuisance from Sewage Treatment Works

2.4.8 DEFRA's Code of Practice on Odour Nuisance from Sewage Treatment Works[7] focuses on odour nuisance and applies to WWTW and/or plant operations at WWTW that are not currently subject to environmental regulation under other specific legislation relevant to odour.

2.4.9 It has been written to assist both Environmental Health Practitioners and operators with the control of odorous emissions from WWTW. Section 3.3 of this document provides a summary of the planning controls that apply for new development proposed in the vicinity of WWTW and states that before permitting development Planning Authorities should consider the WWTW operational and complaints history, and consult with the WWTW operator.

2.4.10 The Code also outlines a number of odour control measures that operators of sewage treatment works should implement, these include; good housekeeping, avoiding anaerobic conditions (other than in processes that are specifically anaerobic), minimising septicity and the use of Odour Management Plans.

2.5 LOCAL AIR QUALITY MANAGEMENT (LAQM)

2.5.1 Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives by the years defined in the Regulations. Where the objectives of the Air Quality Regulations are not likely to be achieved by the objective year, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

2.5.2 The Department for Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their review and assessment work[8]. This guidance, referred to in this report as LAQM.TG(09), has been used where appropriate in the assessment presented herein.

Staffordshire Moorlands District Council review and assessment of air quality

2.5.3 Staffordshire Moorlands District Council (SMDC) has not declared any AQMAs within their administrative area as part of their review and assessment work.

2.6 NATIONAL PLANNING POLICY

Planning Policy Statement 23 (PPS23): Planning and Pollution Control

2.6.1 Policy guidance for local planning authorities (in England only) regarding local air quality and new development is provided in PPS23[9]. PPS23 advises on the policies and practices that should be taken into account by those involved in the planning of any development that has the potential to cause pollution.

2.6.2 With regard to emissions to air, and specifically local air quality management, Appendix 1G of Annex 1 in PPS23 states that 'any air quality consideration that relates to land use and its development is capable of being a material planning consideration'. This is most likely to be the case in situations where the proposed development could produce an exceedence of the AQS objectives and result in an AQMA designation, or where development is proposed in an AQMA, or where a proposed development renders a Local Authority's AQAP unworkable. PPS23 also re-iterates that the presence of an AQMA should not result in the sterilisation of a site from development.

Draft National Planning Policy Framework

2.6.3 The draft National Planning Policy Framework (NPPF)[10] is the first draft of new national planning policy. It seeks to combine all the PPSs, PPGs and Guidance notes into a single document. It promotes sustainable development and opportunities for local communities to engage in plan making at a neighbourhood level. The core underpinning principle of the new framework is the presumption in favour of sustainable development, defined as:

[7] DEFRA, Code of Practice on Odour Nuisance from Sewage Treatment Works (2006)

[8] Department for Environment, Food and Rural Affairs (DEFRA): *Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(09)* (Feb 2009).

[9] Communities and Local Government: *Planning Policy Statement 23: Planning and Pollution Control* (Oct 2004)

[10] Communities and Local Government: *Draft National Planning Policy Framework* (July 2011)

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

2.6.4 The document is broken down into sections covering the previous PPSs and PPGs and will, when adopted, supersede them. In relation to air quality, the document states that: *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."*

2.7 LOCAL PLANNING POLICY

2.7.1 There are no local policies relating to air quality considerations within the local planning documents.

3 SCOPE AND METHODOLOGY

3.1 SCOPE

3.1.1 The scope of the assessment has been determined in the following way:

- consultation with the Environmental Health Department of SMDC to discuss the availability of monitoring data, the assessment methodology to be applied and obtain a copy of their latest review and assessment report and any complaints data regarding odour arising from the nearby WWTW;
- review of air quality data for the area surrounding the site, including data from DEFRA[11] and the Environment Agency's websites (EA)[12];
- review of the traffic flow data obtained from the DfT website, which has been used as an input to the air quality assessment; and
- completion of three 'sniff test' assessments of odour arising from the nearby WWTW.

3.2 METHODOLOGY

Construction phase

3.2.1 During the construction phase, activities undertaken on the application site may cause dust and particulate matter to be emitted to the atmosphere.

3.2.2 Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause 'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

3.2.3 The smaller particles of dust (typically less than 10µm in aerodynamic diameter) are known as particulate matter (PM_{10}) and represent only a small proportion of total dust released. As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area. PM_{10} is small enough to be drawn into the lungs during breathing, which in sensitive members of the public could cause an adverse reaction. As a result of this potential impact on health, standards and objectives for PM_{10} are defined in the AQS and Regulations.

3.2.4 A qualitative assessment of the potential impacts due to the generation and dispersion of dust and PM_{10} during the construction phase has been undertaken using information in guidance documents produced by the following organisations:

- Building Research Establishment (BRE)[13];
- Quality of Urban Air Review Group (QUARG)[14]; and
- Department of the Environment (DoE)[15].

[11] http://laqm1.defra.gov.uk/review/tools/background.php

[12] http://www.environment-agency.gov.uk

[13] Kukadia, V., Upton, S. L. and Hall, D. J.; *Control of dust from Construction and Demolition Activities.* BRE (Feb 2003).

[14] Quality of Urban Air Review Group: *Airborne Particulate Matter in the United Kingdom – Third Report of the Quality of Urban Air Review Group.* Prepared for the Department of the Environment (May 1996).

[15] Arup Environmental and Ove Arup and Partners: *The Environmental Effects of dust from Surface Mineral Workings Volume 2.* Prepared for Department of the Environment Minerals Division (Dec 1995).

