DEARNE VALLEY PARKWAY, BIRDWELL

AIR QUALITY IMPACT ASSESSMENT

March 2015

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CONTENTS

1.0 INTRODUCTION

This air quality assessment has been undertaken with the aim of predicting the potential impacts associated with a proposed outline planning application consisting of an employment led mixed use scheme to the West of the Dearne Valley Parkway (A6195), Birdwell.

This report presents the air quality assessment undertaken in relation to air pollution and dust emissions from the development proposals.

1.1 Development Description

An outline planning application has been submitted on behalf of Hartwood Estates for a mixed commercial and retail development. The proposed land uses comprise 70.7% employment and 29.3% Retail:

'Outline planning application for an employment led mixed use scheme comprising of office (B1), general industrial (B2), warehouse/distribution (B8), food and drink (A3/A4), hotel (C1) and petrol filling station / fast food restaurant (sui generis/A3) and associated infrastructure.'

The site is located in Birdwell, approximately 7km to the south of Barnsley town centre. It comprises approximately 3 hectares of land and is currently undeveloped.

The location of the site relative to surrounding receptors and land uses can be seen in masterplan drawing **P13 4806 10** and Figure 1-1 overleaf. This site falls within the administrative area of Barnsley Metropolitan Borough Council (BMDC).

Construction of the new scheme is expected to last up to 36 months, with the site fully open by 2019.

Figure 1-1
Site Setting

1.2 Report Context

This air quality and dust impact assessment has been produced to provide consultees with information relating to the potential for air quality impacts from the construction of the proposed scheme in addition to the potential for vehicle pollution exposure on existing receptors close to the scheme, where appropriate.

1.3 Scope

The scope of this assessment is limited to the prediction of air quality and dust impacts associated with the construction and operation of the scheme and draws on existing information to determine whether these are likely to be significant.

1.4 Objectives

The objectives of the assessment are therefore as follows:

- To identify and assess the development construction impacts;
- To identify and assess the operational impacts of the development (e.g. vehicle trips);
- To identify and existing air quality constraints;
- To assess the significance of these impacts; and
- To identify further options for mitigation where required.

2.0 ASSESSMENT METHODOLOGY

A staged approach has been adopted; this ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being caused. As such, where a simple review of the situation shows that risk of a health or nuisance impact is negligible, this will be sufficient. In cases where the risk cannot be regarded as insignificant, a more detailed assessment may be required, such as a quantitative screening assessment or an advanced dispersion modelling exercise (as appropriate). This approach is in accordance with the EIA Regulations, which require '*a description of the likely significant effects of the development on* the environment'.

The assessment methodology has been agreed with Mr Chris Shields, Technical Officer (Pollution Control) at Barnsley Metropolitan Borough Council.

2.1 Dust Assessment

Given the requirement for large scale construction activities, there is a potential risk for the generation of dust. For such operations the common concern regarding dust emissions is their potential 'nuisance' effect.

A qualitative risk-screening assessment of the dust generation potential of the operations has been carried out. Using the method detailed in the 2014 IAQM document '*Assessment of dust from demolition and construction*'.

2.2 Traffic Exhaust Emissions Risk Assessment

Typically for a scheme of this nature in this location, initial screening assessment of impact of traffic would be carried out using the UK Design Manual for Roads and Bridges (DMRB) methodology (2007)[1]. The criterion for assessment of air quality contained within the latest DMRB guidance (207/07) focuses on roads with relatively high changes in flows or high proportion of Heavy Duty Vehicle (HDV) traffic. 'Affected roads' are defined as those that meet any of the following criteria:

- road alignment will change by 5 m or more; or
- daily traffic flows will change by 1,000 Annual Average Daily Trips (AADT) or more; or
- HDV flows will change by 200 AADT or more; or
- daily average speed will change by 10 km/hr or more; or
- peak hour speed will change by 20 km/hr or more.

Only properties and Designated Sites (such as SSSI's for example) within 200m of roads affected by the project need be considered.

If none of the roads in the network meet any of the traffic/alignment criteria or there are no properties or relevant Designated Sites near (within 200m) the affected roads, then the

[1] Design Manual for Roads and Bridges Vol. 11 Environmental Assessment (Consolidated Edition), Section 3, Part 1 Air Quality (May 2007)

impact of the scheme can be considered to be 'neutral' in terms of local air quality and no further air quality assessment is required.

In this case, BMBC has requested that a detailed dispersion modelling assessment is completed as this is consistent with other similar applications within the area. However, only road links with the potential to be impacted significantly have been assessed in accordance with the requirements of the EIA Regulations.

For this assessment the BREEZE Roads CAL3QHCR dispersion model has been used.

2.3 Significance Criteria

The EIA Regulations require '*a description of the likely significant effects of the development on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development*'. The approach to impact significance and judgements on effect is described below.

