RSK GROUP PLC

RSK Health & Safety Ltd
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT
United Kingdom

Telephone: +44 (0) 1442 437500
Fax: +44 (0) 1442 437550
www.rsk.co.uk

Our Ref: 440143 –36 wflet
29th September 2009

Mr Tom Beavin
JVH Town Planning
Houndhill Courtyard
Houndhill
Marchington
Staffordshire
GB
ST14 8LN

Dear Tom,

Scoping level Air Quality Assessment Report

Thank you for your instruction to prepare the Air Quality Assessment for the North Gawber Colliery site. I hope you have found our services to date satisfactory, and enclose 5 copies & a cd of our Scoping Level Report.

Should you wish to discuss any matter, or require further information.

Yours sincerely,

William Franklin
Senior Environmental Scientist
RSK-STATS Environment Health & Safety Ltd

Scoping level Air Quality Impact Assessment for a Proposed Residential Development at the Former North Gawber Colliery, Maplewell

Prepared for

Harworth Estates

September 2009

RSK GROUP PLC

RSK NOTES

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1 INTRODUCTION

RSK STATS Environment, Health and Safety Limited (RSK) was commissioned by Harworth Estates to undertake a scoping level air quality assessment for a proposed 400 dwellings development at the Former North Gawber Colliery, Mapplewell. The grid reference for the approximate centre of the site is 433036, 409863 and Figure 1 shows the Masterplan plan for the development.

This report presents the findings of a scoping level assessment of the current ambient air quality, and the potential for impacts due to the development during the construction and occupation phases.

Detailed assessment of the potential impacts, including the air quality impact of increased road traffic due to the development, will be considered separately in the Air Quality Impact Assessment report.

Figure 1 Site Plan of the Development



2 LEGISLATION AND POLICY CONTEXT

2.1 Key Legislation

UK air quality policy is published under the umbrella of the *Environment Act, 1995*, Part IV and specifically Section 80, the National Air Quality Strategy (NAQS). *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in January 2000 set air quality standards and objectives for eight key air pollutants that were to be achieved between 2003 and 2008. An addendum was published in February 2003 that introduced revised air quality objectives for benzene, carbon monoxide and particulate matter (PM_{10}) and a new air quality objective for polycyclic aromatic hydrocarbons (PAH) to be met by 2010. Revisions to existing air quality objectives and the introduction of new targets/objectives for $PM_{2.5}$ and ozone (for the protection of vegetation and ecosystems) were published in 2007.

The EU Air Quality Framework Directive (1996) established a framework under which the EU could set limit or target values for specified pollutants. The Directive identified 12 pollutants for which limit or target values have or will be set in subsequent Daughter Directives. The air quality standards in the United Kingdom are derived from European Commission (EC) Directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the EU Air Quality Framework Directive into English Law. The objectives relevant to the proposed development are summarised below in Table 1.

Table 1: UK National Air Quality Objectives and Attainment Dates

Substance	Averaging period	Exceedences allowed per year	Ground level concentration ($\mu g\ m^{-3}$)	Target date
Nitrogen dioxide (NO_2)	1 year	-	40	31.12.05
	1 hour	18	200	31.12.05
Sulphur dioxide (SO_2)	15 minute	35	266	31.12.05
	1 hour	24	350	31.12.04
	24 hours	3	125	31.12.04
Ozone (O_3)	8 hour	10	100	31.12.05
Particles (PM_{10})	1 year	-	40	31.12.04
	24 hours	35	50	31.12.04
Particles ($PM_{2.5}$)(1)	1 year	-	25	2020
	1 year	15% reduction in urban background concentration	N/A	2010-2020
Carbon monoxide (CO)	8 hour(2)	-	10,000	31.12.03
1,3 Butadiene	1 year(2)	-	2.25	31.12.03
Benzene	1 year	-	5	31.12.10
PAH	1 year	-	0.00025	31.12.10
Lead	1 year	-	0.25	31.12.08

Note: (1) = new targets; (2) = running average

These objectives, and others specifically for the protection of vegetation and ecosystems, are to be used in the review and assessment of air quality by local authorities under Section 82 of the Environment Act (1995).