3.2.5 As there are no formal assessment criteria for dust and PM_{10} generation and dispersion during construction, the significance of impacts associated with this phase of the proposed redevelopment has been determined qualitatively by:

- identifying the construction activities associated with the proposed redevelopment that could generate dust and PM_{10} and their likely duration;
- identifying sensitive receptors (e.g. schools, residential properties) within 200m of the construction site boundary; and
- the prevailing wind direction.

3.2.6 Exhaust emissions from construction vehicles will have an impact on local air quality both on-site and adjacent to the routes used by these vehicles to access the site. As information on the number of vehicles associated with the construction phase is not available, a qualitative assessment of their impact on local air quality has been undertaken by considering:

- the level of construction traffic likely to be generated by this phase of the redevelopment;
- the number and distance of sensitive receptors in the vicinity of the site and along the likely routes to be used by construction vehicles; and
- the likely duration of the construction phase and the nature of the construction activities undertaken.

Operational phase

Exposure of future residents to air pollution

3.2.7 The proposed redevelopment will not generate any net increase in traffic once operational. Therefore the assessment of the operational phase will only focus on the exposure of the future residents of the redevelopment to air pollution concentrations that may exceed the AQS objectives. The key pollutant source in the vicinity of the site is the adjacent road (A522). The main pollutants of concern for road traffic are generally considered to be NO_2, PM_{10}, CO and C_6H_6. Of these pollutants, emissions of NO_2 and PM_{10} are most likely to result in exceedences of the relevant air quality standards or objectives. This air quality assessment will therefore only consider these two pollutants.

3.2.8 For the prediction of pollution concentrations at the Site, the Design Manual for Roads and Bridges (DMRB) version 1.03[16]air pollutant screening model has been used. This screening model uses detailed information regarding traffic flows on the local road network and separation distances to predict pollution concentrations at specific locations selected by the user.

3.2.9 For the assessment, three scenarios were modelled. These scenarios are as follows:

- 2010 “model verification”;
- 2011 “baseline”; and
- 2013 “opening year”.

3.2.10 2013 is the proposed opening year of the development. 2011 is the current baseline year. 2010 is the year in which traffic data and monitoring data were both available to complete the model verification.

3.2.1 A summary of the traffic data used in the assessment can be found in **Appendix C**. It includes details of Annual Average Daily Traffic flows (AADTs), average vehicle speeds and the percentage of Heavy Goods Vehicles (HGVs) for the local road network in all assessment years considered.

3.2.2 Recent observations in urban locations across the UK have found that there is little evidence to support the downward trend in NO_2 that is suggested by current emission factors provided on the DEFRA website. Therefore to ensure a worst case approach, emission factors were maintained at 2010 levels throughout the assessment. This approach was agreed in consultation with the Environmental Health Officer of SMDC.

3.2.3 Predicted annual mean oxides of nitrogen (NO_x) concentrations were converted to annual mean NO_2 concentrations using the methodology given in LAQM.TG(09) and the NO_x:NO_2 calculator available from DEFRA’s

[16] Design Manual for Roads and Bridges Screening Method, Version 1.03 (July 2007)

website. The calculator provides a method of calculating NO_2 from NO_x wherever NO_x emissions from road traffic are predicted using dispersion modelling.

3.2.4 For PM_{10}, the modelled annual mean concentrations were used to calculate the number of exceedences of the 24-hour mean objective for direct comparison with the relevant AQS objective, following the methodology given in LAQM.TG(09).

3.2.5 LAQM.TG(09) does not provide a method for the conversion of annual mean NO_2 concentrations to 1 hour mean NO_2 concentrations. However, research carried out in 2003[17], determined that exceedences of the 1 hour mean objective were unlikely to occur where annual mean concentrations were below 60µg/m^3. Further research carried out in 2008[18] generally supported this relationship and as a result this criterion has been adopted for the purposes of local air quality review and assessment.

3.2.6 Comparison of the predicted pollutant concentrations within the site arising from road traffic emissions from the adjacent road (A522) have been completed against the current statutory standards and objectives for NO_2 and PM_{10} set out in **Appendix B**.

Model verification

3.2.7 The DMRB screening model has been widely validated for this type of assessment and is considered to be fit for purpose.

3.2.8 Model validation undertaken by the software developer will not have included validation in the vicinity of the development considered in this assessment. To determine the performance of the model at a local level it is therefore advisable to perform a comparison of modelled results with local monitoring data at one or more relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

3.2.9 Suitable local monitoring data for the purpose of model verification is available for concentrations of NO_2 at the locations shown in **Table 1**.

Table 1 Local monitoring data sources suitable for model verification

Location & Site Classification	O.S. Grid Reference	Distance to Site	2010 Monitored NO_2 Concentrations (µg/m^3)
Cheadle (14) (Roadside Diffusion Tube)	400991, 343372	6.9km	34.7
Tean (6) (Roadside Diffusion Tube)	401102, 339445	3.9km	32.0
Blythe Bridge (5) (Roadside Diffusion tube)	396344, 340626	8.6km	30.2

3.2.10 Model verification has been undertaken following the methodology specified in Annex 3 of LAQM.TG(09) using the NO_x:NO_2 calculator available from DEFRA's website to calculate the roadside NO_x component of the annual mean NO_2 concentrations measured at the diffusion tube sites. Details of the verification calculations are presented in **Appendix D**.

