



Air Quality Assessment

Old Mill Lane, Barnsley, S71 1PJ

Hadfield Developments

February 2022

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1 Introduction

1.1 Overview

Hadfield Developments ('the client') is seeking planning permission for the development of a new car park on Old Mill Lane, Barnsley, S71 1PJ, which lies within Barnsley Metropolitan Borough Council (BMBC).

AVAL Consulting Group Limited (ACGL) was instructed by the client to produce an Air Quality Assessment to accompany the planning application to the BMBC for consent to undertake the proposed work.

The potential local air quality effects of the proposed development have been assessed using the latest planning guidance from Environmental Protection UK (EPUK), the Institute of Air Quality Management (IAQM)¹ and the Department for Environment, Food and Rural Affairs (Defra)².

A construction dust risk assessment has been undertaken, to consider the potential risk from dust-generating activities during the construction phase of the development. This has been carried out in accordance with the latest IAQM guidance on construction dust³.

1.2 Objective

This report provides an assessment of the following key impacts associated with the constructional and operational phase of the proposed development:

- Nuisance, loss of amenity and health impacts associated with the construction phase of the development on sensitive receptors;
- Changes in traffic-related pollutant concentrations associated with the operational phase of the proposed development;
- Suitability of the site in terms of air quality impact on existing receptors.

¹ IAQM (2017): 'Land Use Planning and Development Control: Planning for Air Quality v1.2'

² Defra (2016): 'Local Air Quality Management – Technical Guidance (TG16)'

³ IAQM (2016): 'Guidance on the Assessment of Dust from Demolition and Construction v1.1'.

1.3 Site Location

Figure 1.1 shows the location of the proposed development site, which is located outside of an Air Quality Management Area (AQMA). The closest Local Nature Reserve is less than 1km east of the proposed development site. There is an AQMA located approximately 500m south-east of the proposed development.

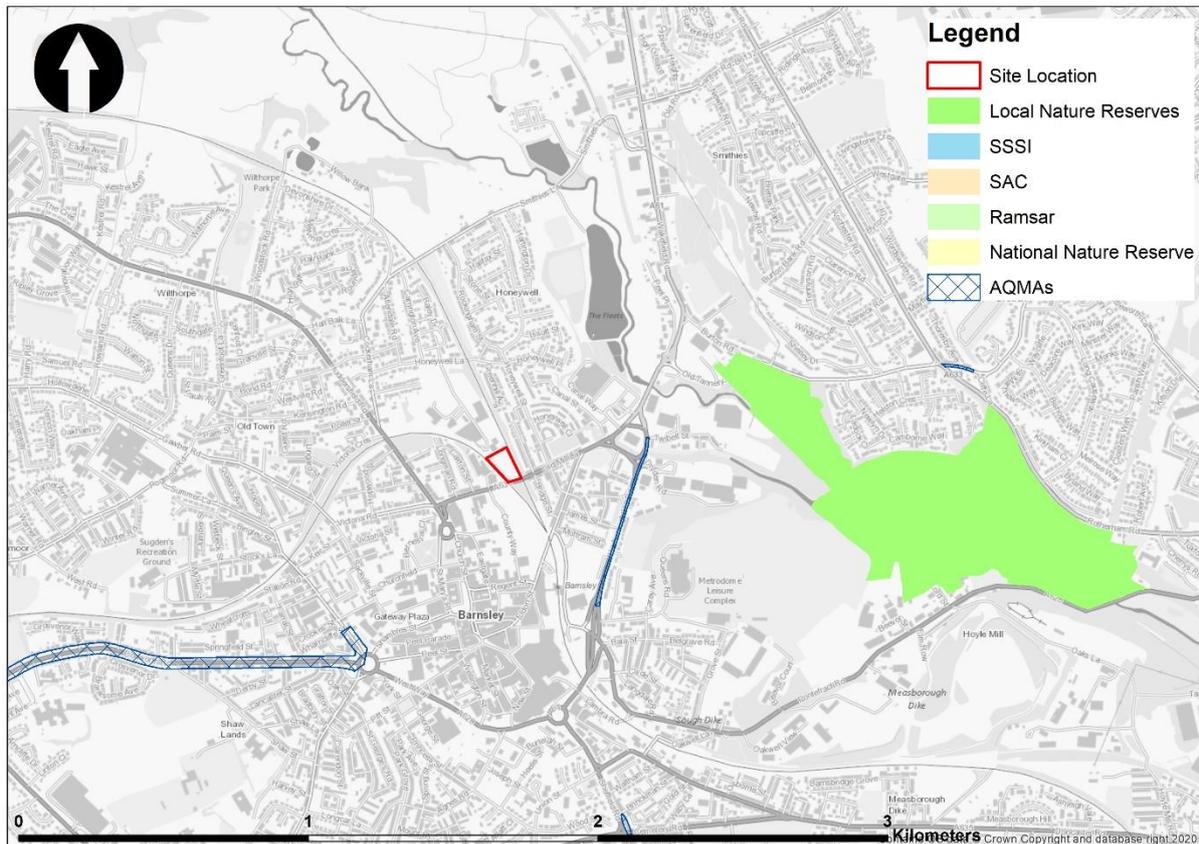


Figure 1.1: Proposed site location (Source: ArcGIS)

1.4 Key Pollutants

The key pollutants associated with the construction phase of the project will be 'disamenity' or 'nuisance' dust. The key pollutants associated with the operational phase of the proposed development will be road traffic emissions, including nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}). These pollutants are therefore considered as part of this assessment. Further details of the key pollutants are presented in Appendix A.

2. Legislation and Policy

This section summarises all legislation, policy, statutory and non-statutory guidelines relevant to the proposed development. Furthermore, the latest regional and local planning policy guidance specifically applicable to the proposed development has been reviewed.

2.1 European Union

The EU sets legally binding limit values for outdoor air pollutants to be met by EU countries by a given date. These limit values are based on the World Health Organisation (WHO) guidelines on outdoor air pollutants. These are legally binding and set out to protect human health and the environment by avoiding, preventing or reducing harmful air pollution effects.

The current air quality directive is the Directive 2008/50/EC⁴ on ambient air quality, and cleaner air for Europe entered into force in June 2008. This merged most of the existing 'Daughter' Directives⁵ (apart from the fourth Daughter Directive); maintaining existing air quality objectives set out by 'Daughter' Directives for sulphur dioxide (SO₂), nitrogen dioxide (NO₂), and oxides of Nitrogen (NO_x), particulate matter (PM₁₀ and PM_{2.5}), lead (Pb), benzene(C₆H₆), carbon monoxide (CO), ozone (O₃). It also includes related objectives, exposure concentration obligation and exposure reduction targets for PM_{2.5} (fine particles). The 'Daughter' Directives were based upon requirements set out in the first EU Ambient Air Quality Framework Directive 96/92/EEC⁶.

2.2 National Level – England

The UK government has a legal responsibility to meet the EU limit values. Part IV of the 1995 Environment Act⁷ sets guidelines for protecting air quality in the UK and forms the basis of the local air quality management. The Environment Act requires local authorities in the UK to review air quality in their area periodically and designate 'Air Quality Management Area' (AQMA) if improvements are necessary. Where an AQMA is designated, local authorities are also required to produce an 'Air Quality Action Plan' (AQAP) detailing the pollution reduction measures that need to be adopted to achieve the relevant air quality objectives within an AQMA.