If exceedences are measured or predicted through the review and assessment process, the local authority must declare an Air Quality Management Area (AQMA) under Section 83 of the Act, and produce an air quality Action Plan to outline how air quality is to be improved to meet the objectives under Section 84 of the Act.

It should be noted that Barnsley Metropolitan Borough Council (BMBC) has declared six AQMAs for NO_2. The closest AQMA to the site is Air Quality Management Area No. 1 along the M1 motorway, declared on the basis of predicted exceedence of the NO_2 standard and is approximately 2.3 km west of the proposed site.

2.2 Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concerns that relate to land use and its development can, depending on the details of the proposed development, be a material planning consideration in the determination of planning applications. Planning policies particularly relevant to air quality management are set out in PPG13 – Transport (HMSO, 2001) and PPS23 – Planning and Pollution Control (HMSO, 2004), and in the Local Air Quality Management guidance note on Air Quality and Land Use Planning (DEFRA, 2003), Environmental Protection UK (EP-UK , formerly known as 'National Society for Clean Air' (NSCA) guidance (NSCA, 2006)) and supplementary planning guidance. These policies are discussed in more detail below.

2.2.1 PPG13: Transport

PPG13 (Transport) was published in March 2001 and provides the Government's transport planning policies, with the objectives of delivering an integrated transport policy, extending transport choices and securing mobility in a way that supports sustainable development.

The aim is to integrate planning and transport at a number of levels to promote more sustainable transport choices (for people and freight), to promote accessibility to services and to reduce the need to travel, especially by car. PPG13 states that local air quality is a key consideration in the integration of planning and transport. This is particularly relevant in areas where the Government's national air quality objectives are not expected to be met and where air quality action plans are formulated. The PPG advises that well designed traffic management measures are able to contribute to reducing local air pollution and improving the quality of local neighbourhoods.

2.2.2 PPS23: Planning and Pollution Control

PPS23: Planning and Pollution Control is intended to complement the pollution control framework under the Pollution Prevention and Control Act 1999 and The Pollution Prevention and Control (England and Wales) Regulations 2000 that is now superseded by the Environmental Permitting Regulations 2007. PPS23 sets out the Government's core policies and principles on land use planning. It contains an Annex on 'Pollution Control, Air and Water Quality', which considers the links between the land use planning and pollution control systems and how the interaction should be dealt with within planning.

Policies and advice contained within PPS23 (including Annexes) should be taken into account in preparing policies for the development and use of land in the region by Regional Planning Bodies, Regional Spatial Strategies and Local Planning Authorities and in determining applications for planning permission. PPS23 also makes reference to proposed development within designated Air Quality Management Areas (AQMAs). It states that whilst it is important that possible impacts on air quality to or in an AQMA are considered, it is not the case that all planning applications for developments inside or adjacent to AQMAs should be refused if the developments would result in a deterioration of local air quality, as this could sterilise development.

2.2.3 LAQM.PG(09): Local Air Quality Policy Guidance

Policy guidance note LAQM.PG(09) replaces LAQM.PG(03) to enable local authorities to improve on the services they already provide in tackling air quality problems. The guidance provides an overview of the local air quality management system, the various considerations that local authorities should bear in mind and the practical guidance on some of the more effective and ambitious measures that local authorities can pursue.

2.2.4 EP-UK Guidance – Development Control: Planning for Air Quality

The Environmental Protection UK (formerly the National Society for Clean Air – NSCA) guidance note 'Development Control: Planning for Air Quality' responds to the need for closer integration between air quality and development control. It provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes a method for assessing the significance of the impacts of development proposals in terms of air quality and how to make recommendations relevant to the development control process in light of this assessment. The need for early and effective dialogue between the developer and local authority is identified to allow air quality concerns to be addressed as early in the development control process as possible. The guidance also provides some clarification as to when air quality constitutes a material consideration. The approach for assessing the significance of air

quality impacts associated with a given development will be used in the further assessment, and is outlined in Section 3.1.