3.2.11 A factor of **2.9** was obtained during the verification process and this factor has been applied to the modelled NO_x roads component before conversion to annual mean NO_2 concentrations.

3.2.12 Local monitoring data is not available for concentrations of PM_{10}; as such final modelling results for this pollutant have been verified using the factor calculated for adjusting the modelled NO_x roads concentrations. This approach is considered to be appropriate according to guidance given in LAQM.TG(09).

[17] D Laxen and B Marner: *Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites* (July 2003).

[18] A Cook: *Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the 1-hour mean AQS Objective* (2008).

Exposure of future residents to odour arising from the nearby Waste Water Treatment Works

3.2.13 A Waste Water Treatment Works (WWTW) is located approximately 850m to the west of the site. Consultation with the Environmental Health Department of SMDC has indicated that odour arising from the WWTW may impact the surrounding area.

3.2.14 To determine the extent of any odour from the WWTW likely to be experienced at the proposed redevelopment site, an odour 'sniff test' survey was completed for key locations in the vicinity of the site following the guidance outlined in the Environment Agency's Horizontal Guidance Note H4. The odour sniff tests were completed on three site visits on 15th, 18th and 25th November 2011. Completed 'sniff test' records for each of the sites are presented in **Appendix E.**

3.2.15 In addition, a review of wind direction data obtained from the nearest meteorological station which is East Midlands Airport Meteorological Station was undertaken to determine the prevailing wind direction. A windrose for five years of wind direction data from East Midlands Airport Meteorological Station is presented in **Appendix F.**

3.2.16 Consultation with SMDC revealed that there have been no complaints made by local residents regarding odour from the WWTW.

Sensitive Receptors

3.2.17 Sensitive locations are those where the public may be exposed to pollutants from the Site. These will include locations sensitive to an increase in dust deposition as a result of on-site construction activities, or exposure to gaseous pollutants from exhaust emissions from construction site traffic.

3.2.18 Locations with a high sensitivity to dust generated by construction activities include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive to dust include schools, residential areas and food retailers.

3.2.19 In terms of locations that are sensitive to gaseous pollutants emitted from engine exhausts, these will include places where members of the public will be exposed to pollution over the period of time that they are present, and therefore the most suitable AQS averaging period of the pollutant needs to be used for assessment purposes.

3.2.20 For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15 minute mean or 1 hour mean) may be relevant. In a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24 hour mean or annual mean) may be more appropriate. In general terms, long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

3.2.21 To complete the exposure assessment, pollution concentrations were predicted at a number of locations within the proposed redevelopment site. The locations of the assessment receptors are detailed in **Table 2**.

Table 2: Receptor Locations Used in the Assessment

Receptor No.	Receptor Name	Distance from centre of Road (A522)
1	Site Boundary	5.5
2	Nearest Property (approximate)	7.5
3	5m within Site Boundary	10.5
4	10m within Site Boundary	15.5
5	15m within Site Boundary	20.5

3.2.22 In terms of locations that are sensitive to odour emissions, these will include primarily residential properties, schools, hospitals and offices.

3.2.23 To complete the odour 'sniff test' survey, a number of locations in the vicinity of the WWTW were selected and tested on different days to determine the odour levels arising from the works. These receptors were selected as

the nearest sensitive receptors to the WWTW in each direction. These receptors are illustrated on **Figure 1** and detailed in **Table 3** below.

Table 3: Odour 'Sniff Test' Locations Used in the Assessment

Receptor No.	Receptor Name	Distance from WWTW
1	Bus stop outside residential property on A522	1.1km E
2	Site entrance	900m E
3	Old Lane Outside residential property (5 Green Park)	250m N
4	Old Lane Outside residential property between Crimond and Dunny's Cottage (near Rectory farm)	360m NW
5	Outside closest residential property to WWTW	160m NE
6	WWTW Boundary	0m

4 EXISTING CONDITIONS

4.1 LOCAL EMISSION SOURCES

4.1.1 The proposed redevelopment site is located in an area where air quality is mainly influenced by emissions from road transport, the A522 passes close to the site.

4.1.2 There are no industrial pollution sources in the immediate vicinity of the site that will influence the local air quality apart from the WWTW.

4.2 BACKGROUND AIR QUALITY DATA

4.2.1 There are no automatic monitoring stations located within the immediate vicinity of the proposed redevelopment site from which appropriate background concentrations can be obtained. Suitable estimates have therefore been taken from DEFRA's website, where estimated background concentrations of the pollutants included in the AQS have been mapped at a grid resolution of 1x1km grid squares for the whole of the UK for the years between 2008 and 2020.

4.2.2 It is important to note that for NO_x and PM_{10}, the background maps present both the 'total' estimated background concentrations and the individual contributions from a range of emission sources (for example, motorways, aircraft, domestic heating etc). When detailed modelling of an individual sector is required as part of an air quality assessment, the respective contribution can be subtracted from the overall background estimate to avoid the potential for 'double-counting'. For this assessment, traffic data for all the A Roads within the study area have been included in the modelling. Therefore, contributions from this sector have been removed from the background concentrations.

4.2.3 Recent analysis of historical monitoring data has identified a disparity between measured concentrations and the projected decline in concentrations associated with the DEFRA estimates. This disparity is currently being investigated by DEFRA and once the reasons are understood updated guidance will be issued. Following consultation with SMDC it was agreed that no reduction in background concentrations with time should be assumed for this assessment. As such, background concentrations obtained for the year 2010 have been used for all assessment years.

