



**LAND NORTH OF HAWSHAW LANE, HOYLAND, BARNSELY
RESIDENTIAL DEVELOPMENT
AIR QUALITY ASSESSMENT REPORT**

**FOR
HOYLAND DEVELOPMENTS LTD**

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EXECUTIVE SUMMARY

Surface Property was commissioned to undertake an assessment of the potential impact to local air quality associated with the proposed Hoyland Lowe residential development, near Barnsley. This assessment is in support of an application for outline planning permission for a residential development of circa 100 units (the "Development") on currently undeveloped land to the north of the B6096 (Hawshaw Lane) (the "Development site") in Hoyland. This report reflects the Transport Assessment which considers a development of up to 120 dwellings. The actual quantum of development will be determined at Reserved Matters stage.

Barnsley Metropolitan Borough Council (BMBC) has investigated air quality within its area as part of its responsibilities under the LAQM regime and has designated a number of Air Quality Management Areas (AQMA), the closest of which is approximately 1 km west of the Development site (M1 motorway) for exceedances of nitrogen dioxide (NO₂) objectives.

The following assessments have been undertaken:

- Potential impacts of the Development on existing and new residential receptors. The Design Manual for Roads and Bridges (DMRB) screening method has been used to assess these effects for baseline year of 2016 and a future year of 2021; and
- Dust generation during construction.

There are no onsite or offsite point source emissions to air which require detailed modelling and assessment.

An assessment of construction dust effects has been undertaken which has found that the AQO for PM₁₀ will not be exceeded. In any case, best practice mitigation measures would be implemented which would mean that no significant effects are predicted.

The DMRB screening assessment has demonstrated that background air quality in 2021, when the Development is operational, will not exceed Air Quality Objectives at existing or new residential receptors.

Overall the Development is predicted to have a negligible air quality impact on existing or new receptors.

1 INTRODUCTION

1.1 Background

Surface Property has been commissioned to undertake an assessment of the potential impact of residential development at Hoyland Lowe (the "Development") on air quality at existing and new receptors.

The following assessments have been undertaken:

- Potential impacts of the Development on existing and new residential receptors. The Design Manual for Roads and Bridges (DMRB) screening method has been used to assess these effects for baseline year of 2016 and a future year of 2021; and
- Dust generation during construction.

There are no onsite or offsite point source emissions to air which require detailed modelling and assessment.

This report details the methodology and assumptions adopted, baseline conditions, and determination of the likely potential impact, taking into account national and local planning policy and national air quality legislation. Mitigation/control measures have been presented to minimise or remove potential impacts, where applicable.

1.2 Overview of the Development

The Development site is located in the town of Hoyland, approximately 5.9 km south of Barnsley and to the east of Junction 36 of the M1 motorway. The Development site currently comprises open fields/ agricultural land with existing residential development and the B6096 (Hawshaw Lane) along the south eastern frontage, with undeveloped agricultural land extending to the north, east and west.

Hoyland Developments Ltd have submitted an application for outline planning for a residential development comprising circa 100 units, to which this air quality assessment applies. This report reflects the Transport Assessment which considers a development of up to 120 dwellings. The actual quantum of development will be determined at Reserved Matters stage.

The location of the residential units has not yet been confirmed and whilst the majority of units will be set back from the B6096, it is understood that some properties will be built close to the access point off the B6096 which will be set back a similar distance from the road to match the existing properties. It is anticipated that there will be approximately 90 and 85 two-way vehicle trips during weekday AM and PM peak hours respectively, equating to an average daily flow of 1,200 trips. Of these movements none are anticipated to be heavy goods vehicles (HGVs).

Table 10 of the Transport Assessment (TA) submitted for the Development indicates that 68.7% of the traffic associated with the development is predicted to utilise the A6135 Sheffield Road / B6096 Hoyland Road / Tankersley Lane signalised junction. The remaining 31.3% of the development traffic will be distributed to other parts of the local highway network. However, for the purposes of this assessment a conservative approach has been taken assuming that all traffic arising from the Development uses all routes.

1.3 Study Species

Air Quality Objectives exist for the following pollutants¹:

- Fine particulate matter (PM₁₀ and PM_{2.5});
- Nitrogen dioxide (NO₂);
- Ozone;
- Sulphur dioxide (SO₂);
- Polyaromatic Hydrocarbons (PAHs);
- Carbon monoxide (CO);
- Benzene;
- 1,3-butadiene; and
- Lead.

These species are currently regulated because of their known or suspected deleterious effects upon human health, and because historically, relatively high concentrations have been recorded within and downwind of urban centres.

In most urban areas of the UK, traffic-generated pollutants have become the most common pollutants. These are NO₂, PM₁₀, CO, 1,3-butadiene and benzene.

This assessment of road traffic effects focuses on NO₂ and PM₁₀, as these pollutants are least likely to meet their Air Quality Strategy objectives near roads.

The following traffic-generated pollutants have been excluded from the road traffic assessment, along with justification:

- Lead, because it has now been removed from petrol fuels;
- SO₂, because of the introduction of low sulphur diesel and the relatively insignificant sulphur content of petrol fuels.
- CO, benzene or 1,3-butadiene, because only one of the 168 Local Authorities having designated AQMAs within the UK did so due to an exceedance of CO, benzene or 1,3-butadiene objectives.

1.4 Study Area

According to guidance published by the Institute of Environmental Assessment², an increase in road traffic of less than 10% is unlikely to give rise to significant environmental impacts and would not normally justify any further air quality assessment.