2.2.5 Local Planning Policy Guidance

BMBC's Unitary Development Plan (UDP, covering the period to 2020) provides the strategic and detailed policy framework within which provision will be made for development and conservation within the local authority area over the next 11 years.

UDP Policy ES1 – Environmental Standard – is particularly relevant to the proposed development and potential air quality impacts. This is reproduced below for reference:

"THE COUNCIL WILL REFUSE PROPOSALS FOR DEVELOPMENT WHICH ARE LIKELY TO RESULT IN HARM TO THE ENVIRONMENT THROUGH EXCESSIVE LEVELS OF POLLUTION ARISING EITHER WITHIN THE SITE TO BE DEVELOPED OR OCCASIONED ELSEWHERE BY THE PROPOSED DEVELOPMENT.

THE COUNCIL WILL IN PARTICULAR RESIST DEVELOPMENT WHICH IS LIKELY TO RESULT IN HOUSING, SCHOOLS, HOSPITALS OR OTHER SENSITIVE LAND USES BEING SUBJECTED TO EXCESSIVE LEVELS OF AIR, NOISE OR OTHER POLLUTION.

WHERE DEVELOPMENT IS PERMITTED THE COUNCIL WILL SEEK TO ENSURE THAT RESULTING POLLUTION IS AVOIDED OR MINIMISED."

3 ASSESSMENT METHODOLOGY

The approach for the scoping level assessment of the potential for air quality impacts due to the development may be summarised as follows:

- Characterisation of 'baseline', existing local air quality and its potential to impact on the proposed development;
- Qualitative consideration of the potential air quality impacts due to the construction and occupation of the development.
- Recommendations for further assessment or mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

4 BASELINE AIR QUALITY CHARACTERISATION

Existing, or baseline, air quality refers to the concentration of relevant substances/pollutants that are already present in ambient air. These substances are released/emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. Baseline air quality information employed in this assessment has been obtained from BMBC and the UK Air Quality Archive[1].

4.1 Emissions Sources and Key Air Pollutants

In recent decades, transport-related emissions have become one of the main sources of air pollution in urban areas. The principal pollutants relevant to this assessment are considered to be NO_2 and PM_{10}, two key parameters released by vehicular combustion processes or subsequently generated by vehicle emissions in the atmosphere through chemical reactions, and which are generally considered to have the greatest potential to result in human health impacts.

4.2 Local Authority Review and Assessment of Air Quality

As directed by the Environment Act 1995, local authorities are required to review and assess air quality with respect to the standards and objectives for the pollutants specified in the Government's National Air Quality Strategy (NAQS, 2007). Local authorities are required to undertake an Updating and Screening Assessment (USA) of their area every three years. If the USA identifies potential 'hotspot' areas where air quality objectives are likely to be exceeded, then a detailed assessment of those areas is required.

Where objectives are not predicted to be met, local authorities must declare this 'hotspot' region as an Air Quality Management Area (AQMA). In addition, local authorities are required to produce an Air Quality Action Plan (AQAP), which outlines measures aimed at improving air quality within the designated AQMA.

BMBC has reviewed air quality within its administrative area and has declared six AQMAs. The proposed development site is not situated in any of the AQMAs. It is assumed, therefore, that air quality at the proposed development site is likely to meet relevant national air quality objectives.

4.3 Baseline Air Quality Data

BMBC undertakes air quality monitoring for a variety of parameters at a number of locations using both automated and passive (diffusion tube) techniques. The nearest automatic monitoring station to the proposed development site is located at the Gawber (grid reference: 432525, 407475). This monitoring station, which is classified

[1] www.airquality.co.uk

as an urban background site, is located approximately 2.4 km from the proposed development site. Table 2 below shows the annual average NO_X and NO_2 concentrations as measured at this site in 2008.

There are 12 diffusion tube monitoring sites approximately 2km away from the proposed site. Table 2 identifies the annual average NO_2 concentrations as measured at the abovementioned locations in 2008.