In the case of significance criteria for the assessment of traffic emissions, the example criteria described within guidance issued by Environmental Protection UK (EPUK)[2] has been used as presented in Table 2-1 and Table 2-2. This terminology should be used where a quantitative assessment is undertaken (i.e. the vehicle trips exceed the screening threshold).

Table 2-2
EPUK Magnitude of Change for PM_{10} and NO_2

Magnitude of Change	Annual Mean NO_2 / PM_{10}
Large	+/- >10%
Medium	+/- 5-10%
Small	+/- 1-5%
Imperceptible	+/- <1%

The magnitude of change may then be used to determine the significance of impact:

Table 2-3
Significance Criteria for Annual PM_{10} and NO_2

Magnitude of Change	Small	Medium	Large
Above Objective/Limit Value With Scheme (>100% of AQO)	Minor Adverse	Major Adverse	Major Adverse
Just Below Objective/Limit Value With Scheme (>90% of AQO)	Minor Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (>75% <90% of AQO)	Negligible	Minor Adverse	Minor Adverse
Well Below Objective/Limit Value With Scheme (<75%)	Negligible	Negligible	Minor Adverse

In relation to construction dust impacts, IAQM terminology has been used (section 3.4 below).

[2] Environmental Protection UK, Development Control: Planning For Air Quality (2010 Update)

3.0 REGULATORY STANDARDS AND GUIDANCE

3.1 European Legislation

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

3.2 UK Legislation

UK legislation relative to the air quality environment is described below.

3.2.1 Air Quality Standards

Current EU Air Quality limit values defined within the Directive have been transposed into UK legislation in the Air Quality Standards Regulations 2010, Statutory Instrument 2010 No. 1001. These standards have been carried forward into the Air Quality Strategy as detailed below.

3.2.2 Air Quality Strategy

The Air Quality Strategy (UKAQS) 2007 for England, Scotland, Wales and Northern Ireland[3] sets out the Government's policies aimed at delivering cleaner air in the UK. It sets out a comprehensive strategic framework within which air quality policy will be taken forward in the short to medium term, and the roles that Government, industry, the Environment Agency, local government, business, individuals and transport have in protecting and improving air quality.

The UKAQS actually includes more exacting objectives for some pollutants than required by EC legislation. This assessment refers only to UK air quality standards, as compliance with these standards will ensure that the less demanding European Air Quality limit values are also being met.

The Air Quality Strategy defines 'standards' and 'objectives' in paragraph 17:

> *'For the purposes of the strategy:*
>
> *standards are 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 assessment of the effects of each pollutant on human health including the effects on sensitive subgroups or on ecosystems;*
>
> *objectives are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedences, within a specified timescale.'*

[3] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, DEFRA. July 2007

The air quality Standards and Objectives considered within this air quality assessment are presented within Table 3-1.

Table 3-1
Air Quality Limit Values

Pollutant	Standard	Measured as	Equivalent percentile
Nitrogen dioxide (NO_2)	40µg/m^3	Annual mean	-
	200µg/m^3	1 hour mean	99.79th percentile of 1-hour-means (equivalent to 18 1-hour exceedences)
Particulate matter with an aerodynamic diameter of less than 10µm (PM_{10}) (gravimetric)	40µg/m^3	Annual mean	-
	50µg/m^3	24 hour mean	90.41th percentile of 24-hour-means (equivalent to 35 24-hour exceedences)

In accordance with DEFRA's technical guidance on Local Air Quality Management (LAQM.TG(09)), the air quality objectives should be assessed at 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. A summary of relevant exposure for the objectives presented in Table 3-1 are shown below in Table 3-2.

Table 3-2
Relevant Public Exposure

Objective Averaging Period	Relevant Locations	Objectives should apply at:	Objectives should not apply at:
Annual mean	Where individuals are exposed for a cumulative period of 6 months in a year;	Building facades of residential properties, schools, hospitals etc	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure if expected to be short term
1-hour mean	Where individuals might reasonably expected to spend one hour or longer	As above together with kerbside sites of regular access, car parks, bus stations etc	Kerbside sites where public would not be expected to have regular access

3.2.3 Local Authority Air Quality Review and Assessment

Local Authorities (LAs), including the Barnsley Metropolitan Borough Council (BMBC) , have formal powers to control air quality through a combination of Local Air Quality Management (LAQM) and by use of their wider planning policies.

Under Section 82 of the Environment Act 1995 (Part IV), LAs are required to periodically review and assess air quality within their area of jurisdiction under the system of LAQM. This review and assessment of air quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings, in the instance of

annual mean concentrations, where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA). For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

The results of BMBC Review and Assessment of air quality are summarised in Section 4.3.1

3.3 The National Planning Policy Framework

The National Planning Policy Framework (NPPF) was formally adopted on 27th March 2012 and describes the policy context in relation to pollutants, including atmospheric pollution:

> *'The Government's objective is that planning should help to deliver a healthy natural environment for the benefit of everyone and safe places which promote wellbeing.*
>
> *To achieve this objective, the planning system should aim to conserve and enhance the natural and local environment by:*
>
> *[...] preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of land, air, water or noise pollution or land instability.'*

Where pollution is defined as:

> *'Any consideration of the quality of land, air, water, soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including smoke, fumes, gases, dust, steam and odour.'*

The NPPF specifically requires consideration of pollution on health and the natural environment as part of the planning decision process:

> *'To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.'*

3.3.1 Local Policy

The existing Regional Spatial Strategy, Unitary Development Plan and related Supplementary Planning Guidance will be replaced with the BMBC Local Development Framework (LDF). This LDF is still under consultation at the time of writing.