The traffic flows provided for the Development indicate that this trigger threshold would be exceeded on the B6069 where road traffic is predicted to increase by up to 13.7% due to the operation of the Development (based on a 2021 baseline).

The study area for this air quality assessment extends to three receptors (new housing proposed as part of the Development, a primary school opposite the Development site and existing housing along the B6096) and the effect on these receptors from increased traffic on the B6096. These receptors have been included as they are the closest residential and school receptors to the assessed route and as such they constitute worst case effects. The effects at other receptors, further from the route, would be lower than the effects predicted in this assessment.

¹ DEFRA (2016). National Air Quality Objectives. Available at: https://uk-air.defra.gov.uk/assets/documents/National_air_quality_objectives.pdf [accessed on 2/12/2016]

² Institute of Environmental Assessment. March 1993. Guidance Note 1: Guidelines for the Environmental Assessment of Road Traffic.

2 LEGAL AND PLANNING POLICY CONTEXT

2.1 National Policy and Legislation

2.1.1 Legislation

The principal air quality legislation in the UK is the Air Quality (England) Regulations (2000 and 2002 Amendment)³, which were enacted as part of the National Air Quality Strategy (NAQS) For England, Scotland, Wales and Northern Ireland (2000, and 2003 and 2007 addendums)⁴ under Section 80 of the Environment Act 1995.

The Strategy provides an over-arching strategic framework for air quality management by:

- Setting out a way forward for air quality issues;
- Setting out the air quality standards and objectives to be achieved; and
- Introducing a new policy framework for tackling fine particles.

Current assessment criteria applicable to the protection of human health and Local Air Quality Management are presented in Table 2.1 below for the study species in this assessment. Concentrations are expressed in micrograms per cubic metre ($\mu\text{g}/\text{m}^3$).

Table 2.1 National Air Quality Strategy Objectives ($\mu\text{g}/\text{m}^3$) for the protection of Human Health

Pollutant	Air Quality Objective		To be achieved by and maintained
	Concentration	Measured as	
Nitrogen dioxide (NO_2)	$200\mu\text{g}.\text{m}^{-3}$	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	$40\mu\text{g}.\text{m}^{-3}$	Annual mean	31/12/2005
Particles (PM_{10})	$50\mu\text{g}.\text{m}^{-3}$	24-hour mean not to be exceeded more than 35 times per year	31/12/2004
	$40\mu\text{g}.\text{m}^{-3}$	Annual mean	31/12/2004

Objectives for $\text{PM}_{2.5}$ have been introduced in the UK but are not included in Regulations. As such, this assessment has not considered the impact on $\text{PM}_{2.5}$.

The Regulations require that Local Authorities undertake a tiered appraisal of air quality within the borough to establish compliance or non-compliance with the targets established in the NAQS. Where the objectives are likely to be exceeded, the Authority must designate an Air Quality Management Area (AQMA) and establish an Action Plan for the region that outlines measures to achieve the objectives.

2.1.2 National Planning Policy and Guidance

On a national level, air quality can be a material consideration in planning decisions.

The National Planning Policy Framework (NPPF) (2012) sets out national planning policy for England; designed to make the planning system less complex, to protect the environment and promote sustainable development. The NPPF states that the “*planning*

³ The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043 (2002), HMSO and The Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000), HMSO.

⁴ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, July 2007’

system should contribute to 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 soil, air, water or noise pollution or land instability”.

The NPPF states that the effects of pollution on health and the sensitivity of the area and the development should be taken into account.

“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”.

The NPPF is supported by Planning Practice Guidance (PPG), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states the importance that the potential impact of new development on air quality is taken into account. The PPG states that:

“Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife)”.

The PPG sets out the information that may be required in an air quality assessment, making clear that *“Assessments should be proportional to the nature and scale of development proposed and the level of concern about air quality”.*

It also provides guidance on mitigating air quality impacts, stating *“Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact”.*

2.1.3 Land Use Planning and Development Control

In April 2010, guidance released by Environmental Protection UK (EPUK)⁵ provided a set of criteria used to determine whether a development will have a significant impact on air quality. If the proposed development results in a significant change in air quality or results in a change of relevant exposure to air quality, then it is reasonable to expect an air quality assessment to be undertaken.

In May 2015, Environmental Protection UK and the Institute of Air Quality Management (IAQM) released a final draft guidance to ensure that air quality is adequately considered in the land-use planning and development control processes⁶.

2.2 Local Planning Policy

The Development site is within Barnsley Metropolitan Borough Council (BMBC), but outside of any Air Quality Management Areas (AQMAS). Relevant local planning policies

⁵ Development Control: Planning for Air Quality (2010 Update), Updated guidance from Environmental Protection UK on dealing with air quality concerns within the development control process, Environmental Protection UK, April 2010

⁶ Land-Use Planning & Development Control: Planning for Air Quality. Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes. EPUK & IAQM. Final draft April 2015

are set out below. The BMBC Core Strategy forms the Development Plan and was adopted in September 2011. The following policies relate to air quality:

CSP 28 Reducing the Impact of Road Travel: *We will reduce the impact of road travel by:*

- *Developing and implementing robust, evidence based air quality action plans to improve air quality;*
- *Working with our sub regional partners, fleet and freight operators to improve the efficiency of vehicles and goods delivery, and reduce exhaust emissions; and*
- *Implementing measures to ensure the current road system is used efficiently.*

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.*

2.3 BMBC Air Quality and Emissions Good Practice Planning Guidance

Whilst planning policy cannot solve immediate air quality issues, it is identified as having a role to play so that any likely scheme impacts are reasonably mitigated and future scheme occupants are able to make more sustainable vehicle choices.