Table 2 Measured Annual Average NO_X and NO_2 Concentrations – BMBC Air Quality Monitoring Data (2008)

Ref number	Monitoring Site	Type of Monitoring Sites	Data Capture Rate (%)	2008 Annual Average NO_X ($\mu g/m^3$)	2008 Annual Average NO_2 ($\mu g/m^3$)
Automatic Station	Barnsley Gawber	Urban background	91	28.2	18.8
Diffusion tube 27	Bar Lane/ Wakefield Road	Kerbside	100	-	29.3
Diffusion tube 28	Bar Lane/ Wakefield Road	Roadside	92	-	33.3
Diffusion tube 29	Bar Lane/ Wakefield Road	Roadside	33	-	44.0
Diffusion tube 30	Wakefield Road/ New Lodge Crescent	Roadside	100	-	38.5
Diffusion tube 31	Wakefield Road/ Laithes Lane	Roadside	83	-	32.4
Diffusion tube 32	Wakefield Road/ Laithes Lane	Roadside	83	-	37.4
Diffusion tube 33	Wakefield Road/ Wensley Road	Roadside	75	-	31.0
Diffusion tube 34	Wakefield Road/ New Lodge Crescent	Roadside	92	-	32.2
Diffusion tube 35	Wakefield Road approach Rotherham Road	Roadside	92	-	33.0
Diffusion tube 36	Rotherham Road/ Wakefield Road	Roadside	83	-	28.4
Diffusion tube 37	Wakefield Road/ Brunswick Close	Kerbside	83	-	33.5
Diffusion tube 138	Lansdowne Crescent	Urban Background	100	-	36.4
Air Quality Objectives	-	-		30	40

Note: Reported concentrations refer to the ratified data obtained from BMBC USA 2009 report. The air quality objective for NO_X is for the protection of vegetation/ecosystem health only, and is not applicable to human health.

NO_2 concentrations measured at diffusion tube site 29 exceeded the long-term air quality standard, however, the nearest station (automatic monitoring site) to the proposed development site recorded much lower background annual average NO_2 concentrations.

4.4 UK Air Quality Archive Data

In addition to local air quality monitoring, background air quality data available from the UK Air Quality Archive can also be used to establish likely background air quality conditions at the proposed development site. The UK Air quality Archive provides estimated annual average concentrations of NO_X/NO_2 and PM_{10} (and other pollutants) on a 1 km^2 grid basis across the UK.

Table 3 below shows, from data obtained from the UK Air Quality Archive, estimated annual average NO_X/NO_2 and PM_{10} concentrations for 2008 and the proposed operational year of 2011. The reported concentrations in Table 3 refer to the average pollutant concentrations for the nearest 1 km^2 grid encompassing the proposed development site.

Background concentrations of PM_{10} and NO_2 are estimated to be below relevant air quality objectives in 2008 and 2011.

Estimated annual average NO_X concentrations for the aforementioned years are also predicted to be below the relevant air quality objective for the protection of vegetation/ecosystem health. However, as no designated ecological sites are in close proximity to the development site, long-term NO_X predictions are not considered to be relevant in the context of the proposed development scheme.

Table 3: Estimated Annual Average Background Pollutant Concentrations (UK Air Quality Archive Data)

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the UK Air Quality Archive		
	Annual Average NO_X ($\mu g/m^3$)	Annual Average NO_2 ($\mu g/m^3$)	Annual Average PM_{10} ($\mu g/m^3$)
2008	20.3	15.3	16.1
2011	17.6	13.5	15.6
Air Quality Objective	30	40	40

Note: Presented pollutant concentrations represent the nearest 1 km^2 grid with centre at 433500, 409500. Approximate grid reference for centre of development site is 433036, 409863; the air quality objective for NO_X is for the protection of vegetation/ecosystem health only, and is not applicable to the proposed development site.