Core Strategy: CSP 40 and Core Strategy: are of relevance in relation to this air quality assessment.

CSP 40 Pollution Control and Protection:

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air, surface water and groundwater, noise, smell, dust, vibration, light or other pollution which would unacceptably affect or cause a nuisance to the natural and built environment or to people.

We will not allow development of new housing or other environmentally sensitive development where existing air pollution, noise, smell, dust, vibration, light or other pollution levels are unacceptable and there is no reasonable prospect that these can be mitigated against. Developers will be expected to minimise the effects of any possible pollution and provide mitigation measures where appropriate.

CSP 41 Development in Air Quality Management Areas:

Development in air quality management areas will be expected to demonstrate that it will not have a harmful effect on the health or living conditions of any future users of the development in terms of air quality (including residents, employees, visitors and customers), or that any such harmful effects can be mitigated against.

We will only allow residential development in air quality management areas, where the developer provides an assessment that shows living conditions will be acceptable for future residents.

We will only allow development in air quality management areas which could cause more air pollution, where the developer provides an assessment that shows there will not be a significantly harmful effect on air quality.

3.4 Standards Relating to Dust

There are no statutory limit values for dust deposition 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.

Guidance for the control of dust from construction sites has been produced by the IAQM[4]. This guidance document provides site evaluation guidelines based upon the size in square metres (or number of properties) of a development to rate the application site between a low risk to high risk once local sensitivity has been taken into account.

[4] IAQM (2014) *Assessment of dust from demolition and construction 2014*

4.0 SITE SETTING

The following sections provide detail of the location of the site and the surrounding topography and receptors, in addition to the meteorological conditions which influence the dispersal of emissions.

4.1 Site Location

The boundaries of the site are formed by the A6195 Dearne Valley Parkway to the south, Rockingham Roundabout to the north east, Rockingham Business Park to the north west and a highways depot to the south west.

The application site is located approximately 7km to the south of Barnsley town centre.

The location of the site relative to surrounding receptors and land uses can be seen in masterplan drawing **P13 4806 10** and Drawing AQ1. This site falls within the administrative area of Barnsley Metropolitan Borough Council (BMDC).

4.2 Sensitive Receptors

The term 'sensitive receptors' includes any persons, locations or systems that may be susceptible to changes as a consequence of the proposed development. This includes the future occupiers of the development themselves.

Receptors assessed in the dispersion model are shown in Drawing AQ1 and Table 4-1, below.

Table 4-1
Assessment Receptors

Ref	Receptor	OS Xm	OS Ym
R1	53 Locksley Gardens	434940	400713
R2	Hopper Highways Depot	434901	400448
R3	33 Wood View	434858	400383
R4	227 Sheffield Road	434638	400786
R5	152 Sheffield Road	434570	401169
R6	9 Jubilee Cottages	435344	400349
R7	50 Sheffield Road	435501	400227
R8	Stonehurst	435548	400126
R9	Rockingham Hall	435164	400374
DT4	Sheffield Road	434559	401274
DT97	Sheffield Road	434595	401107
DT112	Doncaster Road	434989	400362
BP1	Site 1	435033	400666
BP2	Site 2	435003	400573
BP3	Site 3	434966	400450
BP4	Site 4 (Hotel)	434947	400393

[R = residences; DT = Council diffusion tubes (see Table 4-2); BP = Business Park]

In relation to the development site, the key receptors will be:

- Demolition and construction dust: Local buildings, commercial and retail establishments, persons parking in the immediate vicinity of the development; and
- Existing receptors: Workers in nearby commercial and retail establishments, occupiers of residences alongside road links used by site traffic and residences closest to the site (such as those at Rockingham Hall and Locksley Gardens).

There are no ecologically sensitive sites within 200m of the development proposals, the screening distance proposed within the DMRB guidance, and guidance issued by Natural England[5].