4.2.4 **Table 4** shows the estimated background concentrations of NO_2 and PM_{10} that were used in the assessment.

Table 4:Estimated background concentrations used in the assessment (µg/m^3)

Grid Square	NO_2	PM_{10}
396500, 340500	11.6	14.4
401500, 339500	9.6	13.3
400500, 343500	10.7	13.3
401500,343500	11.6	13.2
404500, 337500	10.1	13.2

4.2.5 The table above shows that all estimated background concentrations of NO_2 are below the objective limit of 40µg/m^3 to be achieved by 2005 and thereafter. Estimated background concentrations of PM_{10} meet the objective limit of 40µg/m^3 to be achieved by 2004 and thereafter.

4.3 LOCAL AIR QUALITY MONITORING DATA

4.3.1 Concentrations of NO_2 have been measured using diffusion tubes at locations in the vicinity of the proposed redevelopment site, concentrations for the year 2007 are provided in **Table 5** for the nearest locations to the site**.** This is the latest monitoring data provided in the latest review and assessment report provided by SMDC.

Table 5:SMDC Monitoring Data (µg/m^3)

Site	2007
Blythe Bridge (Catchments Corner)	33.84
Blythe Bridge (Uttoxeter Road)	29.33
Blythe Bridge (Chestnut Crescent)	24.32
Tean	28.75
Cheadle (Council Offices)	29.58
Cheadle (Tape Street)	26.30

4.3.2 The monitoring results show that the objective level for annual mean NO_2 concentrations was being met at the closest monitoring locations to the site.

5 ASSESSMENT OF IMPACTS / EXPOSURE, MITIGATION AND RESIDUAL EFFECTS

5.1 IMPACT

Construction phase

Construction sources of dust and PM_{10}

5.1.1 The main sources of dust and PM_{10} during construction activities include:

- haulage routes, vehicles and construction traffic;
- materials handling, storage, stockpiling, spillage and disposal;
- exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
- site preparation and restoration after completion;
- demolition;
- construction and fabrication processes; and
- internal and external finishing and refurbishment.

5.1.2 The majority of the releases are likely to occur during the 'working-week'. However, for some potential release sources, e.g. exposed soil produced from significant earthwork activities, in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

5.1.3 Depending on wind speed and turbulence it is likely that the majority of dust generated by construction activities will be deposited in the area immediately surrounding the source (up to 200 metres away). As illustrated in the windrose shown in **Appendix F**, the prevailing wind direction is from the south southwest with a significant contribution from the southwest and west. Properties to the north, northeast and west of the site are therefore likely to experience the greatest impact. There are only a small number of residential properties along the A522 adjacent to the northern side of the site.

5.1.4 By consideration of the factors described above the overall impact of dust deposition would therefore be temporary, short-medium term, local in effect and of a **slight adverse** significance. Any adverse impacts resulting from the generation and dispersion of PM_{10} during construction are likely to be temporary, short-term and of **slight adverse** significance.

Release of emissions to air from construction traffic

5.1.5 The impact on air quality from traffic associated with this phase of the proposed redevelopment will be in the areas immediately adjacent to the principal means of site access for construction traffic. Based on the current local air quality in these areas and the likely volume of construction traffic, the impacts are therefore considered to be temporary, short-medium term, local and of **slight adverse** significance.

Operational phase

Exposure of future residents to air pollution

5.1.6 Full results of the DMRB screening model are presented in **Appendix G**, and a summary is provided below.

5.1.7 The results show that the concentrations of NO_2 and PM_{10} within the site are predicted to be well below the relevant objective levels.

Annual mean NO_2 concentrations

5.1.8 The objective for annual mean NO_2 concentrations is 40µg/m^3 to be achieved by the end of 2005 and thereafter. The results of the assessment show that in the 2011 baseline case concentrations within the site are predicted to be well below the objective level. The highest predicted concentration is 24.3µg/m^3 at the site boundary.

5.1.9 These results agree with the conclusions of the review and assessment work undertaken by SMDC, which concluded that exceedences of the objective for this pollutant are not likely to occur in their areas.

5.1.10 In 2013, the opening year of the proposed redevelopment, predicted concentrations at all of the receptors within the site are still below the objective level. The highest concentration of 24.4µg/m^3 is predicted at the site boundary receptor.

Hourly mean NO_2 concentrations

5.1.11 The annual mean NO_2 concentrations predicted by the model were all below 60µg/m^3, and therefore exceedences of the hourly mean NO_2 concentration objective are unlikely to occur. These results again agree with the conclusions of the review and assessment work undertaken by SMDC, which concluded that no AQMAs needed to be designated for this pollutant.

Annual mean PM_{10} concentrations

5.1.12 The objective for annual mean PM_{10} concentrations is a concentration of 40µg/m^3 to be achieved by the end of 2004 and thereafter. The results of the assessment show that in the 2011 baseline case concentrations within the site are predicted to easily meet the objective level. The highest predicted concentration is 15.8µg/m^3 which is predicted at the site boundary.

5.1.13 These results agree with the conclusions of the review and assessment work undertaken by SMDC, which concluded that no AQMAs needed to be designated for this pollutant.

5.1.14 By 2013, predicted concentrations within the site are still below the objective level. The highest concentration of 15.9µg/m^3 is predicted at the site boundary.

24 hour mean PM_{10} concentrations

5.1.15 The objective for 24 hourly mean PM_{10} concentrations is 50µg/m^3 to be exceeded no more than 35 times a year by the end of 2004 and thereafter. The results of the dispersion modelling show that in the 2011 baseline year the maximum number of exceedences is less than one day, which is well below the objective.