As part of the Environment Act, the UK Government was required to publish a National Air Quality Strategy (NAQS) to establish the system of 'local air quality management' (LAQM) for the designation of AQMAs. This led to the introduction of the first Air Quality Strategy (AQS) in 1997⁸ which since has progressed through several revisions until it was replaced by the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007⁹. Each revision introduced strategies and regulations that considered measures for different pollutants by tightening existing objectives and by introducing new

⁴ European Union (2008): 'Ambient air quality assessment management', Framework Directive 2004/50/EC.

⁵ European Union. (1999), 'Ambient air quality assessment management', Framework Directive 1999/30/EC;

European Union. (2000), 'Ambient air quality assessment management', Framework Directive 2000/3/EC;

European Union. (2002), 'Ambient air quality assessment management', Framework Directive 2002/3/EC;

European Union. (2004), 'Ambient air quality assessment management', Framework Directive 2004/107/EC.

⁶ European Union. (1996), 'Ambient air quality assessment management', Framework Directive 96/62/EC.

⁷ Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament.

⁸ Department for Environment Food and Rural Affairs. (1997), 'The United Kingdom National Air Quality Strategy', Cm 3587, Department for Environment Food and Rural Affairs.

⁹ Department for Environment Food and Rural Affairs. (2007), 'The Air Quality Strategy for England, Scotland, Wales and Northern Ireland', Cm 7169, Department for Environment Food and Rural Affairs.

ones to establish a common framework to protect human health and the environment by achieving ambient air quality improvements.

The 2008 EU ambient air quality directive 2008/50/EC was transposed to England law through the introduction of the Air Quality (Standards) Regulations in 2010¹⁰ which also incorporated the fourth EU Daughter Directive (2004/107/EC) that set target values for certain toxic heavy metals and polycyclic aromatic hydrocarbons, (PAH).

2.2.1 National Planning Policy Framework

The principal national planning policy guidance in respect of the proposed development is the National Planning Policy Framework (NPPF)¹¹. The most recent update of the NPPF was published on 20th July 2021 by the Department for Communities and Local Government (DCLG).

The NPPF Section 105 states that:

The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations that are or can be made sustainable, by limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making.

Section 174 states:

“Planning policies and decisions should contribute to and enhance the natural and local environment by:

...preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water, or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans...”

Section 185 states:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and

¹⁰ Statutory Instrument. (2010), ‘The Air Quality Standards Regulations’, No. 1001. Queen’s Printer of Acts of Parliament.

¹¹ National Planning Policy Framework. Accessible at:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/810197/NPPF_Feb_2019_revised.pdf

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes, and nature conservation.

Section 186 states that:

Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.”

2.2.2 Relevant National Planning Practice Guidance

The DCLG published a number of supporting web-based resources of Planning Practice Guidance (PPG)¹² to supplement the NPPF. With respect to air quality PPG provide guidance on when air quality is relevant to a planning application. It states that:

“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 also states that, when deciding whether air quality is relevant to a planning application, the applicant should consider whether the proposal will:

“Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. Introduce new point sources of air pollution.....,

Expose people to existing sources of air pollutants.....,

Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.....,

- Affect biodiversity.....”

2.2.3 Statutory Nuisance

It is recognised that the planning system presents a way of protecting amenity. However, in cases where planning conditions are not applicable to a development/installation, the requirements of the Environmental Protection Act 1990 still apply. Under Part III of the Environmental Protection Act 1990, local authorities have a statutory duty to investigate any complaints of:

- “any premises in such a state as to be prejudicial to health or a nuisance

¹² National Planning Practice Guidance web-based resource. Accessible at: <http://planningguidance.planningportal.gov.uk/>

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

Where the local authority establishes any one of these issues constitutes a statutory nuisance and believes it to be unreasonably interfering with the use or enjoyment of someone’s premises and/or is prejudicial to health, an abatement notice will be served on the person responsible for the offence or the owner/occupier. Failure to comply with the notice could lead to prosecution. However, it is considered as a defence if the best practicable means to prevent or to counteract the effects of the nuisance are employed.

2.2.4 Relevant National Air Quality Standards

A summary of the relevant Air Quality Standards/Objectives (henceforth referred to as ‘AQO’) and the types of receptors that are relevant to this assessment are presented in Table 2.1 and Table 2.2. The AQO listed in Table 2.1 applies only at locations with relevant exposure where a member of the public could be exposed to a level of pollution concentration for the specific averaging periods for that pollutant as stated in Table 2.2.

Table 2.1: AQO Relevant to the Proposed Development

Pollutant	Air Quality Objectives		Concentration measured as:	Applicable to:
	Concentration	Allowance		
Nitrogen Dioxide (NO ₂)	200 µg/m ³	18 per calendar year	1-hour mean	All local authorities
	40 µg/m ³		Annual mean	All local authorities
Particulate Matter (PM ₁₀)	50 µg/m ³	35 per calendar year	24-hour mean	All local authorities
	40 µg/m ³		Annual mean	All local authorities
Particulate Matter (PM _{2.5}) Exposure reduction ^(a)	25 µg/m ³ ^(a)		Annual	England only

Notes: (a) This is a target value set for a 15% reduction in concentrations at urban backgrounds aimed to achieve between 2010 and 2020

Source: Department for Environment Food and Rural Affairs (2014): ‘Local Air Quality Management Technical Guidance’ (TG.16).

Table 2.2: Examples of Where the AQO Should Apply

Averaging period	Objectives should apply at	Objectives should not apply at
Annual	<i>All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.</i>	<i>Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.</i>
24 Hour	<i>All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.^(a)</i>	<i>Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.</i>
1 Hour	<i>All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.</i>	<i>Kerbside sites where the public would not be expected to have regular access.</i>

Note: ^(a) “Such locations should represent parts of the garden where relevant public exposure to pollutants is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.”

Source: Department for Environment Food and Rural Affairs (2014): ‘Local Air Quality Management Technical Guidance’ (TG.16).

2.3 Local Level – Barnsley Borough Council

The Barnsley Borough Council Local Plan states the main policy relating to Air Quality.

Policy T5: Reducing the Impact of Road Travel states:

“ We will reduce the impact of road travel by:

- *Developing and implementing robust, evidence based air quality action plans to improve air quality.”*

Policy AQ1: Development in Air Quality Management Areas states that:

“Development which impacts on areas sensitive to air pollution in air quality management area 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), taking into account any suitable and proportionate mitigation required for the development.

We will only allow development which impacts on areas sensitive to air pollution which could cause more air pollution, where the developer provides an assessment that shows there will not be a significant harmful effect on air quality, subject to any required mitigation.”

3. Methodology

3.1 Overview

This section provides the details of the methodological approach taken to assess the impacts on air quality from the construction and operation stages of the proposed development.

3.2 Scope of the Assessment

3.2.1 Construction Phase

Based on the IAQM Guidance, sensitive receptors within 350 m of the proposed development have been considered.

For track out IAQM guidance suggest without site-specific mitigation, track out may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. It is considered that the track out impact declines with distance from the site, and it is only necessary to consider track out impacts up to 50 m from the edge of the road.

A construction dust assessment was carried out to consider impacts from 'disamenity' (or 'nuisance') dust, as discussed in Appendix A3, associated with annoyance. The development has the potential to generate dust during the construction phase of the project. Although there are no standards (such as AQO) for dust disamenity or annoyance, various 'custom and practice' criteria have become established.