4.3 Baseline Conditions

4.3.1 Local Authority Review and Assessment

The BMBC LAQM review and assessments have indicated that concentrations of NO_2 are above the relevant limits at a number of locations of relevant public exposure within the Borough. It is reported that:

> *This has resulted in declaration of air quality management areas (AQMAs) within the borough due to exceedence of the annual average objective for NO_2. These AQMAs are limited to the zone of exceedence of the objective and are associated with busy arterial roads and junctions close to Barnsley town centre. Similarly, the M1 AQMA is limited to one hundred metres either side of the central reservation of the M1 motorway in the Barnsley Borough. The zone of exceedence is defined as the geographical area, in which an air quality objective is breached or "exceeded". Outside the zone of exceedence pollution concentrations are below the objective.*

A total of 7 Air Quality Management Areas (AQMAs), have been declared for NO_2, as follows:

- **AQMA No.1**: M1 Motorway, 100m either side of the central reservation within the Barnsley Borough;
- **AQMA No.2a**: A628 Dodworth Road;
- **AQMA No.3**: Junction of A61 Wakefield Road and Burton Road;
- **AQMA No.4**: A61 Harborough Hill Road;
- **AQMA No.5**: Junction of A633 Rotherham Road and Burton Road;
- **AQMA No.6**: A616 passing through Langsett; and
- **AQMA No.7**: Junction of A61 Sheffield and A6133 Cemetery Road.

The proposed development site is located approximately 225m from AQMA No.1 at its closest point. None of the other AQMAs are relevant to the study area.

[5] *The ecological effects of diffuse air pollution from road transport* R580

It is not predicted that traffic associated with the proposed development will significantly influence the existing flows along the M1, however a detailed study has been requested by the Council.

All other Air Quality Strategy pollutants are below the relevant limits at locations of relevant public exposure, and as such no AQMAs have been declared within the Council's administrative area for any pollutants other than NO_2.

4.3.2 Automatic Air Quality Monitoring

Although the Council operates 5 real-time monitors, none of these are located close to the development site and therefore none are directly relevant to this assessment.

4.3.3 Passive Diffusion Tube Monitoring

During 2013 BMBC operated a network 113 nitrogen oxide diffusion tubes for the whole of the year.

A summary of recent NO_2 monitoring results from the diffusion tube monitoring locations with most relevance to the application site is presented within Table 4-2.

Table 4-2
NO_2 Diffusion Tube Monitoring Results, BMBC

Tube Ref	OS Xm	OS Ym	2013 Annual Mean Concentration (µg/m^3)
DT1	434652	400231	26.3
DT2	434721	400352	31.0
DT3	434309	401032	31.9
DT4	434559	401274	34.5
DT5	435414	404151	30.5
DT97	434595	401107	33.3
DT111	435876	401392	34.2
DT112	434989	400362	48.2
DT113	437923	401668	28.1
DT113	434652	400231	26.3

Table 4-2 indicates that the annual mean air quality Standard of 40µg/m^3 has been exceeded at the diffusion tube monitoring location adjacent to the Birdwell Roundabout with baseline NO_2 concentrations above the Objective. There are no residential receptors at this location hence this is not a location of potential exposure and no AQMA is required.

There are no diffusion tubes located at the development site, which does not lie within an AQMA.

4.3.4 National Air Quality Archive

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by National Air Quality Information Archive based upon the background mapping study undertaken by DEFRA, and is routinely used to support LAQM and Air Quality Assessments.

Mapped background concentrations of NO_X, NO_2 and PM_{10} were downloaded for grid square x435000, y400500 which, is the closest to the development site. This data is presented in Table 4-3, below.

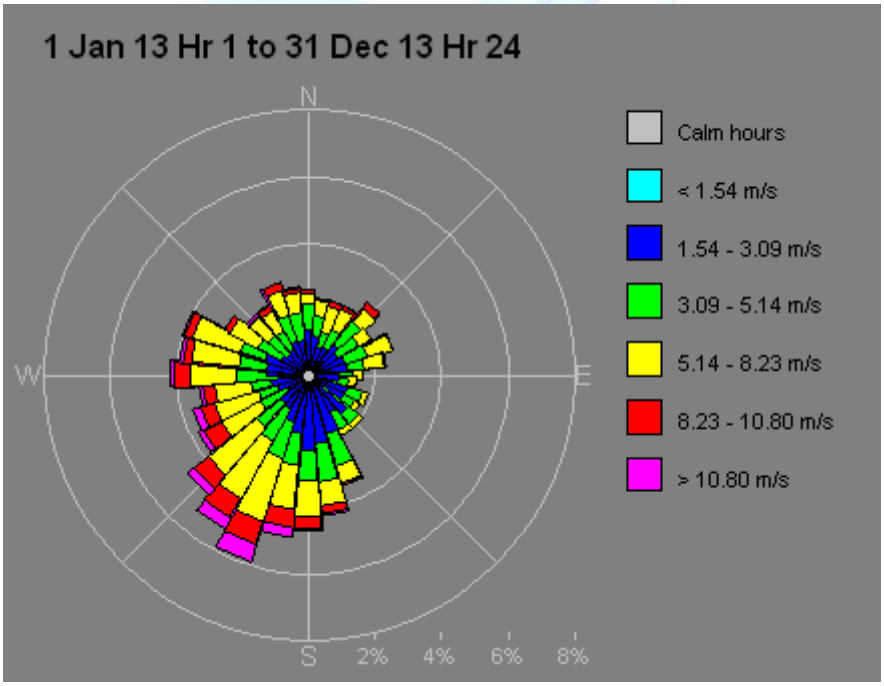
Table 4-3
Relevant Estimated Annual Mean Background Concentrations