5.1.16 The number of days of exceedences remains at this level in the opening year of 2013.

5.1.17 These results again agree with the conclusions of the review and assessment work undertaken by SMDC, which concluded that no AQMAs needed to be designated for this pollutant.

Exposure of future residents to odour arising from the nearby Waste Water Treatment Works

5.1.18 In order to determine the likely odour levels arising from the WWTW an odour 'sniff test' was completed. Three site visits were undertaken on the 15th, 18th, and 25th November. Weather conditions on all three site visits were fairly similar with the wind being light or calm on each visit. Completed odour 'sniff test' record forms for the site visits are presented in **Appendix E**.

5.1.19 On the first site visit (15th November 2011), the weather conditions were dry and cold with light winds. The wind direction was variable but mostly from the east. Sniff tests were completed, at the site entrance and at key sensitive receptors in the vicinity of the WWTW and at the WWTW boundary, as illustrated in **Figure 1**. An odour was detected only at the boundary of the WWTW and at location 4, outside properties Crimond and Dunny's Cottage on Old Lane. The odour detected has been classified as being a persistent odour and having an intensity rating of 2 (faint odour) in accordance with the guidelines provided in H4. However, the odour detected at this location appeared to be arising from the adjacent farm (Rectory Farm) rather than the WWTW. No odour was detected at the entrance to the site.

5.1.20 On the second site visit (18th November 2011), the weather conditions were dry and mild with light winds. The wind direction again was variable. Sniff tests were completed at the same locations. On this occasion, odour from the WWTW was again detected at the boundary of the WWTW. This odour was classified as being a persistent odour and having an intensity rating of 2 (faint odour in accordance with the guidelines provided in H4. No odour was detected at the entrance to the site or at any of the other sniff test locations.

5.1.21 On the third site visit (25th November 2011), the weather conditions were dry and cold with light winds. The wind direction was generally from the southwest direction. On this occasion, odour was detected at location 4. The odour detected has been classified as being a persistent odour and having an intensity of 3. Again, this appeared to

be arising from the nearby farm (Rectory Farm). No odour was detected at any other location including at the WWTW boundary.

5.1.22 As illustrated in the windrose provided in **Appendix F**, the prevailing wind direction is from the south-southwest with a large proportion of winds blowing from the west and southwest. As illustrated in **Figure 1**, the WWTW is located to the west of the site and therefore any odour released at the WWTW will be blown towards the proposed redevelopment site for the majority of the time. However, no odour has been detected at the site during any of the site visits and it is considered that the site is sufficiently distant from the WWTW so that it is very unlikely that any odour from the WWTW will be detectable on it.

5.1.23 Furthermore, on all three site visits odour arising from the WWTW was only detected at the boundary of the WWTW and although a number of residential properties are located in close proximity to the WWTW, the closest being just 160m from the site, no odour complaints have been received by SMDC from these residents, indicating that there is no history of odour nuisance associated with the WWTW.

5.1.24 It is therefore considered that odour arising from the WWTW is very unlikely to result in any complaints of odour from future residents of the proposed redevelopment.

5.2 MITIGATION

Construction phase

5.2.1 A number of mitigation methods should be implemented, as appropriate including:

- vehicles carrying loose aggregate and workings should be sheeted at all times;
- implementation of design controls for construction equipment and vehicles and use of appropriately designed vehicles for materials handling;
- completed earthworks should be covered or vegetated as soon as is practicable;
- regular inspection and, if necessary, cleaning of local highways and site boundaries to check for dust deposits (and removal if necessary);
- minimise surface areas of stockpiles (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up;
- where appropriate, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Site and the surroundings;
- where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of prevailing wind directions and seasonal variations in the prevailing wind;
- during dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up;
- use of dust-suppressed tools for all operations;
- ensuring that all construction plant and equipment is maintained in good working order and not left running when not in use;
- Restrict on-site movements to well within site and not near the perimeter, if possible; and
- no unauthorised burning of any material anywhere on site.

5.2.2 Detailed mitigation measures to control construction traffic should be discussed with SMDC to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

5.2.3 It is recommended that liaison with SMDC be maintained throughout the construction process.

5.3 RESIDUAL EFFECTS

Construction phase

5.3.1 The greatest potential for an increase in dust deposition to occur will be within 200 metres of the construction site perimeter. There may be limited incidences of increased dust deposited on property beyond this distance. With appropriate use of mitigation measures and good site management the residual effects of dust generation and deposition would be **negligible**, given also the small number of sensitive receptors in the vicinity of the site.

5.3.2 The potential for short-term releases of PM_{10} from materials handling and site plant will remain following mitigation. However, reducing the use of site plant and equipment near sensitive receptors and implementing the mitigation measures outlined above would result in **negligible** residual effects.

5.3.3 The residual effects of emissions from construction vehicles will be **negligible**.

6 SUMMARY

6.1.1 A qualitative assessment of the potential impacts on local air quality from construction activities on the proposed redevelopment has been carried out. This showed that during site construction activities releases of dust and PM_{10} were likely to occur. However, through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases will be reduced and excessive releases prevented. The residual effects of the construction phase on air quality are considered to be **negligible** given also the small number of sensitive receptors in the vicinity of the site.