For the purposes of this assessment, IAQM's 2016 construction dust guidance¹³ has been used. The IAQM guidance provides a methodology (Appendix B) to evaluate the potential risk of dust generation for development and the level of mitigation required. The impact of the development is described using one of the following three categories: 'Low Risk', 'Medium Risk' and 'High Risk'. Based on the risk level, appropriate mitigation measures can be considered to minimise any effects of dust from the construction phase.

3.2.2 Operational Phase

The proposed development has the potential to cause adverse impacts on air quality, as it is expected that it will generate a significant number of vehicle trips.

Trip generation data was provided by KEI Services Ltd. which indicated that the proposed development would generate approximately 456 daily trips. As this is close to the threshold of the EPUK Criteria, of 500 AADT, a traffic-related air quality impact assessment has been undertaken.

¹³ Institute of Air Quality Management (2014): 'Guidance on the Assessment of Dust from Demolition and Construction'

3.3 Detailed Air Quality Assessment

3.3.1 Modelled Scenarios

Based on the above the following scenarios have been considered to assess the impact of the proposed development:

- 2019 base year (for verification);
- 2026 without the development; and
- 2026 earliest year of occupation.

According to the guidance provided by Defra in their Air Quality Strategy, vehicle emissions are expected to decrease in future years as a result of advancements in abatement technologies. It is also expected that more stringent emission limits will be imposed upon manufacturers.

3.3.2 Dispersion Model Used

The assessment on identifying the impact of current traffic-related emissions sources in the area of the proposed development has been carried out using the latest version of 'ADMS-Roads' dispersion modelling software (version 5.0.0.1) developed by Cambridge Environmental Research Consultants (CERC). This model is commonly used in assessing planning application and regulatory assessment of traffic-related emissions.

The science of ADMS-Roads is significantly more advanced than that of most other air dispersion models (such as CALINE, ISC and R91) in that it incorporates the latest understanding of the boundary layer structure, and goes beyond the simplistic Pasquill-Gifford stability categories method with an explicit calculation of important parameters. The model uses advanced algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions.

3.3.3 Road Traffic Data

The following key facts of the road traffic data were considered:

- Traffic data has been obtained from road traffic statistics published by the government and accessible via <https://roadtraffic.dft.gov.uk>
- A TEMPro factor has been applied to 2019 traffic data to predict traffic volumes in 2026;
- The speed at junctions has been reduced as advised in Defra Technical Guidance (TG16) for a robust assessment;
- Where measured road speed is not available we have used the existing road speed limit for the purpose of this assessment.

Table 3.1 shows the traffic data for the proposed development, and Figure 3.1 and 3.2 shows the extent of the ADMS-Roads dispersion modelling network.

Table 3.1: Relevant traffic Data for the Proposed Development

Link Name	Without the Development (2026)			With the Development (2026)		
	AADT	HDV%	Speed (kph)	AADT	HDV%	Speed (kph)
Old Mill Lane	15,418	1%	32 (worst-case assumption of 20mph)	15,874	1%	32 (worst-case assumption of 20mph)
Roundabout	15,418	1%	16 (worst case assumption of 10mph)	15,874	1%	16 (worst-case assumption of 20mph)
Slip road	15,418	1%	16 (worst case assumption of 10mph)	15,874	1%	16 (worst-case assumption of 10mph)

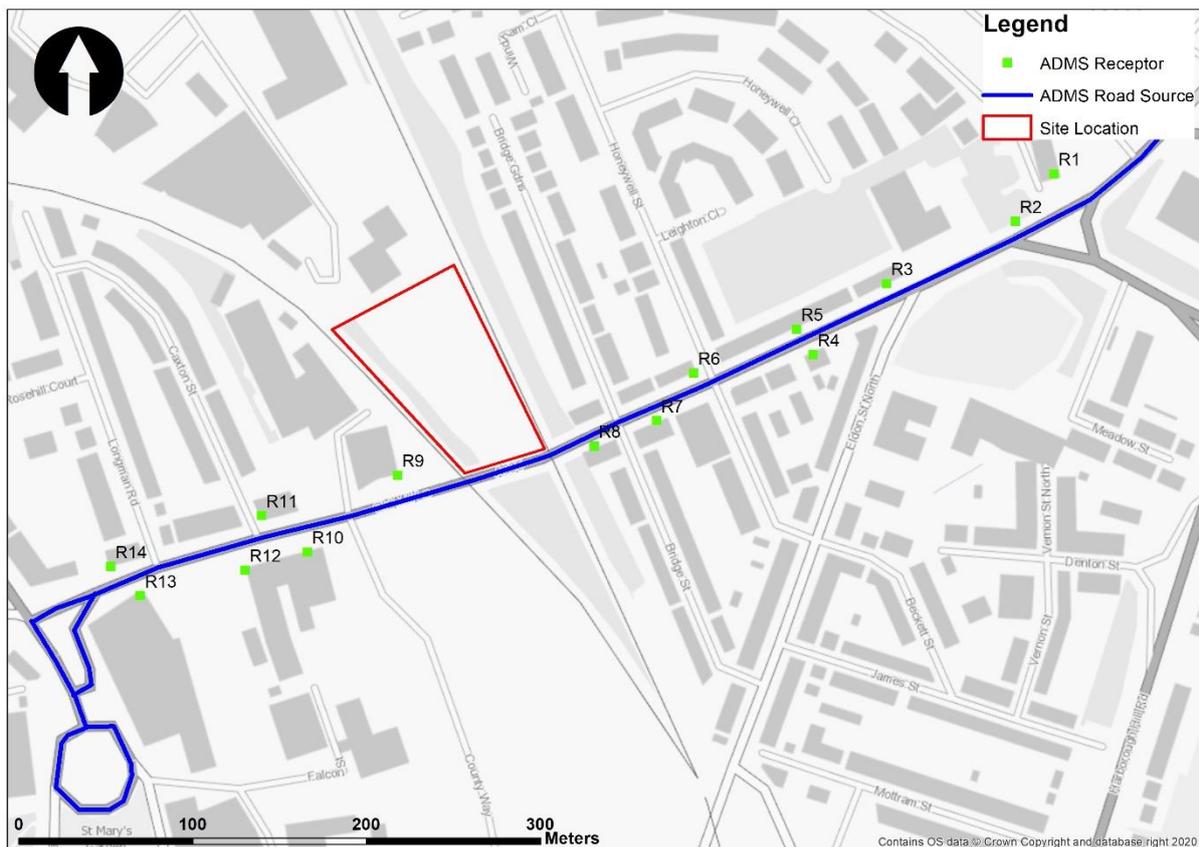


Figure 3.1: Modelling Network of existing road with Receptors used for ADMS-Roads Dispersion Modelling.

3.3.4 Meteorological Data

The key meteorological parameters for dispersion modelling are wind speed and wind direction. There are other meteorological parameters, which also need to be taken into account such as cloud cover, surface temperature, precipitation rate, and relative temperature.

The most representative meteorological monitoring station identified is the Emley Moor meteorological monitoring site which is located approximately 13km from the proposed development site.