Pollutant	Predicted 2013 (µg/m³)	Predicted 2016 (µg/m³)	Predicted 2019 (µg/m³)
NO_2	19.0	17.1	14.5
NO_x	26.7	23.5	19.6
PM_{10}	17.5	16.8	16.4

4.4 Meteorological Conditions

A windrose for Doncaster ('Robin Hood') airport for the 2013 providing the frequency of wind speed and direction, is presented overleaf. This site lies 31km due east of the application area. The use of this meteorological data set was requested by BMBC.

Figure 4-1
Windrose for Robin Hood Observing Station (2013)



5.0 DUST ASSESSMENT

This dust assessment has been undertaken in accordance with IAQM '*Guidance on the assessment of dust from demolition and construction'*.

The demolition and construction phases are broken down into 4 different activities with the potential to generate dust:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

5.1 STEP1: Screening

There are human receptors located within 350m of the boundary of the site and 50m of the route(s) used by construction vehicles. There are however no notable ecological receptors close to the development site.

The risk cannot therefore be regarded as 'negligible' and an assessment is required.

5.2 STEP2a: Dust Emission Magnitude

5.2.1 Demolition

The site is currently unoccupied and therefore no demolition activities are required.

The potential dust emission magnitude during demolition is therefore '**negligible**'**.**

5.2.2 Earthworks

The total site area is 3.1 Ha (31000m^2) however there will not be a significant requirement for bund formation or material moved from site.

The potential dust emission magnitude as a result of earthworks is therefore '**medium**'.

5.2.3 Construction

The new buildings will be significant, with a total building volume falling within the range 25000m^3 – 100000m^3.

The potential dust emission magnitude as a result of construction is therefore '**medium**'.

5.2.4 Trackout

Indications are that there will be between 50 and 60 outward HDV movements on some days (100 – 120 movements in total).

The potential dust emission magnitude as a result of trackout is therefore '**medium'**.

5.3 STEP2b: Sensitivity of the Area

The site is close to commercial, retail and residential properties where the occupiers can reasonably expect enjoyment of a high level of amenity.

The sensitivity of the surrounding area must therefore be regarded as '**high**'. There are less than 100 receptors within 50m of the development, hence the sensitivity of the area to dust soiling effects on people and property must be regarded as '**medium**'.

Given the low baseline PM_{10} concentrations, the sensitivity of the area to human health impacts must be regarded as '**low**'. Similarly, the sensitivity of the area to ecological impacts must also be regarded as '**low**'.

5.4 STEP2c: Risks

For each of the 3 different activities with the potential to generate dust, the risk of dust impacts must be regarded as '**medium risk**' before mitigation is considered.

5.5 STEP3: Mitigation

The risk of dust impacts must be regarded as '**medium risk**' before mitigation is considered and therefore the mitigation measures detailed in section 8.2 of the IAQM '*Guidance on the assessment of dust from demolition and construction'* should be considered in this case.

Specific measures would be detailed within a site Construction Environmental Management Plan which should be approved before potentially dusty activities commence on site.

5.6 STEP4: Effects

IAQM '*Guidance on the assessment of dust from demolition and construction*' describes that, where suitable mitigation is applied, the residual effect will normally be 'not significant'. This is the case with the proposed development scheme where robust mitigation measures have been adopted.

6.0 ASSESSMENT OF AIR QUALITY IMPACTS

6.1 Model Setup

Full details of development trips are included in the Transport Assessment completed in support of the planning application.

The data has been converted to Annual Average Daily Traffic figures and used as input to the dispersion modelling assessment. The number of additional movements onto the M1 in either a northerly or southerly direction from the motorway junction will be negligible in comparison with the baseline AADT flows of nearly 100,000 (taken from the Department for Transport website). This link is only included within the model as it is a significant existing source of air pollutants.

The road links and receptors assessed are presented in **Drawing AQ1**. The traffic data used is included in **Appendix A**.

6.2 Model Scenarios

A total of 5 No. scenarios have been assessed:

- **Scenario 0**: This scenario represents the 2013 baseline and allows for model verification based on passive diffusion tube monitoring data collected by the council;
- **Scenario 1a**: This scenario represents the 2016 baseline (i.e. without development);
- **Scenario 1b**: This scenario represents 2016 'with' development. At this stage the development will be under construction hence all vehicle movements will be associated with the construction phase;
- **Scenario 2a**: This scenario represents the 2019 baseline (i.e. without development);
- **Scenario 2b**: This scenario represents 2019 'with' development. All vehicle movements will be associated with the operational phase.