This guidance deals primarily with pollutants regulated under the local air quality management (LAQM) regime and the impact of traffic emissions. The assessment and control of dust impacts during demolition and construction is also considered.

Under the guidance air quality assessments follow a three stage process:

- Stage 1: Determining the classification of the development proposal by screening against criteria to identify whether they are classified as major, medium or minor;
- Stage 2: Assessing and quantifying the impact on local air quality;
- Stage 3: Determining the level of a mitigation required by the proposal to meet Local Development Plan requirements.

The impact on air quality is a material planning consideration in the determination of a planning application. The weight to be given to the impact on air quality in the consideration of a planning application and the acceptability of proposed mitigation measures lies with the relevant local planning authority. Any agreed measures will be taken forward by condition where possible, or through Section 106 agreements.

2.4 Barnsley Metropolitan Borough Council Air Quality Action Plan

In accordance with the LAQM.TG (16) guidance, BMBC has prepared an Air Quality Action Plan (AQAP)⁷ following the declaration of the AQMAs. This original plan covered the period 2012-2016. There is currently a new version of the AQAP which is under consultation⁸. Projects delivered from the 2012-2016 action plan include:

- Delivery of a Quality Bus Corridor traffic management scheme resulting in the revocation of an air quality management area (AQMA).
- Continued development of the ECO Stars fleet recognition scheme in order to reduce road traffic fleet emissions.
- Development of the Barnsley MBC Air Quality and Emissions Good Practice Planning Guidance, in order to mitigate against the air quality impact of future development in the borough.
- Implementation of intelligent traffic management systems to ease traffic flow and congestions, and hence reduce emissions.

The latest AQAP includes 26 further measures BMBC wishes to pursue to improve air quality, which include:

- Congestion management;
- Encourage uptake of low emission vehicles and alternative fuels;
- Air quality assessment and mitigation for planning applications;
- Control of industrial emissions;
- BMBC fleet improvements; and
- Priority parking for LEVs.

⁷ Barnsley Metropolitan Borough Council (2012) Air Quality Action Plan

⁸ Barnsley Metropolitan Borough Council (2016) Air Quality Action Plan Consultation Draft. Available online: <https://www.barnsley.gov.uk/media/4090/aqap-2016-consultation-draft.pdf>

3 ASSESSMENT METHODOLOGY

3.1 Construction Phase

Dust is an environmental concern during construction. Residents living in proximity to construction sites can potentially be affected by site dust up to 1 km from the source, although continual or severe concerns about dust sources are most likely to be experienced near to dust sources, generally within only 100 m.

In a Building Research Establishment (BRE)⁹ study, six months of continuous PM₁₀ sampling was undertaken at three stations within 200 m proximity of a large construction site. The 0.65-hectare site was a former chemical works and required demolition of existing buildings, excavation of soil to a depth of 1 m across the site, and subsequent erection of apartments. Average baseline PM₁₀ levels were approximately 12 µg/m³ prior to commencement of works. On average, throughout the 6 month period, PM₁₀ levels within 1 m of the site boundary increased by approximately 3 µg/m³ during site preparation, 11 µg/m³ during demolition, and 5 µg/m³ during piling and earth working. PM₁₀ levels about 150 m from the construction site were indistinguishable from background levels. In addition, the 24-hour limit for PM₁₀ was exceeded on only one occasion at the site boundary throughout the 6-month period.

The BRE study has been used as the basis for a qualitative assessment of construction dust effects.

IAQM guidance on the assessment of dust from construction and demolition¹⁰ identifies the main air quality impacts as being:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM₁₀ concentrations, as a result of dust generating activities on site; and
- An increase in concentrations of airborne particles and nitrogen dioxide due to exhaust emissions from diesel powered vehicles and equipment on site.

In relation to the most likely impacts, the guidance states the following:

- The most common impacts are dust soiling and increased ambient PM₁₀ concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of particulate matter in all size fractions; and
- Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed.

In IAQM guidance activities on construction sites are divided into four categories: demolition, earthworks, construction and trackout, in order to assess the risk of dust impacts in a quantitative manner.

The first requirement of the risk assessment process is to screen whether there is need for a detailed assessment. In the case of the Development the assessment is required as there are human receptors within 350 m of the boundary of the site and 50 m of the routes used by construction vehicles on the public highway up to 500 m from the site entrance.

⁹ Building Research Establishment (BRE). 2005. Effects of a Construction Site on Local PM₁₀ Levels.

¹⁰ Institute of Air Quality Management Guidance. 2014. Available online: http://iaqm.co.uk/wp-content/uploads/guidance/iaqm_guidance_report_draft1.4.pdf

The site is then assigned a risk category based on the scale and nature of works (defined as small, medium or large, based on professional judgement) and the sensitivity of the receiving environment (proximity and number of receptors, background PM₁₀ concentrations, presence of natural shelters etc., again based on professional judgement).

The magnitude and sensitivity are then combined in a matrix to define the risk of the impact and subsequent site specific mitigation requirements. The guidance advises that pre-mitigation effects should not be assessed and that following mitigation residual effects would normally be 'not significant'. It is acknowledged that even with rigorous dust management plans dust mitigation may not be effective all of the time, particularly under adverse weather conditions. As such occasional short term dust annoyance cannot be discounted.