6.1.2 An assessment of the likely exposure of future residents of the proposed redevelopment to concentrations of NO_2 and PM_{10} in excess of the relevant AQS objective levels has also been completed. The DMRB screening model (version 1.03) has been used to predict the likely concentration of NO_2 and PM_{10} within the redevelopment site as a result of emissions from traffic using the adjacent road (A522).

6.1.3 The results show that the concentrations of NO_2 and PM_{10} within the redevelopment site are likely to be well below the relevant objective levels.

6.1.4 In addition, an assessment of odour arising from the nearby WWTW has been completed to determine the potential for odour from the WWTW to be detected by future occupants of the redevelopment. An odour 'sniff test' was completed on three separate days within November 2011 and during these visits no significant odour levels arising from the WWTW were detected beyond the boundary of the WWTW. No odour was detected at the entrance to the proposed site on any of the site visits. Furthermore, no complaints regarding odour arising from the WWTW have been received by SMDC, despite the closest existing property being 160m from the WWTW boundary.

6.1.5 It is therefore considered that the site is suitable for the proposed residential use.

FIGURE & APPENDICES

Figure 1 Location of Odour ‘Sniff Test’ Receptors

Appendix A Glossary of Terms

Term	Definition
AADF/T Annual Average Daily Flow/Total	A daily total traffic flow (24 hrs), expressed as a mean daily flow across all 365 days of the year.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months.
AQMA	Air Quality Management Area.
AURN	Automatic Urban and Rural (air quality monitoring) Network, managed by contractors on behalf of DEFRA and the Devolved Administrations.
DEFRA	Department for Environment, Food and Rural Affairs.
DfT	Department for Transport.
EIA	Environmental Impact Assessment.
Exceedence	A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
LAQM	Local Air Quality Management.
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
µg/m^3 micrograms per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of 1ug/m3 means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.
USA	Updating and Screening Assessment.
Validation	Refers to the general comparison of modelled results against monitoring data carried out by model

(modelling)	developers.
Validation (monitoring)	Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification).
Verification (modelling)	Comparison of modelled results versus any local monitoring data at relevant locations.

Appendix B Air Quality Standards & Objectives

A summary of the current air quality objectives for the seven pollutants detailed in the *Air Quality Regulations 2000 and (Amendment) Regulations 2002* for the purpose of Local Air Quality Management is provided below.

Air Quality Objectives currently included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)						
Pollutant	**Applies to**	**Standard**		**Objective**		**EU AQ Daughter Directive**
		Concentration	*Measured as*	*Annual exceedences allowed*	Target date	
Benzene (C_6H_6)	All UK	16.25µg/m^3	running annual mean		31.12.2003	
	England and Wales	5µg/m^3	annual mean		31.12.2010	As standard. target: 01.01.2010
	Scotland	3.25µg/m^3	running annual mean		31.12.2010	
1,3-Butadiene (C_4H_6)	All UK	2.25µg/m^3	running annual mean		31.12.2003	
Carbon monoxide (CO)	All UK	10mg/m^3	maximum daily running 8 hour mean		31.12.2003	As standard. target: 01.01.2005
Lead (Pb)	All UK	0.5µg/m^3	annual mean		31.12.2004	As standard. target: 01.01.2005[8]
	All UK	0.25µg/m^3	annual mean		31.12.2008	
Nitrogen dioxide (NO_2)	All UK	200µg/m^3	1 hour mean	18	31.12.2005	As objective. target: 01.01.2010
	All UK	40µg/m^3	annual mean		31.12.2005	As standard. target: 01.01.2010
Particulate Matter (PM_{10}) (gravimetric)[1]	All UK	40µg/m^3	annual mean		31.12.2004	As standard. target: 01.01.2005
	All UK	50µg/m^3	24 hour mean	35	31.12.2004	As objective. target: 01.01.2005
	Scotland	50µg/m^3	24 hour mean	7	31.12.2010	As objective. target: 01.01.2010
	Scotland	18µg/m^3	annual mean		31.12.2010	
Sulphur dioxide (SO_2)	All UK	266µg/m^3	15 minute mean	35	31.12.2005	
	All UK	350µg/m^3	1 hour mean	24	31.12.2004	As objective. target: 01.01.2005
	All UK	125µg/m^3	24 hour mean	3	31.12.2004	As objective. target: 01.01.2005

Provisional Air Quality Objectives currently NOT included in the Air Quality Regulations 2000 and (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM)						
Pollutant	**Applies to**	**Standard**		**Objective**		**EU AQ Daughter Directive**
		Concentration	*Measured as*	*Annual exceedences allowed*	Target date	
Polycyclic aromatic hydrocarbons (PAHs)[2]	All UK	0.25ng/m^3 B[a]P[3]	annual mean		31.12.2010	
Particulate Matter ($PM_{2.5}$) (gravimetric)[1,2]	UK (except Scotland)	25µg/m^3	annual mean	-	2020	As standard Target 2010
	Scotland	12µg/m^3	annual mean	-	2020	25µg/m^3 Target 2015
	UK urban areas	Target of 15% reduction in concentrations at urban background	annual mean	-	Between 2010 and 2020	Target 20% reduction in concentrations at urban background Target Between 2010 and 2020

Other Air Quality Strategy Objectives						
Pollutant	**Applies to**	**Standard**		**Objective**		**EU AQ Daughter Directive**
		Concentration	*Measured as*	*Annual exceedences allowed*	Target date	
For the protection of human health						
Ozone (O_3)[4]	All UK	100µg/m^3	maximum daily running 8 hour mean	10	31.12.2005	As objective; but 25 annual exceedences target: 01.01.2010
For the protection of vegetation and ecosystems[5]						
Nitrogen oxides (NO_X)[6]		30µg/m^3	annual mean		31.12.2000[7]	As standard. target: 19.07.2001
Sulphur dioxide (SO_2)		20µg/m^3	annual mean		31.12.2000[7]	As standard. target: 19.07.2001
		20µg/m^3	winter mean (1 October to 31 March)		31.12.2000[7]	As standard. target: 19.07.2001