6.3 Emission Factors

The following emissions source and data conversion tools have been used:

- Emission factor toolkit EFT6.0.2, November 2014; and
- NO_x to NO_2 conversion spreadsheet. Version 4.1, June 2013.

6.4 Model Verification

The dispersion model (Sc0) has been verified using the method described in LAQM(TG09) guidance. This method, using the measured 2013 NO_2 results from 3 diffusion tube sites, has provided a factor of 3.85 which has then been applied to the other 4 predictive scenarios.

A description of the verification process is included in **Appendix B**.

6.5 Results

The results of the dispersion modelling are as shown below for NO_2.

Table 6-1
NO_2 Concentration Results

Month	Sc0: 2013	Sc1a: 2016	Sc1b: 2016	Sc2a: 2019	Sc2b: 2019	difference (µg/m³) Sc2a:Sc2b	Change as % of Standard
R1	29.3	25.9	25.9	21.6	21.7	0.1	0.3%
R2	34.0	29.9	29.9	24.7	24.9	0.2	0.5%
R3	39.8	34.8	34.8	28.7	28.9	0.2	0.6%
R4	37.0	32.7	32.8	27.3	27.4	0.2	0.5%
R5	32.4	28.8	28.8	24.1	24.2	0.1	0.3%
R6	30.7	27.5	27.5	23.0	23.2	0.1	0.3%
R7	29.3	26.3	26.3	22.1	22.2	0.1	0.3%
R8	26.9	24.0	24.0	20.1	20.2	0.1	0.1%
R9	30.9	27.4	27.4	22.9	23.0	0.1	0.3%
DT4	32.7	29.1	29.1	24.4	24.5	0.2	0.4%
DT97	36.0	32.0	32.1	26.8	27.0	0.2	0.5%
DT112	47.6	41.8	41.8	34.6	35.6	1.0	2.5%
BP1	34.8	30.6	30.7	25.4	25.9	0.5	1.3%
BP2	35.4	31.1	31.1	25.8	26.3	0.5	1.2%
BP3	38.0	33.3	33.4	27.6	28.1	0.5	1.4%
BP4	39.8	34.9	34.9	28.8	29.4	0.5	1.4%

The results of the dispersion modelling are as shown below for PM_{10}.

Table 6-2
PM_{10} Concentration Results

Month	Sc0: 2013	Sc1a: 2016	Sc1b: 2016	Sc2a: 2019	Sc2b: 2019	difference (µg/m³) Sc2a:Sc2b	Change as % of Standard
R1	18.5	17.7	17.7	17.2	17.3	0.04	0.1%
R2	19.3	18.4	18.4	17.9	17.9	0.06	0.2%
R3	20.4	19.4	19.4	18.9	18.9	0.08	0.2%
R4	20.1	19.1	19.1	18.6	18.7	0.06	0.2%
R5	19.2	18.3	18.3	17.9	17.9	0.04	0.1%
R6	19.0	18.2	18.2	17.7	17.8	0.04	0.1%
R7	18.7	17.9	17.9	17.5	17.5	0.03	0.1%
R8	18.2	17.4	17.4	17.0	17.0	0.01	0.0%
R9	18.9	18.0	18.0	17.6	17.6	0.04	0.1%
BP1	19.3	18.5	18.5	18.0	18.1	0.05	0.1%
BP2	20.1	19.2	19.2	18.7	18.8	0.07	0.2%
BP3	22.3	21.2	21.2	20.6	21.0	0.36	0.9%
BP4	19.8	18.9	18.9	18.5	18.6	0.18	0.5%

The results of the dispersion modelling are as shown below for PM_{10} in relation to number of days of exceedance.

Table 6-3
PM_{10} Results: Days of Exceedance

Month	Sc0: 2013	Sc1a: 2016	Sc1b: 2016	Sc2a: 2019	Sc2b: 2019	difference (days)
R1	1.8	1.2	1.2	0.9	0.9	0.0
R2	2.6	1.7	1.7	1.3	1.3	0.0
R3	4.0	2.7	2.7	2.1	2.2	0.1
R4	3.5	2.4	2.4	1.9	2.0	0.1
R5	2.5	1.7	1.7	1.3	1.3	0.0
R6	2.3	1.5	1.5	1.2	1.2	0.0
R7	2.0	1.4	1.4	1.0	1.1	0.0
R8	1.5	1.0	1.0	0.7	0.7	0.0
R9	2.2	1.4	1.4	1.1	1.1	0.0
BP1	2.6	1.8	1.8	1.4	1.5	0.0
BP2	3.5	2.4	2.4	2.0	2.1	0.1
BP3	6.9	5.0	5.0	4.2	4.7	0.5
BP4	3.2	2.2	2.2	1.8	1.9	0.2

6.6 Summary

The difference in concentration of NO_2 and PM_{10} along all assessed roads links as a result of the construction phase of operations is negligible. This is as would be expected given the number of vehicles which will be involved which is very low when considered against the existing baseline.