The impact of exhaust emissions (PM₁₀) from construction vehicles has not been assessed. Based on EPUK guidance an assessment of construction exhaust emissions on the local road network is only required where HGV flows exceed 200 movements per day. The Development construction-related HGV flows are expected to be substantially less than this.

3.2 Operational Phase

The local air quality assessment has been undertaken in accordance with requirements of BMBC's 'Air Quality and Emissions Good Practice Planning Guidance'.

Following the criteria in the BMBC guidance the Development constitutes a medium proposal, i.e. it meets the requirement for a Transport Assessment by exceeding the residential dwelling (C3) threshold of 50 units. It does not trigger any of the criteria for major proposal (i.e. does not fall under the Town and Country Planning (Environmental Impact Assessment (England and Wales) Regulations 2011, is not in an AQMA and does not include additional HGV movements by more than 10% of total trips). Under the guidance medium proposals require that an assessment should be undertaken to determine the likelihood of introducing additional exposure and where necessary determining the level of mitigation that may be required.

The DMRB screening method has been used as an initial test to establish whether a more detailed assessment is required. The assessment considered concentrations of NO₂ and PM₁₀ to enable comparison with AQOs. Other pollutants were scoped out of the assessment as detailed in Section 1.3. If it is predicted that the air quality criteria would be exceeded, then the DMRB advises that detailed modelling is undertaken.

The screening method takes into account the:

- Distance from receptor to centre of roads;
- Average daily vehicle flows and speeds;
- Road type (motorway or A road, other urban roads, other roads);
- Proportion of light and heavy duty vehicles;
- Background concentrations of pollutants; and
- Predicted future traffic emissions.

Predictions have been made for the current baseline year (2016) and a future year (2021) representing a year with the proposed scheme in place in full occupation and includes the natural increase in baseline traffic flows.

3.3 Receptor Points

3.3.1 Construction Dust Assessment

In the qualitative assessment no specific receptors were considered.

In the IAQM risk assessment residential receptors with 100 m of the Application site, or within 20 m of the B6096 in the vicinity of the site entrance, were considered.

No ecological receptors were identified as requiring assessment.

3.3.2 DMRB Screening

For the purposes of the DMRB screening exercise three receptor points were selected. The assessment considers the air quality impact on these receptors from traffic on the B6096.

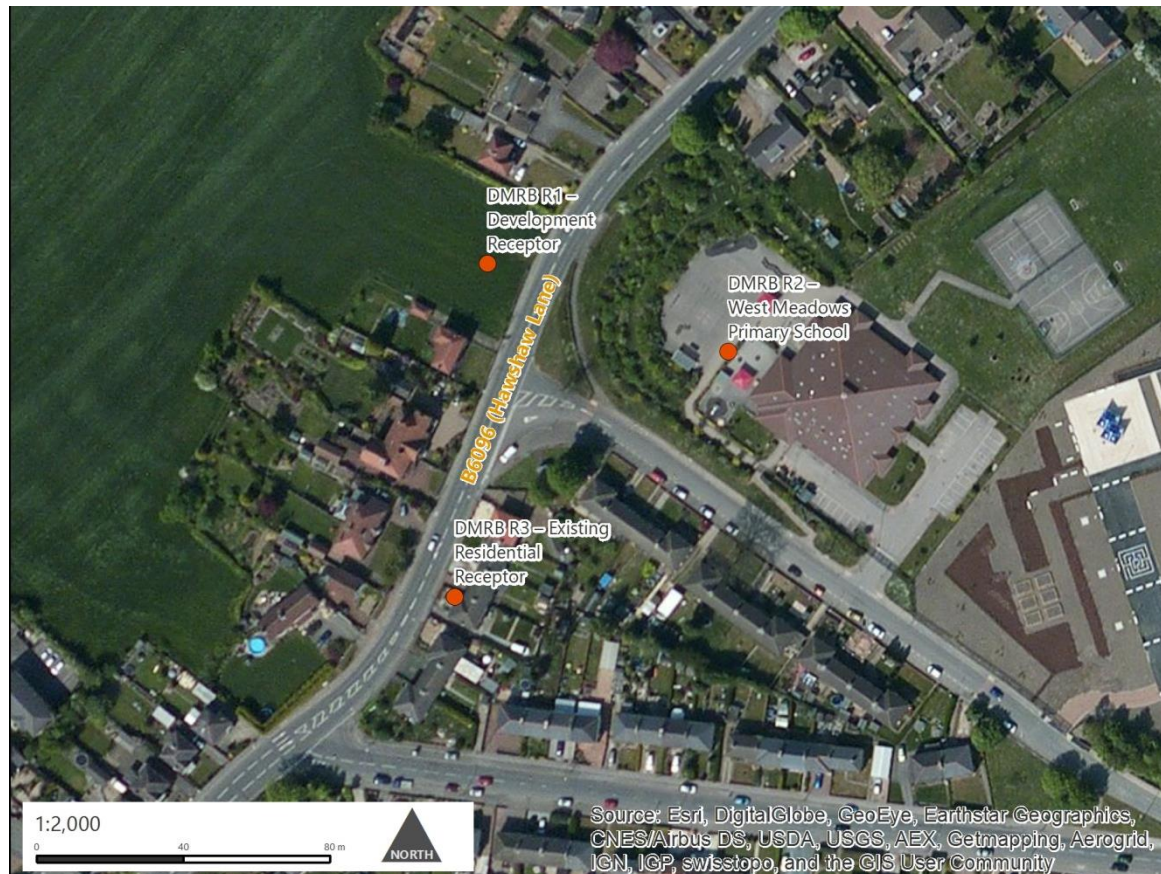
Table 3.1 details the receptors and the distances between the receptors and the assessed link. Figure 1 illustrates the location of the receptors and link.