In order to undertake a worst-case meteorological assessment, dispersion modelling has been carried out with meteorological data from the period 2018 to 2020. The maximum annual mean concentrations predicted across the modelled years have been used for each receptor. Figure 3.3 below presents the windrose for each modelling year.

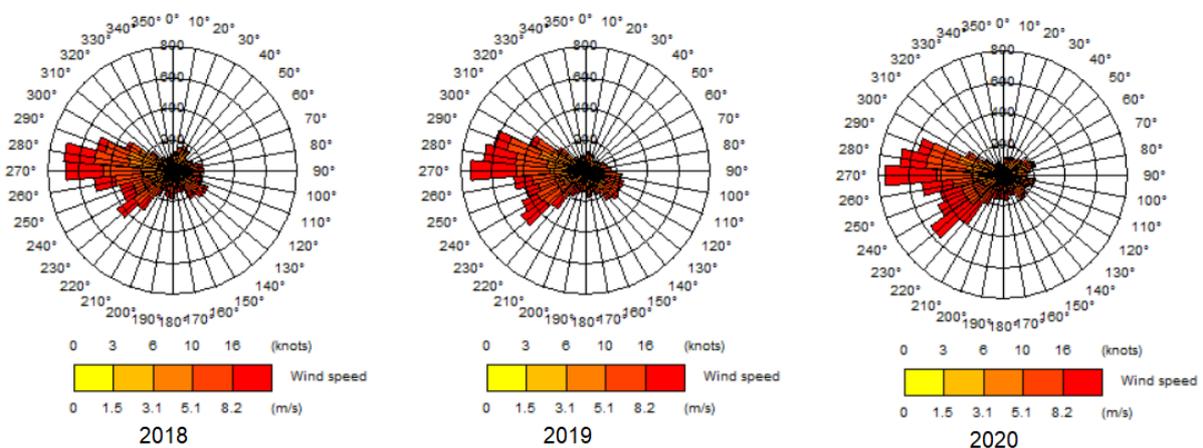


Figure 3.3: Windrose for Emley Moor Meteorological Station 2018-2020

3.3.5 Assessment of Background Concentrations

This assessment considers road traffic emission sources in detail, and as part of the predictive process, all non-road traffic-related emission sources in the Defra data set were assigned appropriate 'background' concentrations at the modelled receptors. Further details regarding the assignment of background pollution concentration are presented in Section 4.3.

3.3.6 Emission Factors

For the purpose of this assessment, the latest Defra Emission Factor Toolkit (EFT 10.1) has been used for the earliest opening year. The EFT Version 10.1 has been developed for the UK by the National Atmospheric Emissions Inventory (NAEI) and Transport for London (TfL). The EFT is based on data collected from a number of sources, including the European Environment Agency (EEA) COPERT (Computer Programme to calculate Emissions from Road Transport) emission calculator.

3.3.7 NO_x to NO₂ Conversion Method

This assessment uses the latest NO_x to NO₂ conversion factor toolkit for the operational phase of this development (version 8.1, August 2020), provided by Defra as a Microsoft Excel based calculation tool

which is available from Defra's web-based air quality resource centre. This method is considered to be the most appropriate technique for determining NO₂ concentrations from road NO_x contributions.

3.3.8 Estimating Hourly and Daily Mean Concentrations

The latest Local Air Quality Management (LAQM) Technical Guidance (TG 16) has been used for predicting 1 hourly and 24-hourly pollutant concentrations. The guidance suggests that the short-term hourly NO₂ AQO of 200 µg/m³ (not to be exceeded more than 18 times per year) is not likely to exceed at any roadside locations if the annual mean concentration is below 60 µg/m³. Based on this guidance, the hourly mean NO₂ AQO is only considered when the annual mean NO₂ concentrations are over 60 µg/m³.

In accordance with the guidance, the short term 24 hourly PM₁₀ mean concentration can be calculated using the following equation as presented below:

$$\text{Number of 24 hour mean exceedences} = 18.5 + 0.00145 \times \text{annual mean}^3 + \left(\frac{206}{\text{annual mean}}\right)$$

3.3.9 Relevant Sensitive Receptors

Table 3.2 below presents the locations of sensitive receptors considered within this assessment. No designated sites such as Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Sites of Special Scientific Interest (SSSI) were identified within 200 m of the affected road network.

LAQM technical guidance (TG16) clarifies where likely exceedences of the objectives should be assessed and states that Review and Assessment should focus on:

"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 relevant air quality objective".

Table 2.2 above provides details of where the respective objectives should and should not apply and therefore, the types of receptors that are relevant to the assessment. The greatest impact on a human health receptor situated within the proposed development is considered to be at the closest point of the proposed building facade or the development site boundary for the purpose of assessing the worst case.

It is also considered that receptors at the ground floor level are likely to experience the highest traffic-related pollution concentrations. Receptors located on the first floor and above are likely to experience lower concentrations than ground floor receptors due to the increasing height from the ground level. Figure 3.3 below shows the modelled receptor location.

Table 3.2: Sensitive Receptors Identified for the Proposed Development

<i>Receptor name</i>	<i>Height</i>	<i>National Grid Reference (X)</i>	<i>National Grid Reference (Y)</i>
R1	1.5	434896.81	407082.16
R2	1.5	434874.59	407054.62
R3	1.5	434800.53	407018.66
R4	1.5	434758.19	406977.38
R5	1.5	434748.66	406992.19
R6	1.5	434689.38	406966.81
R7	1.5	434668.22	406939.28
R8	1.5	434632.25	406924.47
R9	1.5	434519.00	406907.53
R10	1.5	434467.12	406863.09
R11	1.5	434440.69	406884.25
R12	1.5	434431.16	406852.50
R13	1.5	434370.84	406837.69
R14	1.5	434353.91	406854.62

3.3.10 Criteria Used to Assess Site Suitability

For the purposes of this assessment, the IAQM (2017) criteria have been used for calculating the magnitude descriptors for predicted change in annual mean concentrations at individual receptors (Table 3.6). The IAQM recognise that professional judgement is required in the interpretation of air quality assessment significance. Table 3.6 is intended to be used as a tool to assist with interpretation of the air quality assessment.

Table 3.3: Impact descriptors for predicted change in annual mean concentrations at individual receptors (Reproduced from EPUK and IAQM Guidance)

Long term average concentration at the receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
<i>75% or less of AQAL</i>	<i>Negligible</i>	<i>Negligible</i>	<i>Slight</i>	<i>Moderate</i>
<i>76-94% of AQAL</i>	<i>Negligible</i>	<i>Slight</i>	<i>Moderate</i>	<i>Moderate</i>
<i>95%-102% of AQAL</i>	<i>Slight</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Substantial</i>
<i>103-109% of AQAL</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Substantial</i>	<i>Substantial</i>
<i>110% or more of AQAL</i>	<i>Moderate</i>	<i>Substantial</i>	<i>Substantial</i>	<i>Substantial</i>

3.3.11 Model Uncertainties, Assumptions, and Limitations

The assessment has been carried out based on the following assumptions:

- Verification has been undertaken using 2019 data as this is the earliest available year before the COVID-19 pandemic;
- The mitigation measures proposed in Section 6 will be implemented in order to mitigate construction-related dust nuisance;
- Emissions from vehicles are expected to decrease in the future, as mentioned in Section 3.4.1. Hence, the 2026 year scenario was considered to be the worst-case and therefore no further future year scenario was considered in this assessment;
- For the construction dust risk assessment, it has been assumed that all construction activities will be carried out for the duration of the construction period in order to assess a worst-case scenario;
- No assessment of any potential onsite energy plants has been carried out as it is assumed that the Principal of Good Practice as stated in the IAQM guidance will be used when selecting the appropriate energy plant for the required design.