5 POTENTIAL AIR QUALITY IMPACTS

5.1 Existing Air Quality at the Proposed Development

The proposed development is not within the AQMAs declared by BMBC, and the proposed development site is not near a major road. Furthermore, Section 4 identified that the current air quality conditions at the proposed development site are good and air quality is unlikely to be a constraint to the proposed development. However, additional road traffic generated from the proposed development might cause increase in the key air pollutant levels and a quantitative assessment of the potential air quality impacts is considered necessary. Section 5.2 discusses the potential construction and operational impacts from the proposed development.

5.2 The Proposed Development on Local Air Quality

5.2.1 Construction Phase

Atmospheric emissions from demolition and construction activities will depend on a combination of the potential for emissions (the type of activity) and the effectiveness of control measures. In general terms, there are two sources of emissions that need to be controlled to minimise the potential for adverse environmental effects:

- Exhaust emissions from site plant, equipment and vehicles; and,
- Fugitive dust emissions from site activities.

London Councils' Best Practice Guidance[13] 'The Control of Dust and Emissions From Construction And Demolition' sets out 'Site Evaluation Guidelines' to classify the risk of construction stage impacts. As per the guidelines, the proposed North Gawber Colliery development site can be classified as a high-risk site as the development comprises more than 150 properties and covers an area greater than 15,000 m^2.

A quantitative impact assessment of construction activities is virtually impossible due to the sporadic and constantly changing nature of the construction-related activities, as well as the difficulty in accurately representing the activities in predictive models. Impacts on local air quality resulting from construction activities are considered to be temporary and local to the constructions site.

It is considered appropriate to undertake qualitative impact assessment of the construction phase impacts of the proposed development. This will discuss the likely key aspects affecting air quality during construction and focus on demonstrating that effective mitigation measures and sound environmental management techniques are in place for the construction works.

5.3 Operational Phase

The development will not include any industrial or other major sources of emissions to air and should generally be considered a low polluting development.

The development will however contribute to emissions to air due to domestic emissions (space heating and cooking). The space heating for the development has not been specified at this stage, however modern plant is highly efficient and the potential for space heating and cooking emissions to impact on local air quality is considered likely to be very low.

The overwhelming potential impact of the proposed development is considered likely to be due to emissions from increased road traffic associated with the development.

Traffic data are not available at the time of this assessment, however it is recommended that a detailed atmospheric dispersion modelling study be undertaken to assess the potential impacts of increased road traffic due to the development.

The following subsections specify the proposed methodology for the detailed assessment of air quality impacts resulting from the operation of the proposed development.

5.3.1 Traffic Data (Emissions to Air Included in the Assessment)

A traffic assessment was prepared in September 2008, however this is understood to be no longer appropriate, due to changes to the proposed development. A revised Transport Assessment is being undertaken at the time of writing this report.

Traffic data for the base case year of 2008 and the future anticipated operational year of 2011 (data for both with and without the proposed development scenarios) generated by the appointed traffic consultant for the proposed scheme, AECOM will be used in the air quality assessment.

The revised traffic study is expected to take place at the following junctions:

- Blacker Road/ Mapplewell Road/ Carr Green Lane;
- Blacker Road/ Mapplewell Road;
- A61/ Dearne Hall Road;
- A61 Wakerfield Road/ Bar Lane; and
- B6428 Greenside/ B6131 Blacker Lane/ B6131 Towngate.

The air quality impact assessment will be based on the annual average daily traffic flow (AADT24), the percentage of heavy duty vehicles (HDVs), traffic speed on all affected road links and queue lengths at junctions.

5.3.2 Emission Factors

Vehicular emissions factors are provided with the ADMS-Roads dispersion model. The factors are the 2003 Design Manual for Roads and Bridges (DMRB) emissions factors from the Highways Agency.

Although these emissions factors are currently under review, the revised figures are as yet unavailable. Therefore it is proposed to use the 2003 emission factor dataset, but with enhanced proportions of emitted primary NO_2, in the light of the Air Quality Expert Group 2006 report 'Trends in Nitrogen Dioxide in the UK'[14].

5.3.3 Dispersion Model

It is recommended that the dispersion modelling of road traffic emissions be conducted using an advanced model such as 'ADMS-Roads' developed by Cambridge Environmental Research Consultants, Cambridge, UK.