No ecological receptors were identified as requiring assessment.

Table 3.1 Receptors and Links

Receptor	Distance to centre point of the B6096 (m)
DMRB R1 - Development Receptor	13
DMRB R2 – West Meadows Primary School	54
DMRB R3 – Existing Residential Receptor	10

Figure 1: Location of Sensitive Receptors and Link for DMRB Screening



3.4 Assessment Criteria

3.4.1 Construction Dust Assessment

Significant air quality effects are only anticipated if AQOs are predicted to be exceeded.

3.4.2 DMRB Screening

Significant air quality effects are only anticipated if AQOs are predicted to be exceeded.

3.5 Limitations and Assumptions

The assessment has utilised the background concentrations from 2016 for assessment in 2021 to provide a conservative assessment. This is despite evidence of downward trends in background concentrations of both NO₂ and PM₁₀ concentrations.

Although some breakdown of traffic flows has been reported in the TA, for the purposes of this assessment it is assumed that all Development traffic will utilise all routes.

The location of the residential units associated with the Development has not yet been confirmed, and whilst the majority will be set back from the B6096, it is understood that some properties will be built at the Development's access point off the B6096 and they will be set back a similar distance from the road to match the existing properties. These have been assessed as a worst case receptor as emissions at properties set back further from the B6096 would be lower.

4 BASELINE CONDITIONS

4.1 Baseline Air Quality

4.1.1 Industrial Sources

A search of the Environment Agency's 'What's in your Backyard'¹¹ website and Public Register¹² identified industrial permitted installations; none of which are within 3 km of the Development site. This search was complemented by a further review of aerial photographs and Google Streetview.

4.1.2 Air Quality Review

4.1.2.1 Local Authority Data

BMBC have declared seven AQMAs due to exceedances of the annual mean objective for NO₂:

- M1 motorway, 100 m either side of the central reservation within the Barnsley Borough;
- A628 Dodworth Road;
- Junction of A61 Wakefield Road and Burton Road;
- A61 Harborough Hill Road;
- Junction of A633 Rotherham Road and Burton Road;
- A616 passing through Langsett; and
- Junction of A61 Sheffield and A6133 Cemetery Road

The closest AQMA to the Development site is the M1 motorway AQMA, located approximately 1 km west of the Development and not in the study area.

BMBC operate a network of monitoring sites across the council area monitoring NO₂ and PM₁₀ both continuously and using passive techniques (diffusion tubes)¹³.

No continuous monitoring is undertaken near the Development site, with the nearest location in the AQMA on the A635 south of Barnsley (436298, 405691) approximately 5 km north of the Development site. It is noted that the monitoring location is not truly representative of the Development site being located on a busy A road much closer to the urban centre of Barnsley. However, a summary of monitoring results from this continuous monitoring location is detailed in Table 4.1 below for reference:

Table 4.1 Background Monitoring Data – A635 south of Barnsley

Pollutant	Annual Mean Pollutant Concentration (µg/m ³)				
	2011	2012	2013	2014	2015
Nitrogen dioxide (NO ₂)	41 (2)	39 (11)	37 (0)	35 (1)	-
Particulates (PM ₁₀)	-	-	-	25 (13)	20 (9)

Bold figures indicated exceedance of AQO, Exceedances of the 1hr NO₂ standard and daily hour PM₁₀ standard are shown in brackets.

¹¹ Environment Agency (2016) 'What's in your Backyard', [Online], Available: <http://www.environment-agency.gov.uk/homeandleisure/37793.aspx>.

¹² Environment Agency Public Register – Environmental Permitting Regulations. Available online: <https://environment.data.gov.uk/public-register/view/search-industrial-installations>

¹³ <https://www.barnsley.gov.uk/media/4007/bmbc-2016-air-quality-annual-status-report.pdf>

Annual mean NO₂ concentrations have been below the objective and decreasing between 2012 and 2014. In 2011 an exceedance of 1 µg/m³ was recorded over the AQO and no data was available for 2015. The number of exceedances of the 1 hour standard was well below the permitted 18 exceedances per year. PM₁₀ data collection commenced in 2014 and exists for 2014 and 2015. Annual mean concentrations were below the AQOs and decreasing and exceedances of the 24 hour standard were below the permitted 35 exceedances per year.

Diffusion tube monitoring of NO₂ concentrations is carried out closer to the Development site, as follows:

- DT82, Doncaster Road, approximately 650 m north of the Development site;
- DT 85, A6135, approximately 650 m west of the Development site.

A summary of monitoring results from DT85 is detailed in Table 4.2 below. Data from this location has been selected, over that from DT82 as it is considered more representative of the Development site. DT82 is dominated by the A6195 dual carriageway whereas DT85 is considered more similar in terms of location along a single carriageway A road passing through a residential area, despite being closer to the M1 than the Development site.

Table 4.2 Background NO₂ Concentrations – Diffusion Tube Location DT85

Monitoring Location	Annual Mean Pollutant Concentration (µg/m ³)				
	2011	2012	2013	2014	2015
DT85, A6135, Hoyland 435274, 400384	-	-	-	25.8	28.7

4.1.2.2 DEFRA Background Maps

Additional information on estimated background pollutant concentrations has been obtained from the Defra background maps provided on the UK-AIR, the Air Quality Information Resource¹⁴.