- Local monitoring data has been used to verify the model. More information regarding this can be found in Appendix E.

4. Baseline Conditions

4.1 Overview

The following section sets out the baseline conditions in relation to air quality for the proposed development. Baseline air quality information is available from a number of sources, including local and national monitoring data reports and websites. For the purposes of this assessment, data has been obtained from the Defra air quality resource website¹⁴ and from Air Quality Monitoring Data obtained from Barnsley Borough Council¹⁵.

4.2 Existing Baseline Conditions

Barnsley Borough Council undertook automatic air quality monitoring at 3 site and non-automatic monitoring at 64 sites across the borough in 2019.

The nearest monitoring site is DT38 which is approximately 0.5km east from the proposed site location. The data obtained from the local authority recorded the NO₂ concentration at this location as 37.8µg/m³ which is below the AQO limit of 40 µg/m³. This monitor has been used to verify the model as set out in Appendix E.

Figure 4.1 shows the location of the monitoring location in relation to the proposed development site.

Further background pollution concentration derived from the Defra backgrounds maps has been used within the assessment and presented in Section 4.3.

¹⁴ Department for Environmental Food and Rural Affairs. Accessible at: <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>

¹⁵ Barnsley Borough Council (2020): '2020 Air Quality Annual Status Report (ASR) (for 2020 monitoring year)'

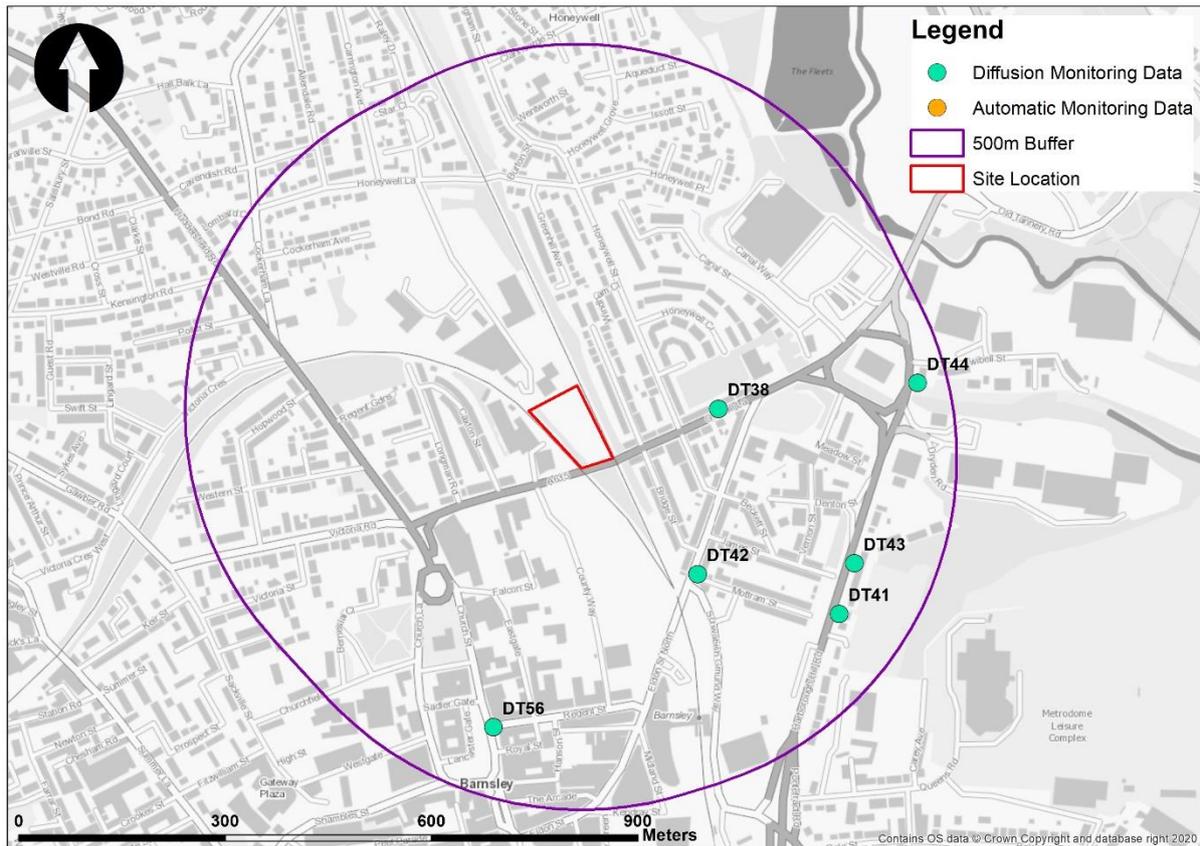


Figure 4.1: Existing nearby monitoring sites

4.3 Defra Background Pollution Concentrations

Defra provides background pollution concentration estimates to assist local authorities to undertake their 'Review and Assessment' work. This data is available to download from Defra air quality resource website for NO_x, NO₂, PM₁₀ and PM_{2.5} for every 1 km X 1 km grid square for all local authorities. The current dataset is based on 2020 background data and the future year projections are available for 2017 to 2030. The background dataset provides a breakdown of pollution concentrations by different sources (both road and non-road sources).

Defra provides background pollution concentration estimates to assist local authorities to undertake their 'Review and Assessment' work. This data is available to download from Defra air quality resource website for NO_x, NO₂, PM₁₀, and PM_{2.5} for every 1 km X 1 km grid square for all local authorities. The current dataset is based on 2020 background data and the future year projections are available for 2017 to 2030. The background dataset provides a breakdown of pollution concentrations by different sources (both road and non-road sources).

Table 4.3 presents the predicted background concentrations for the study area for the earliest year of occupation (2026) for the relevant receptor locations. Background concentrations for all pollutants presented in Table 4.1 are well below the relevant AQO.

Table 4.3: Defra Projected Background Concentrations (for all receptors)

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)
NO _x	18.2
NO ₂	13.4
PM ₁₀	10.9
PM _{2.5}	7.1

Note: Data presented within the table are derived from the following ordinance survey grid squares: 434500, 406500.

5. Potential Impacts

5.1 Construction Phase

The construction phase of the proposed development is yet to be decided. For the purpose of this assessment, the earliest construction year is assumed to be 2026. The impacts from demolition, earthworks, construction and track-out have been considered. In order to assess the worst-case scenario, it has been assumed that all activities will be carried out for the duration of the construction period. Figure 5.1 shows the construction dust assessment study area based on the recommended distances by IAQM.

Magnitude and sensitivity descriptors that have been applied to assess the overall impact of the construction phase are presented in Appendix C.

Table 5.1 presents the potential dust emission magnitude based on project-specific construction activities and is based on the criteria presented in Table C1 within Appendix C.