Explanation:

ng/m^3 = nanogram per cubic metre;

µg/m^3 = microgram per cubic metre;

mg/m^3 = milligrams per cubic metre (i.e. microgram per cubic meter x 1,000);

1 Measured using the European gravimetric transfer sampler or equivalent.

2 Objective to be set in regulations in the future.

3 Concentration of Benzo[a]pyrene (B[a]P) to be measured as a marker for the total mixture of PAHs.

4 The objective for this pollutant is provisional and must be tackled at a national level due to its trans-boundary nature.

5 Only applies to those parts of the UK > 20km from an agglomeration; and > 5km from Part A processes, motorways and built up areas of > 5,000 people.

6 Assuming NO_X is taken as NO_2.

7 These objectives have successfully been achieved.

8 Also an EU AQ Directive Limit Value of 1µg/m^3 to be achieved by 01.01.2010 in the immediate vicinity (1000 m) of certain named industrial sources situated on sites contaminated by decades of industrial activities.

The Air Quality Strategy states that further review and assessment and consultation in relation to air quality will be a rolling process, with additional revisions to the objectives for selected pollutants as appropriate, or where there is new evidence in relation to the effects of pollutants on health or ecosystems. New pollutants may be introduced through future reviews.

Appendix C Summary of Traffic Data used in the Assessment

The tables below show the data that was used in the assessment of traffic impacts on local air quality. This data was obtained from the DfT website (http://www.dft.gov.uk) where traffic flows are available for the year 2010. For the other years included in the assessment, the traffic flows were adjusted using year adjustment factors provided by WSP Property and Development (WSPP&D).

2010 Verification

Road link	Speed (km/hour)	Annual Average Daily Flows (AADT)	%HGV
A522 Tape Street, Cheadle	48.3	13610	5.7
A521 High Street, Cheadle	48.3	4586	5.4
A521 Bank Street / Chapel Ste, Cheadle	48.3	7406	4.4
A522 Uttoxeter Road, Tean	48.3	5212	10.2
A521, Blythe Bridge	32.2	3890	3.6
A50 west of roundabout with A521, Blythe Bridge	32.2	39894	13.5
A50 south of roundabout with A521 Blythe Bridge	32.2	35858	15.2

2011 Baseline

Road link	Speed (km/hour)	Annual Average Daily Flows (AADT)	%HGV
A522 Uttoxeter Road, Fole	48.3	5410	10.7

2013 Opening Year

Road link	Speed (km/hour)	Annual Average Daily Flows (AADT)	%HGV
A522 Uttoxeter Road, Fole	48.3	5650	10.2

Appendix D Model Verification Calculations

Model Verification Calculations

NO_2

Model verification has been undertaken following the methodology specified in Annex 3 of the Technical Guidance LAQM.TG(09). The NO_x:NO_2 calculator available from DEFRA's website was used to calculate the roadside NO_x component of the annual mean NO_2 concentrations measured at the diffusion tube sites summarised in the table below.

A correction factor of **2.9** was obtained during the verification process. This factor has been applied to the modelled Road-NO_x contribution before conversion to total annual mean NO_2 concentrations.

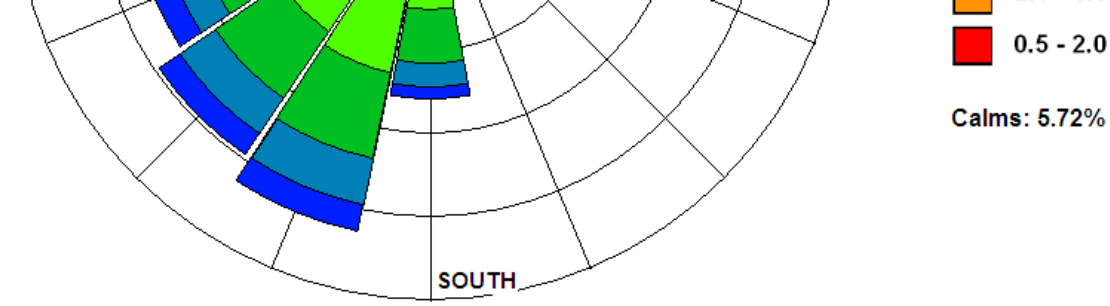
It should be noted that the initial verification calculation using all three diffusion tubes resulted in an adjustment factor of 2.35. When this was applied to the modelled Road-NOx concentrations predicted at each of the diffusion tubes, the resulting % difference between the adjusted modelled road NO_2 concentrations and the monitored NO_2 concentrations calculated at diffusion tubes at Tean and Blythe Bridge were considered to be too large, these diffusion tubes were therefore excluded from the verification process.