Estimated air pollution concentrations for NO₂ and PM₁₀ have been extracted from the background pollution maps for the UK. These maps are available in 1 km x 1 km grid squares and provide an estimate of concentrations across the UK. The grid centre used is located approximately 360 m from the Development site. Data has been obtained for 2016 (the base year) and 2021 (a future year when the Development will be operational) and is provided in Table 4.3.

Table 4.3 Background Pollutant Concentrations from DEFRA (435500, 400500)

Pollutant	Concentration (µg/m ³)	
	2016	2021
Nitrogen dioxide (NO ₂)	17.36	13.38
Particulates (PM ₁₀)	15.47	14.88

The data indicates that existing background concentrations are comfortably meeting the NO₂ and PM₁₀ objectives in the vicinity of the Development site. On the basis of the DEFRA data the concentrations for NO₂ and PM₁₀ are forecast to reduce by 2021.

¹⁴ <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013>

4.1.2.3 Summary

Whilst diffusion tubes allow for a much greater spatial coverage than automatic monitoring sites, they are acknowledged as a less accurate (up to 30% inaccuracy) method of monitoring ambient air pollutants than automatic monitors. Given this, and the unrepresentative nature of the continuous monitoring location, these data sources have not been considered further in this assessment with background concentrations obtained from DEFRA background maps. The DEFRA data indicates that existing background NO₂ and PM₁₀ concentrations are comfortably below the NO₂ and PM₁₀ objectives in the vicinity of the Development site. For this assessment the following background concentrations have been used:

- NO₂: 17.36 µg/m³; and
- PM₁₀: 15.47 µg/m³.

As detailed in Section 3.6 the assessment has utilised the background concentrations from 2016 for assessment in 2021, as a worst case assumption that background concentrations do not decrease.

4.2 Baseline Traffic Data

Baseline traffic flow data has been obtained from the Transport Assessment (TA) completed for the Development and undertaken by Fore Consulting. The TA was informed by automatic traffic counts (ATC) carried out between the 10th and 16th May 2016. This information was used to generate peak hourly flows, both AM and PM for a baseline year of 2016 along with a future baseline for 2021, which included a growth factor and the following known developments included:

- Land off Dearne Valley Parkway, Birdwell, Barnsley (Planning Application Reference Number 2014/1452): Erection of employment led mixed use scheme comprising office (B1), general industry (B2), warehouse/distribution (B8), food and drink (A3/A4/A5), hotel (C1) and petrol filling station/fast food restaurant (Sui Generis/A3) and associated infrastructure (Outline).
- Land to the North of Dearne Valley Parkway, Birdwell, Barnsley (Planning Application Reference Number 2014/1055): Formation of access roadway and associated infrastructure (Full). Outline planning application for a phased, mixed-use development comprising employment uses (B1bc/B8 with ancillary office B1a), hotel (C1) and/or car showroom/garage (sui generis/B2) and food & drink (A3, A4, A5) with associated infrastructure.

Background traffic growth factors (1.0843 for AM flows and 1.0869 for PM flows) have been taken from TEMPRO for principal urban roads in the Hoyland Nether (00CC2) zone.

The AM and PM peak flow data presented in the TA for the various scenarios is summarised in Table 4.3. This was then converted to AADT using the Department for Transport conversion TRA0307¹⁵, which presents traffic distribution by time of day on all roads in Great Britain in 2015. The exact calculation for AM and PM flows is shown in the asterix notes beneath the table. The AADT data then used in this assessment is summarised in Table 4.4, the higher flow between the AM and PM peaks has been used – in all cases this was the AM peak.

¹⁵ <https://www.gov.uk/government/statistical-data-sets/tra03-motor-vehicle-flow>

Table 4.3 Traffic Data Conversion

Year	AM Peak	PM Peak	AM – AADT*	PM – AADT**
2016	603	585	8,040	7,055
Development	90	85	1,200	1,025
2021 Without Development	654	636	8,720	7,670
2021 With Development	744	721	9,920	8,695

* AM AADT calculated from peak flow as follows – 2400 x Peak Hr Flow/ 180

** PM AADT calculated from peak flow as follows – 2400 x Peak Hr Flow/ 199

Table 4.4 Annual Average Daily Traffic Flows, Percentage HDV and Speeds for Selected Roads

Road	Vehicle Speed (km/h)*	Baseline Flows (2016)		Baseline Flows (2021)		Baseline Flow with Development (2021)	
		AADT	% HGV**	AADT	% HGV	AADT	% HGV
B6096 (Hawshaw Lane)	57.3	8,040	0.4	8,720	0.4	9,920	0.4

* 85th percentile speed for B6096 from ATC survey – 35.6 mph

** Percentage HGV data taken from the ATC survey as being any vehicle with 3 or more axels. No HGVs proposed for operation of the Development

By comparison the week-long 2016 ATC survey recorded an average daily flow of 5,836 (7 day average) and 6,266 (5 day average) trips along the B6069. By using the traffic flow figures in Table 4.4 the assessment is considered to represent a worst case scenario in terms of baseline traffic volumes.

4.3 Meteorological Conditions

Local meteorological conditions strongly influence the dispersion of pollutants, in particular dust. Rainfall, in particular, decreases dust emissions due to both surface wetting and increasing the rate at which airborne dust is removed from air. In contrast, strong drying winds increase the rate at which dust is lifted from an untreated surface and emitted into the air and also has the effect of spreading dust over a larger area.