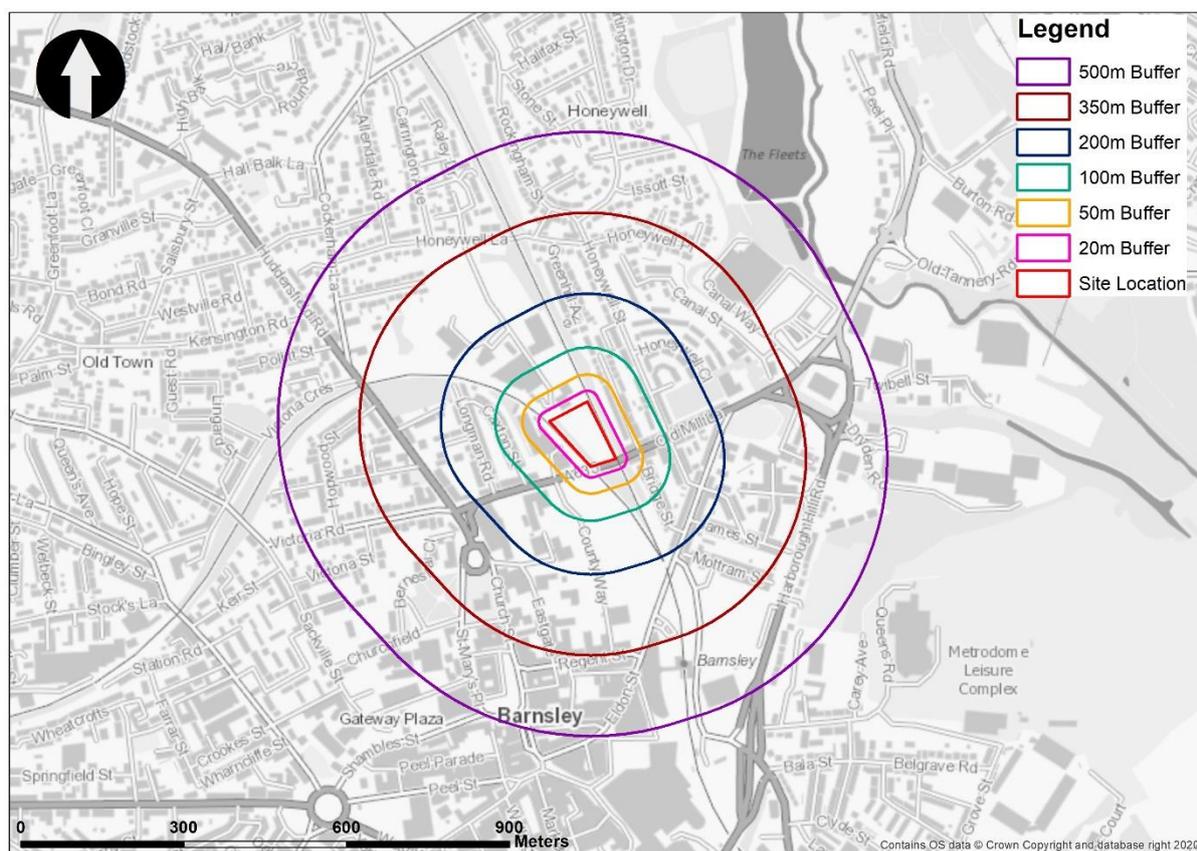


Figure 5.1: Construction assessment buffers

Table 5.1: Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	N/A
Earthworks	Medium
Construction	Small
Track Out	Small

Table 5.2 presents the sensitivity of receptors to effects caused by construction activities and is based on the criteria presented in Table C 2 within Appendix C.

Table 5.2: Sensitivity of Study Area

Potential Impact	The sensitivity of the surrounding area			
	Demolition	Earthworks	Construction	Track out
Dust Soiling	N/A	High	High	High
Human Health	N/A	Low	Low	Low

The overall risk of receptors to dust soiling effects and PM₁₀ effects are presented in Table 5.3. Risk is based on the criteria presented in Table C 3 to Table C 6 within Appendix C.

Table 5.3: Summary of the Risk of Construction Effects

Sensitivity of Area	Risk			
	Demolition	Earthworks	Construction	Track out
Dust Soiling	N/A	Medium Risk	Low Risk	Low Risk
Human Health	N/A	Low Risk	Negligible	Negligible

Based on the above, the largest risk associated with all construction activities are considered to be 'Medium Risk' with regards to dust soiling and 'Low Risk' with regards to human health. Based on the outcome of the construction dust assessment, mitigation measures appropriate for the proposed development have been presented in Section 6. Overall, the impacts from disamenity dust and PM₁₀ from the construction phase of the proposed development are considered to be not significant.

5.2 Operational Impacts

As discussed in Section 3.2, the operational phase of the development has the potential to impact local air quality, as the proposed development will result in a significant increase in traffic compared to the existing use.

Table 5.4 to Table 5.6 present predicted NO₂, PM₁₀, and PM_{2.5} pollutant concentrations, respectively, for all receptors as stated in Section 3.3.9.

Based on the results in Table 5.4-Table 5.6 concentrations of all pollutants for all modelled receptors, are well below the relevant AQO, and impact is described as negligible.

Based on the above, no specific mitigation measures are considered necessary.

Table 5.4: Annual mean NO₂ predicted pollutant concentrations (µg/m³).

Receptor number	Without development (µg/m³)	With development (µg/m³)	Concentration change relative to AQO (%)	Significance descriptor
R1	20.66	20.87	0.53	Negligible
R2	27.81	28.20	0.98	Negligible
R3	28.58	29.00	1.05	Negligible
R4	27.24	27.58	0.85	Negligible
R5	30.92	31.38	1.15	Negligible
R6	28.05	28.48	1.08	Negligible
R7	30.27	30.73	1.15	Negligible
R8	32.57	33.07	1.25	Negligible
R9	24.81	25.16	0.88	Negligible
R10	25.45	25.79	0.85	Negligible
R11	26.57	26.90	0.82	Negligible
R12	25.60	25.89	0.72	Negligible
R13	32.11	32.57	1.15	Negligible
R14	29.52	29.94	1.05	Negligible

Table 5.5: Annual Mean PM₁₀ Predicted Pollutant Concentrations (µg/m³).

Receptor number	Without development (µg/m³)	With development (µg/m³)	Concentration change relative to AQO (%)	Significance descriptor
R1	11.33	11.34	0.030	Negligible
R2	11.78	11.80	0.062	Negligible
R3	11.83	11.85	0.065	Negligible
R4	11.74	11.76	0.058	Negligible
R5	11.98	12.01	0.076	Negligible
R6	11.79	11.82	0.063	Negligible
R7	11.94	11.96	0.071	Negligible
R8	12.09	12.12	0.082	Negligible
R9	11.58	11.60	0.048	Negligible
R10	11.61	11.63	0.049	Negligible
R11	11.68	11.70	0.055	Negligible
R12	11.61	11.63	0.049	Negligible
R13	11.98	12.01	0.075	Negligible
R14	11.83	11.85	0.066	Negligible

Table 5.6: Annual Mean PM_{2.5} Predicted Pollutant Concentrations (µg/m³).