The increase in concentration of NO_2 and PM_{10} at assessed residential receptors (i.e. existing locations) once the development scheme is occupied (i.e. in 2019) is predicted to be below 1% of the annual average limit for these two pollutants. As such the impact during operation of the development will also be negligible at these locations. The number of additional movements onto the M1 in either a northerly or southerly direction from the motorway junction will be negligible in comparison with the baseline AADT flows of nearly 100,000.

The increase in concentration of NO_2 and PM_{10} at locations close to the A6195 (i.e. on the development site) is above 1% of the annual average limit for NO_2, however below 5% and the increase may therefore be regarded as 'small'. As the impact is predicted to be *Well Below Objective / Limit Value With Scheme (<30 µg/m^3)* the magnitude of impact may be considered as negligible. As the concentration is also well below 60 µg/m^3 there is no risk of the 1-hour NO_2 limit being exceeded at the workplaces or hotel on the development site.

7.0 CONCLUSIONS

This air quality assessment has been undertaken with the aim of predicting the potential impacts associated with a proposed outline planning application consisting of an employment led mixed use scheme to the West of the Dearne Valley Parkway (A6195), Birdwell.

This report presents the air quality assessment undertaken in relation to air pollution and dust emissions from the development proposals.

The conclusions of the assessment are as follows:

1. IAQM '*Guidance on the assessment of dust from demolition and construction*' describes that, where suitable mitigation is applied, the residual effect will normally be 'not significant'. This is the case with the proposed development scheme where robust mitigation measures have been adopted.
2. The difference levels of NO_2 and PM_{10} along all assessed roads links as a result of the construction phase of operations is negligible. This is as would be expected given the number of vehicles which will be involved which is very low when considered against the existing baseline.
3. The magnitude of impact at all assessed receptors is predicted to negligible at all locations.

APPENDIX A – TRAFFIC INPUT DATA

Link	1	Width (m)		9.3
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	747	4.8	46
Sc1a	**2016**	773	4.6	46
Sc1b	**2016**	774	4.6	46
Sc2a	**2019**	816	4.8	46
Sc2b	**2019**	845	4.7	46

Link	2	Width (m)		10.3
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	503	1.1	48
Sc1a	**2016**	520	1.1	48
Sc1b	**2016**	521	1.1	48
Sc2a	**2019**	549	1.1	48
Sc2b	**2019**	565	1.1	48

Link	3	Width (m)		11.5
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	741	3.3	48
Sc1a	**2016**	767	3.2	48
Sc1b	**2016**	769	3.2	48
Sc2a	**2019**	810	3.3	48
Sc2b	**2019**	837	3.4	48

Link	4	Width (m)		8
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	741	3.3	48
Sc1a	**2016**	767	3.2	48
Sc1b	**2016**	769	3.2	48
Sc2a	**2019**	810	3.3	48
Sc2b	**2019**	837	3.4	48

Link	5	Width (m)		11
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	962	4.8	32.4
Sc1a	**2016**	996	4.6	32.4
Sc1b	**2016**	1000	4.6	32.4
Sc2a	**2019**	1051	4.8	32.4
Sc2b	**2019**	1170	4.5	32.4

Link	6	Width (m)		11
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	962	4.8	32.4
Sc1a	**2016**	996	4.6	32.4
Sc1b	**2016**	1000	4.6	32.4
Sc2a	**2019**	1051	4.8	32.4
Sc2b	**2019**	1170	4.5	32.4

Link	7	Width (m)		9.3
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	747	1.9	46
Sc1a	**2016**	773	1.9	46
Sc1b	**2016**	774	1.9	46
Sc2a	**2019**	816	1.9	46
Sc2b	**2019**	845	1.9	46

Link	8a	Width (m)		8
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	962	4.8	68
Sc1a	**2016**	996	4.6	68
Sc1b	**2016**	1000	4.6	68
Sc2a	**2019**	1051	4.8	68
Sc2b	**2019**	1170	4.5	68

Link	10	Width (m)		8
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	962	4.8	68
Sc1a	**2016**	996	4.6	68
Sc1b	**2016**	1000	4.6	68
Sc2a	**2019**	1051	4.8	68
Sc2b	**2019**	1170	4.5	68

Link	11	Width (m)		7.3
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	503	1.1	48
Sc1a	**2016**	520	1.1	48
Sc1b	**2016**	521	1.1	48
Sc2a	**2019**	549	1.1	48
Sc2b	**2019**	565	1.1	48

Link	12	Width (m)		9
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
Sc0	**2013**	1483	3.3	68
Sc1a	**2016**	1535	3.3	68
Sc1b	**2016**	1539	3.3	68
Sc2a	**2019**	1619	3.3	68
Sc2b	**2019**	1675	3.3	68

Link	13	Width (m)		30
Scenario	**Year**	**Veh/hour**	**HGV %**	**Speed (km/h)**
All scenarios	**all years**	3906	9.2	113

APPENDIX B – MODEL VERIFICATION

Verification has been completed for NO2 using monitoring data as presented in Table 4-1. Monitoring data from the diffusion tube locations have been used as these are directly applicable to assessment links.