5 POTENTIAL IMPACTS, MITIGATION MEASURES AND RESIDUAL IMPACTS

5.1 Construction Phase Effects

5.1.1 Qualitative Assessment

The findings of the 2005 BRE study¹⁶ on PM₁₀ from construction sites have been applied to the Development proposal, which has a baseline roadside PM₁₀ concentration of 15.47 µg/m³. This leads to an average concentration at the site boundary of 20.47 µg/m³ during piling and earthworking activities, which is comfortably within the AQO of 40 µg/m³ for the annual mean and the 50 µg/m³ 24-hour objective. Concentrations are anticipated to be lower still during other phases of construction, and would decrease with distance from the construction activity.

There are no demolition activities associated with the Development which would have the potential to increase dust generation.

5.1.2 Quantitative Assessment

5.1.2.1 Dust Emission Magnitude

Demolition

There are no demolition works required as part of the Development; demolition effects are scoped out of further detailed assessment.

Earthworks

The characteristics of the soil at the development site were obtained from a review of online British Geological Society Maps¹⁷. The site is shown to be underlain by the Pennine Middle Coal Measures with no superficial deposits. In surrounding areas the mudstone is interspersed with sandstone bedrock. The coal measures are described as follows:

Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit.

Overall, it is considered that, when dry, this material has the potential to be moderately dusty. The dust emission magnitude for earthworks is considered to be **medium**.

Construction

Construction will primarily involve erection of circa 100 residential units on a currently undeveloped site. The majority of works would require the construction of new structures involving both brick and timber which could potentially generate some dust. The dust emission magnitude for construction is considered to be **medium**.

Trackout

The number of vehicles accessing the site, which may track out dust and dirt, is currently unknown. Given the size of the site there may be more than 10 outward heavy vehicle movements per day. The dust emission class for trackout is considered to be **medium**.

¹⁶ Building Research Establishment (BRE). 2005. Effects of a Construction Site on Local PM₁₀ Levels.

¹⁷ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

Summary

Table 5.1 summarises dust emission magnitude for the Development

Table 5.1 Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	N/a
Earthworks	Medium
Construction	Medium
Trackout	Medium

5.1.2.2 Sensitivity of Area

Effects from Dust Soiling

The IAQM guidance states that residential properties are 'high' sensitivity receptors to dust soiling. There are existing residential properties to the south, southeast and east of the Development site (immediately adjacent). The area surrounding the Development site is of **high** sensitivity to dust soiling.

The dust emission magnitude for trackout is medium and there is potential for material to be tracked away from the site entrance. It is not known where the construction materials will be stored or works carried out, furthermore, it is not known which roads construction vehicles will use, although the B6096 will likely be the principal route. There are residential properties within 20 m of the B6096 in the vicinity of the site entrance which might be affected by trackout. The area surrounding the Development site is of **high** sensitivity to dust soiling.

Human Health Effects

Residential properties are classified as being of 'high' sensitivity to human health effects. The 2021 baseline PM₁₀ concentration used in the assessment (the 2016 value) is 15.47µg/m³. Using the matrix in the guidance, the area surrounding the Development site is of **low** sensitivity to human health effects and the area surrounding roads along which material may be tracked from the site is also of **low** sensitivity.

Ecological Effects

There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked within the vicinity of the Development site. The closest designations include Potter Holes Plantation Local Nature Reserve located over 1.6 km west. There are no national or internationally designated sites within at least 5 km of the Development site. This distance is substantially further than the distance the IAQM guidance suggest may result in a significant effect and it is considered highly unlikely the Development could emit dust emissions which may significantly impact designated ecological receptors and as such ecological impacts are not considered further in this assessment.

Summary

Table 5.2 summarises dust emission sensitivity for the Development

Table 5.2 Summary of Area Sensitivity

Effects Arising From	Sensitivity of Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High	High
Human Health	Low	Low
Ecological	None	None

5.1.2.3 Risk Assessment

A risk category for each activity is a combination of dust emission magnitudes and environmental sensitivity. Table 5.3 provides a summary of risk of impact (without mitigation).

Table 5.3 Risk of Impact

Source	Dust Soiling	Human Health	Ecology
Demolition	N/a	N/a	N/a
Earthworks	Medium Risk	Low Risk	N/a
Construction	Medium Risk	Low Risk	N/a
Trackout	Medium Risk	Low Risk	N/a

5.1.3 Mitigation Measures

A number of best practice mitigation measures could be employed to minimise dust emissions during construction. Measures such as, but not limited to, the following should be considered:

- Develop a Dust Management Plan;
- Damping down of brick walls during building demolition;
- Regular inspection and wet suppression of material/soil stockpiles where necessary (including wind shielding or complete enclosure, storage away from site boundaries, and restricted height of stockpiles), with increased frequency when activities with high potential to generate dust are carried out during prolonged dry or windy conditions;
- Appropriate orientation of material stockpiles;
- Provision of wheel washing and wet suppression during loading of wagons/ vehicles;
- Covering vehicles carrying dry spoil and other wastes to prevent escape of materials;
- Shielding of dust-generating construction activities;
- Use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques;
- Use enclosed chutes, conveyors and covered skips;
- Avoid site runoff of mud or water; and
- Provision of suitable site hoarding.

A contractor will be commissioned prior to beginning works to produce a Construction Method Statement (CMS), which will present a comprehensive list of mitigation measures, for agreement with the Council.