Receptor number	Without development (µg/m³)	With development (µg/m³)	Concentration change relative to AQO (%)	Significance descriptor
R1	7.34	7.35	0.027	Negligible
R2	7.59	7.60	0.055	Negligible
R3	7.62	7.63	0.059	Negligible
R4	7.57	7.58	0.052	Negligible
R5	7.70	7.72	0.068	Negligible
R6	7.60	7.61	0.057	Negligible
R7	7.68	7.70	0.064	Negligible
R8	7.77	7.78	0.073	Negligible
R9	7.48	7.49	0.043	Negligible
R10	7.50	7.51	0.044	Negligible
R11	7.54	7.55	0.050	Negligible
R12	7.50	7.51	0.044	Negligible
R13	8.18	8.21	0.120	Negligible
R14	8.03	8.05	0.106	Negligible

6. Proposed Mitigation Measures

6.1 Construction Phase Mitigation Measures

Mitigation measures have been set out in Appendix D in accordance with mitigation measures set out in the IAQM guidance for construction dust to reduce the potential impacts presented in Section 5.

The risks of construction activities in relation to dust soiling were deemed 'Medium Risk', and all risks to human health were also deemed 'Low Risk'. Therefore, it is recommended that the mitigation measures appropriate to mitigate 'Medium Risk' effects, as proposed in Appendix D are applied during the construction phase.

6.2 Operational Phase Mitigation Measures

No specific mitigation measures are considered necessary beyond that already included in the project design.

7. Conclusion

This report provides an assessment of the following potential key impacts associated with the construction and operational phases of the proposed development at Old Mill Lane, Barnsley, S71 1PJ.

- Nuisance, loss of amenity and health impacts associated with the construction phase of the development on sensitive receptors;
- Changes in traffic-related pollutant concentrations associated with the operational phase of the proposed development;
- Suitability of the site in terms of air quality impact on existing receptors.

A qualitative assessment of construction dust effects has been undertaken for the proposed scheme. The construction phase is predicted to have a 'Medium Risk' of nuisance and/or loss of amenity impacts due to dust nuisance. However, the risk of dust nuisance can be mitigated by implementing the appropriate mitigation measures listed in Appendix D.

Traffic-related air quality dispersion modelling has been undertaken to assess the impact of trips associated with the development on air quality at nearby receptors. The air quality dispersion modelling has concluded that no specific further mitigation is necessary.

It can, therefore, be concluded that the proposed development is not considered to conflict with any national, regional, or local planning policy in relation to construction and operation phase dust and air quality nuisance.

Appendices

- Appendix A: Key Pollutants
- Appendix B: Operational Impact Assessment Methodology
- Appendix C: Construction Dust Assessment Criteria
- Appendix D: Mitigation Measures for Construction Impacts
- Appendix E: Model Verification
- Appendix F: Site Drawings

Appendix A: Key Pollutants

A1. Nitrogen Dioxide (NO₂)

Nitrogen dioxide (NO₂) and nitric oxide (NO) are collectively referred to as oxides of nitrogen (NO_x). During fuel combustion, atmospheric nitrogen combines with oxygen to form nitric oxide (NO), which is not considered harmful. Through a chemical reaction with ozone (O₃), however NO can further combine with oxygen to create NO₂ which is harmful to human health and vegetation. The foremost sources of NO₂ in the UK are from combustion sources produced mainly by road traffic and power generation.

A2. Particulate Matter

Particulate matter is a term which refers to a mixture of solid particles and liquid droplets found in the air. These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others can be so small that they can only be detected using an electron microscope. Fine dust, essentially particles up to 10 micron (µm), is commonly referred to as PM₁₀.

PM₁₀ is known to arise from a number of sources such as construction sites, road traffic movement, industrial and agricultural activities. Very fine particles (PM_{2.5} – PM_{0.1}) are known to be associated with pollutants such as oxides of nitrogen (NO_x) and sulphur dioxide (SO₂) emitted from power plants, industrial installation and road transport sources.

PM_{2.5} is generally associated with combustion and traffic sources and is more likely to be associated with the operational phase of the proposed development.

A3. 'Disamenity' Dust

'Dust' is generally regarded as particulate matter up to 75 µm (micron) diameter and in an environmental context can be considered in two categories, according to size: coarser dust (essentially particles greater than 10 µm) and fine particulate matter (PM₁₀ and PM_{2.5}) as set out above.

Coarser dust (essentially particles greater than 10 µm) is generally regarded as 'disamenity dust' and can be associated with annoyance, although there are no official standards (such as AQO) for dust annoyance. Disamenity dust is more readily described than defined as it relates to the visual impact of short-lived dust clouds and the long-term soiling of surfaces.

Although it is a widespread environmental phenomenon, dust is also generated through many human activities including industrial and materials handling sites, construction and demolition sites and roads. Dust is generally produced by mechanical action on materials and is carried by moving air when there is sufficient energy in the airstream. More energy is required for dust to become airborne than for it to remain suspended.

Appendix B: Operational Impact Assessment Methodology

The EPUK & IAQM guidance refers to the Town and Country Planning (Development Management Procedure) Order (England) 2010 [(Wales) 2012] for a definition of a ‘major’ development when scoping assessments required for the planning process. Based on the guidance, a ‘major’ development is such development where:

- The number of dwellings is 10 or above;
- The residential development is carried out of a site of more than 0.5ha where the number of dwellings is unknown;
- The provision of more than 1,000 m² commercial floorspace; or,
- Development carried out on land of 1ha or more.

It is recommended that consideration should be given to reduce impacts from any ‘major’ developments by considering:

- The impact of existing sources in the local area on the proposed development; and
- The impacts of the proposed development on the local area.

The assessment process involves two stages where:

Stage 1 scope out the need for an air quality assessment and **Stage 2** provide guidance of determining the level of assessment required for a project.

Table B 1 below sets out the Stage 1 criteria to determine the need to assess impacts arising from small developments and Table B 2 provides more specific guidance as to when an air quality assessment is likely to be required to assess the impacts of the proposed development on the local area.

Table B 1: Stage 1 Criteria to proceed to Stage 2

Criteria to Proceed to Stage 2	
A	<p>If any of the following apply:</p> <ul style="list-style-type: none"> • or more residential units of a site area of more than 0.5ha • More than 1,000m² of floor space for all other uses or a site area greater than 1ha
B	<p>Coupled with any of the following:</p> <ul style="list-style-type: none"> • The development has more than 10 parking spaces • The development will have a centralised energy facility or other centralised combustion process

Table B 2: Indicative Criteria for Requiring an Air Quality Assessment

The development will	Indicative Criteria to Proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight).	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to	Where the change is 5m or more and the road is within an AQMA.
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	Typically, any combustion plant where the single or combined NO _x emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion.
NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.	In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.
	Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

Appendix C: Construction Dust Assessment Criteria

IAQM guidance framework on assessing the risk of dust proposes the construction phase should be split into phases dependent on their potential impacts, determining the risk for each individually. Therefore, this assessment has determined the risk of the four construction categories put forward by the IAQM guidance:

- Demolition;
- Earthworks;
- Construction; and
- Track out (transport of dust and dirt onto the public road network).

The IAQM guidance framework states that the risk of dust impacts from the four categories can be defined as 'negligible', 'low risk', 'medium risk' or 'high risk' depending upon the scale and nature of the construction activity and the sensitivity and proximity of receptors to the construction site boundary. This categorisation is used to put forward appropriate mitigation measures, reducing the level of effects from the dust impacts so they are not significant.

The assessment of dust impacts using the IAQM guidance considers three separate effects from dust:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to significant increase in exposure to PM₁₀.