ADMS-Roads is a 'new generation' dispersion model developed by the UK consultancy CERC (Cambridge Environmental Research Consultants, Cambridge, UK), is widely used and tested within the UK and Europe. The model allows for the skewed nature of turbulence within the atmospheric boundary layer. An equivalent model, ADMS-Urban, is often used by local councils for air quality review and assessment work.

ADMS-Roads is an advanced model and is capable of processing hourly sequential meteorological data and background concentrations, whilst taking the turbulence caused by vehicles into account. ADMS-Roads enables the user to model line (road), point, area (e.g. car parks) and volume emission sources simultaneously, and facilitates the prediction of ground level concentrations of pollutants of concern at multiple receptor locations.

5.3.4 Meteorological Data

In order to assess 'worst case' meteorological conditions, it is recommended that three years (2006 to 2008 inclusive) of hourly sequential meteorological data be obtained, and sensitivity testing of the dispersion modelling be conducted to select the 'worst case' year for use in the modelling.

The UK Met Office's Church Fenton monitoring station, which is approximately 34 km from the proposed development site is the most representative station measuring all parameters required for advanced air dispersion modelling.

5.3.5 Receptor Locations

Sensitive receptor locations (for example, residential properties) will be included in the assessment. These will represent 'worst-case' exposure locations, for example, near traffic junctions.

It is recommended that receptor locations assessed should include regions of the proposed development site, and existing receptors such as those at junctions of the A61, Wakefield Road.

5.3.6 NO_X/NO_2 Chemistry

A new approach to calculate NO_2 from NO_X concentrations at roadside sites was published in LAQM.TG(09)[2] and will be employed in the assessment.

It is recommended that the NO_X/NO_2 conversion spreadsheet/tool from the UK Air Quality Archive be used to convert predicted roadside NO_X concentrations into NO_2 concentrations resulting from modelled road traffic emissions. The conversion tool is only applicable to the calculation of annual average concentrations of NO_2. For short-term NO_2 predictions, the chemical reaction scheme built into the ADMS-Roads model will be used.

Ozone (O_3) converts nitric oxide (NO) into NO_2 through a process of atmospheric chemical reactions. NO itself is not harmful to human health. A background ozone concentration will be included in the chemical reaction scheme/calculations to aid prediction of short-term NO_2 concentrations.

5.3.7 Model Verification

The predicted pollutant concentrations from the model, specifically annual average NO_2 concentrations, will be verified against roadside diffusion tube monitoring sites along A61 Wakefield Road (including some or all of tubes: 27 to 37, listed in Table 2) according to the methodology suggested in LAQM TG(09).

[2] LAQM (TG 09): Local Air Quality Management Technical Guidance Note published in 2009 by DEFRA and devolved administrations.

6 CONCLUSIONS

A scoping level air quality assessment report for the proposed residential development at the former Gawber Colliery site has been conducted, with respect to existing air quality in the area and relevant air quality legislation, policy and guidance.

A review of Local Authority and other information on existing air quality suggests that the site is unlikely to experience exceedence of the air quality standards, and that therefore a significant impact or constraint on the proposed development due to existing air quality is not considered likely. However, it is considered that the proposed development scheme has the potential to have impact on local air quality during the construction and operational phases.

The demolition and construction impacts of the proposed development on local air quality are likely to be from dust emissions during the period of demolition and construction. The proposed North Gawber Colliery site is in a predominantly residential area. It is recommended that the potential for construction activities to affect receptors in these areas be assessed qualitatively with reference to the London Councils Best Practice Guidance.

The primary air quality impacts once the proposed development becomes fully operational are likely to be from increased road traffic associated with the scheme.

It is considered necessary that a detailed assessment of operational effects be undertaken using the ADMS-Roads atmospheric dispersion model and a methodology to assess the impacts during the operational phase is proposed. Various assumptions that are designed to over-predict pollutant concentrations will be employed to arrive at a conservative impact assessment.

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