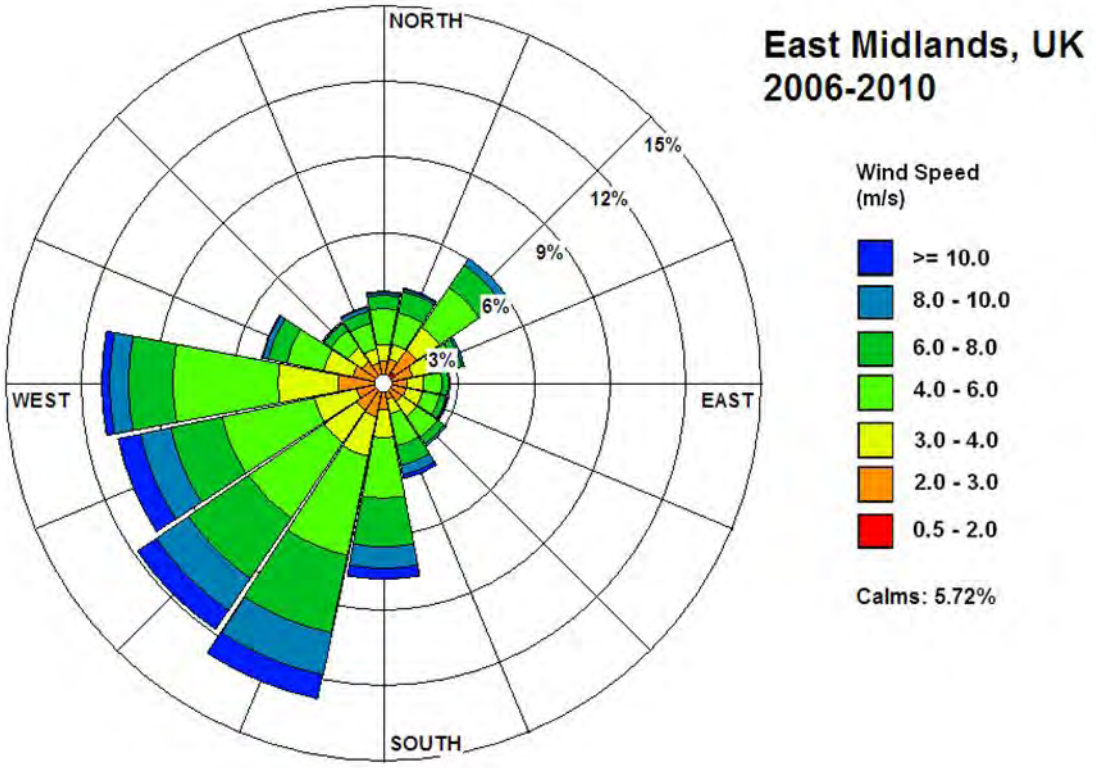
Monitoring Site	Type	2010 Monitored Annual Mean NO_2 Conc. ($\mu g/m^3$)	Background		Monitored Road-NO_x ($\mu g/m^3$)	Modelled Road NO_x ($\mu g/m^3$)	Ratio	Adjustment Factor	Adjusted Modelled Road NOx contribution	Adjusted Modelled Total NO2	% Difference Total NO2 [(modelled – monitored)/monitored]*100
			NO_x	NO_2							
Cheadle 14	Diffusion Tube	34.7	15.7	11.2	52.43	17.97	2.91	2.35	42.17	30.66	-11.46
Tean 6	Diffusion Tube	36	13.3	9.6	49.05	9.4	5.22		22.06	20.48	-36.00
Blythe Bridge 5	Diffusion Tube	30.2	15.7	11.6	40.16	24.68	1.63		57.91	37.10	22.85

PM_{10}

There were no monitoring stations within the vicinity of the site from which appropriate PM_{10} data could be obtained to determine a verification factor for PM10. The modelled PM_{10} results were therefore adjusted by the verification factor obtained for NO_2, an approach that is considered appropriate within the LAQM.TG(09) guidance report.

Appendix E Completed Odour ‘Sniff Test’ Record Forms


SOUTH
0.5 - 2.0
Calms: 5.72%


NORTH
15%
12%
9%
6%
3%
WEST
EAST
SOUTH
East Midlands, UK
2006-2010
Wind Speed
(m/s)
>= 10.0
8.0 - 10.0
6.0 - 8.0
4.0 - 6.0
3.0 - 4.0
2.0 - 3.0
0.5 - 2.0
Calms: 5.72%

Appendix G Assessment Results

NO_2 annual mean	ug/m^3	Source
Objective (ug/m^3)	40.00	AQS 2007

Receptor number	Receptor Name / Description	2011 Baseline	2013 Opening Year
1	Site Boundary	24.26	24.40
2	Nearest Property	23.80	23.94
3	5m within Boundary	22.88	23.01
4	10m within Boundary	21.32	21.43
5	15m within Boundary	19.95	20.04
6	20m within Boundary	18.77	18.86

PM_{10} annual mean	ug/m^3	Source
Objective (ug/m^3)	40.00	AQS 2007

Receptor number	Receptor Name / Description	2011 Baseline	2013 Opening Year
1	Site Boundary	15.81	15.86
2	Nearest Property	15.71	15.76
3	5m within Boundary	15.53	15.57
4	10m within Boundary	15.22	15.26
5	15m within Boundary	14.95	14.98
6	20m within Boundary	14.72	14.75

PM_{10} daily mean	ug/m^3	Source
Objective (ug/m^3)	50 not to be exceeded more than 35 times a year	AQS 2007

Receptor number	Receptor Name / Description	2011 Baseline	2013 Opening Year
1	Site Boundary	0.26	0.27
2	Nearest Property	0.24	0.25
3	5m within Boundary	0.19	0.20
4	10m within Boundary	0.15	0.15
5	15m within Boundary	0.12	0.13
6	20m within Boundary	0.12	0.12