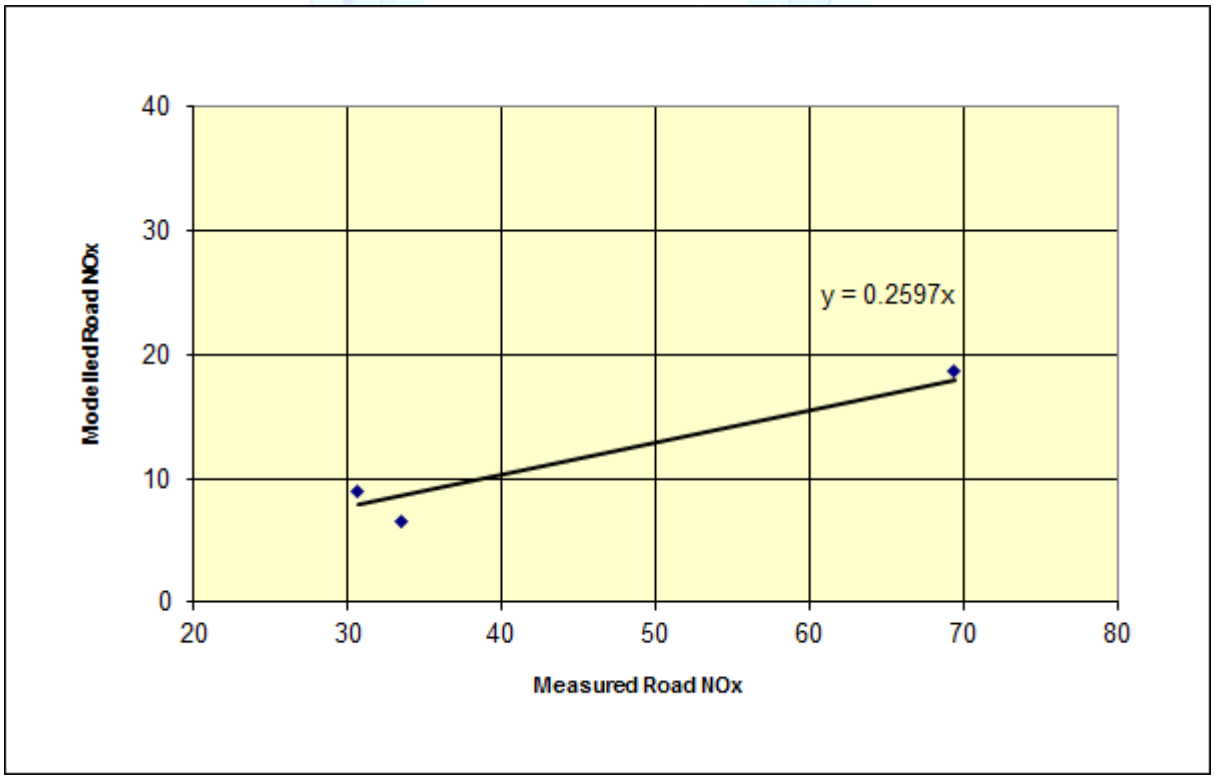
For purposes of the calculations, the DEFRA backgrounds as shown in Table 4-2 have been used. No multipliers have been applied to take account of canyon effects or road gradients.

Monitoring data versus modelling data is shown in Table B-1 below. All results are presented as µg/m3. The results are for the Road Link component only (calculated by taking the DEFRA background from the monitored concentration).

Table B-1
Model Verification: Stage 1

Tube	NO_2 Monitoring Result	Calculated NOx	Modelled Road NO_X Result	Adjusted Total NO_2 Result
DT4	34.5	60.2	6.5	32.7
DT97	33.3	57.3	9.0	36.0
DT112	48.2	96.1	18.6	47.6

Verification above provides a 1st Stage road NOx verification factor of 3.85 (i.e. measured road contribution is a factor of 3.85 higher than the modelling result).



The second stage NO_2 factor of 1.186 then provides the final verified NO_2 concentration.

The NOx adjustment factors above may be a result of:

- Averaging background concentrations over a 1km area. In reality, for a development in an area with other urban sources this averaging may be less appropriate;
- Localised effects such as bus stops (none were obvious);
- A skewed NO_x:NO_2 ratio resulting from the DEFRA NOx calculator. This predicts a NO_x:NO_2 ratio of almost 2:1 whereas the results from SLR monitored diffusion tubes close to the road links indicates that this tool is leading to an over prediction of NOx. This is a cumulative effect when considering that the NAQIA backgrounds form part of the NOx calculation.
- Given that the backgrounds and the traffic flows and speed have been monitored by BMBC and the applicant respectively, it is considered that the input data is as accurate as can be achieved without longer term measurement.