Step 1 of the assessment is set out to screen for the requirement for a more detailed assessment for the proposed development. The screening criteria states:

A 'human receptor' within:

- 350 m of the boundary of the application site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

An 'ecological receptor' within:

- 50 m of the boundary of the application site; or
- 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

Where there are no receptors and the level of risk is deemed 'negligible', there is no need for further assessment.

Step 2A of the assessment enables the overall dust emission magnitude (small, medium or large) from each dust source (demolition, earthworks, construction and trackout) to be identified in relation with the criteria outlined in Table C 1.

Table C 1: Dust emission magnitude

Source	Large	Medium	Small
Demolition	Total building volume >50,000 m ³ , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level.	Total building volume 20,000 m ³ – 50,000 m ³ , potentially dusty construction material, demolition activities <10 – 20 m above ground level.	Total building volume <20,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Earthworks	Total site area >10,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.	Total site area 2,500 m ² – 10,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.	Total site area <2,500 m ² , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	Total building volume >100,000 m ³ , on site concrete batching or sandblasting.	Total building volume 25,000 m ³ – 100,000 m ³ , potentially dusty construction material (e.g. concrete), on site concrete batching.	Total building volume <25,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber).
Track out	>50 HDV (>3.5t) outward movements ^a in any one day ^b , potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.	10-50 HDV (>3.5t) outward movements ^a in any one day ^b , moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.	<10 HDV (>3.5t) outward movements ^a in any one day ^b , surface material with low potential for dust release, unpaved road length <50 m.

Notes: ^a Vehicle movement is a one-way journey. i.e. from A to B, and excludes the return journey.

^b HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.

Step 2B allows for the sensitivity of the area (high, medium or low) to be assessed and takes into account a number of factors:

- The specific sensitivities of receptors in the area;

- The proximity and number of those receptors;
- In the case of PM₁₀, the existing local background concentration; and
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Receptor sensitivity has been based on the highest of any criteria being met thus, the assessment is considered as robust. The sensitivity of the area is further determined for dust soiling, human health and ecosystem effects by considering the criteria presented in Table C 2.

Table C 2: Magnitude of Receptor Sensitivity

Source	High	Medium	Low
Sensitivities of people to dust soiling effects	<ul style="list-style-type: none"> • Users can reasonably expect enjoyment of a high level of amenity; or • The appearance, aesthetics or value of their property would be diminished by soiling; and • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks^b and car showrooms. 	<ul style="list-style-type: none"> • Users would expect^a to enjoy a reasonable level of amenity, but would not reasonably expect^a to enjoy the same level of amenity as in their home; or • The appearance, aesthetics or value of their property could be diminished by soiling; or • The people or property wouldn't reasonably be expected^a to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. • Indicative examples include parks and places of work. 	<ul style="list-style-type: none"> • The enjoyment of amenity would not reasonably be expected^a; or • Property would not reasonably be expected^a to be diminished in appearance, aesthetics or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. • Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks^b and roads.
Sensitivities of people to health effects of PM ₁₀	<ul style="list-style-type: none"> • Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).^c 	<ul style="list-style-type: none"> • Locations where the people exposed are workers^d, and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). • Indicative examples include office and shop 	<ul style="list-style-type: none"> • Locations where human exposure is transient.^e • Indicative examples include public footpaths, playing fields, parks and shopping streets.

Source	High	Medium	Low
	<ul style="list-style-type: none"> Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment. 	<p>workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.</p>	
Sensitivities of receptors to ecological effects	<ul style="list-style-type: none"> Locations with an international or national designation and the designated features may be affected by dust soiling; or Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings. 	<ul style="list-style-type: none"> Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or Locations with a national designation where the features may be affected by dust deposition. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features. 	<ul style="list-style-type: none"> Locations with a local designation where the features may be affected by dust deposition. Indicative example is a local Nature Reserve with dust sensitive features.

- Notes:
- a People's expectations will vary depending on the existing dust deposition in the area, see Section 4.2.
 - b Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.
 - c This follows Defra guidance as set out in LAQM.TG (09).
 - d Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM₁₀. However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.
 - e There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.
 - f Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

The final step, step 2C allows for the risk of impacts to be defined. The dust emission magnitude derived in step 2A is combined with the sensitivity of the area defined in step 2B to determine the risk of effects on:

- Annoyance due to dust soiling;
- Harm to ecological receptors; and
- The risk of health effects due to an increase in exposure to PM₁₀.

The criteria for each of the dust sources are presented in Table C 3, Table C 4, Table C 5 and Table C 6.

Table C 3: Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Table C 4: Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table C 5: Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table C 6: Track out

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Appendix D: Mitigation Measures for Construction Impacts

Mitigation measures set out are from IAQM guidance for construction dust and are appropriate for the mitigation of 'Medium Risk' effects as proposed below:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM10 continuous monitoring and/or visual inspections.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.
- Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.

- Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel- or petrol- powered generators and use mains electricity or battery powered equipment where practicable.
- Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Avoid bonfires and burning of waste materials.
- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Only remove the cover in small areas during work and not all at once.
- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Appendix E: Model Verification

The model verification process includes checks which are carried out to determine the performance of a dispersion model and ensure monitoring results are not bias due to any model uncertainties. Uncertainties are associated with multiple modelling inputs including:

- traffic flows,
- speeds and vehicle splits;
- emissions estimates;
- background concentrations;
- meteorological data; and
- surface roughness, length and terrain.

Model verification is mainly undertaken by comparing modelled results with monitoring data. Uncertainties and differences in data can be identified and resolved by model refinement or adjustment of the model output using a verification factor. The verification factor can be calculated in accordance with the LAQM TG (16) guidance.

Model verification was only carried out for nitrogen dioxide (NO₂) as no suitable background concentrations for PM₁₀ and PM_{2.5} were found for the modelled road network.

E1. Methodology

Based on the LAQM TG (16) guidance produced by Defra, verification of NO₂ concentrations has been carried out using data collected at diffusion tube monitoring sites near the proposed development. Table E.1 presents the monitoring data used within the model verification for NO₂.

Table E.1: Relevant NO₂ Monitoring Data Used for Model Verification

Site name	Monitor type	2019 NO₂ Annual Mean (µg/m³), annualised and bias corrected
DT38	<i>Diffusion Monitoring</i>	37.8

Table E.2 presents the Defra background concentrations used within the model. Road contributions were not removed from background concentrations to ensure a worst-case scenario.

Table E.2: Relevant Background Concentrations Used for Model Verification

<i>Verification Site name</i>	<i>2019 NO_x Background Annual Mean (µg/m³)</i>	<i>2019 NO₂ Background Annual Mean (µg/m³)</i>
DT38	24.3	17.3

E2. Verification Results

Table E.3 presents the monitored and modelled annual mean NO₂ concentrations along with the percentage difference after the verification method was applied. An adjustment factor was then derived by comparing the modelled road NO_x contribution against the monitored road NO_x contribution.

Table E.3 Comparison of monitored and modelled road NO₂ contribution

<i>Site name</i>	<i>Monitored NO₂ (µg/m³)</i>	<i>Modelled NO₂ (µg/m³)</i>	<i>Difference in percentage</i>
DT38	37.8	21.72	-42.5

Based on the methodology presented in LAQM TG (16) guidance, **an adjustment factor of 4.97** was estimated and applied to all road NO_x contributions to take account for systematic bias.

Appendix F: Site Drawings

Please see planning portal for the most recent drawings submitted as part of the planning application