5.1.4 Residual Effects

The IAQM guidance is clear that with appropriate mitigation in place the residual effect will normally be 'not significant'. The mitigation measures discussed above are based on the IAQM guidance; with these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

However, the IAQM guidance acknowledges that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, particularly under adverse weather conditions. During these events, short-term dust annoyance may occur. However, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

5.2 Operational Phase Effects - Impacts of the Development on Existing and New Receptors

Tables 5.1 presents the calculated pollutant concentrations for the following scenarios:

- 2016, baseline year
- 2021, future year, considering known developments and natural traffic growth; and
- 2021, as above plus traffic arising from the Development.

Table 5.1 Modelled Concentrations at Receptors from traffic on the B6069 ($\mu\text{g}/\text{m}^3$)

	Pollutant	Objective	Averaging period	Background Concentration	Road Traffic Component	Total
DMRB R1 - Development Receptor	Baseline 2016					
	NO ₂	40	Annual mean	17.36	1.50	18.86
	PM ₁₀	40	Annual Mean	15.47	0.41	15.88
		50	24 hour Mean	-	-	0.28*
	Baseline 2021 (Without Development)					
	NO ₂	40	Annual mean	17.36	1.60	18.97
	PM ₁₀	40	Annual Mean	15.47	0.44	15.91
		50	24 hour Mean	-	-	0.29*
	2021 With Development					
	NO ₂	40	Annual mean	17.36	1.74	19.10
	PM ₁₀	40	Annual Mean	15.47	0.49	15.96
		50	24 hour Mean	-	-	0.30*
DMRB R2 - West Meadows Primary School	Baseline 2016					
	NO ₂	40	Annual mean	17.36	0.61	17.97
	PM ₁₀	40	Annual Mean	15.47	0.14	15.61
		50	24 hour Mean	-	-	0.21*
	Baseline 2021 (Without Development)					
	NO ₂	40	Annual mean	17.36	0.64	18.00
	PM ₁₀	40	Annual Mean	15.47	0.15	15.62
		50	24 hour Mean	-	-	0.21*
	2021 With Development					
	NO ₂	40	Annual mean	17.36	0.71	18.07
	PM ₁₀	40	Annual Mean	15.47	0.17	15.64
		50	24 hour Mean	-	-	0.22*

	Pollutant	Objective	Averaging period	Background Concentration	Road Traffic Component	Total
DMRB R3 – Existing Residential Receptor	Baseline 2016					
	NO ₂	40	Annual mean	17.36	1.61	18.97
	PM ₁₀	40	Annual Mean	15.47	0.44	15.91
		50	24 hour Mean	-	-	0.29*
	Baseline 2021 (Without Development)					
	NO ₂	40	Annual mean	17.36	1.68	19.04
	PM ₁₀	40	Annual Mean	15.47	0.47	15.94
		50	24 hour Mean	-	-	0.30*
	2021 With Development					
	NO ₂	40	Annual mean	17.36	1.87	19.23
	PM ₁₀	40	Annual Mean	15.47	0.53	16.00
		50	24 hour Mean	-	-	0.31*

* Number of days exceeding 24 hr Mean

Table 5.1 demonstrates that concentrations of pollutants at the nearest existing residential receptor (DMRB R3) are within the relevant AQOs: NO₂ (19.23 µg/m³) and PM₁₀ (16 µg/m³). The contribution to the total concentration at the existing receptor resulting from proximity to the B6069 is predicted to be negligible: NO₂ (1.87 µg/m³) and PM₁₀ (0.53 µg/m³).

Table 5.1 also demonstrates that concentrations of pollutants at the nearest residential receptors proposed as part of the Development (DMRB R1) are within the relevant AQOs: NO₂ (19.1 µg/m³) and PM₁₀ (15.96 µg/m³). The contribution to the total concentration at the new receptors resulting from proximity to the B6069 is predicted to be 1.7 µg/m³ for NO₂ and 0.49 µg/m³ for PM₁₀. Of this road contribution a negligible proportion is as a result of the Development; 0.14 µg/m³ for NO₂ and 0.05 µg/m³ for PM₁₀.

The modelled results at West Meadows Primary School (DMRB R2) are lower than the other two receptors.

This is a worst case assessment assuming background concentrations in 2021 are the same as 2016. In reality the background concentrations would likely reduce due to the introduction of newer cleaner vehicles, and gradual removal of older more polluting vehicles.

The 2021 background concentrations of NO₂ and PM₁₀ at the worst case receptor (existing residential properties along the B6069), taking account of traffic generated by the Development, are conservatively predicted to be 52% and 60% below the NO₂ and PM₁₀ annual average AQOs, respectively.

The Development will therefore have no significant impact on the air quality at existing residential receptors, or at proposed housing associated with the Development.

As a result no detailed modelling is required and no mitigation measures have been recommended as part of this assessment.

6 CONCLUSIONS

A qualitative assessment of construction dust effects has been undertaken which has found that the AQO for PM₁₀ will not be exceeded. In addition a risk assessment of construction dust effects has also been undertaken in accordance with IAQM guidance. This assessment scoped out demolition effects and effects on ecological receptors. It concluded medium risk from earthworks, construction and trackout on dust soiling and low risk from earthworks, construction and trackout on human health receptors. Following the implementation of best practice mitigation measures no significant effects are predicted.

The DMRB screening assessment has demonstrated that background air quality in 2021, when the Development is operational, will not exceed Air Quality Objectives for NO₂ or PM₁₀ at existing or new receptors.

Overall the Development is predicted to have a negligible impact on the surrounding environment, including existing residential properties along the B6069, West Meadows Primary School opposite the Development site and new residential properties proposed as part of the Development.