

South Yorkshire Passenger Transport Executive

A61 Old Mill Lane

Air Quality Assessment

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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Introduction

South Yorkshire Passenger Transport Executive (SYPTE) has commissioned Ove Arup and Partners Limited (Arup) to carry out an assessment of air quality impacts for the proposed works on the A61 to widen and re-deck the Old Mill Lane Bridge and associated highway works (hereafter referred to as the proposed scheme). The proposed scheme aims to reduce congestion along the A61.

The Old Mill Lane Bridge is located to the north of Barnsley town centre and forms part of the A61. The route connects Barnsley town centre to Wakefield to the south to the M1. The route forms part of the Strategic Road Network (SRN) for a short stretch between the A616 and the M1 junction 36 at Tankersley.

The surrounding area comprises of a mixture of light industrial use, commercial and residential. It is located adjacent to the Barnsley No.4 Air Quality Management Area (AQMA), declared due to exceedance of the NO₂ annual mean air quality objective (40µg/m³). The location of the proposed scheme with regards to the AQMA is shown in Figure 1.

1.1 Scope of Assessment

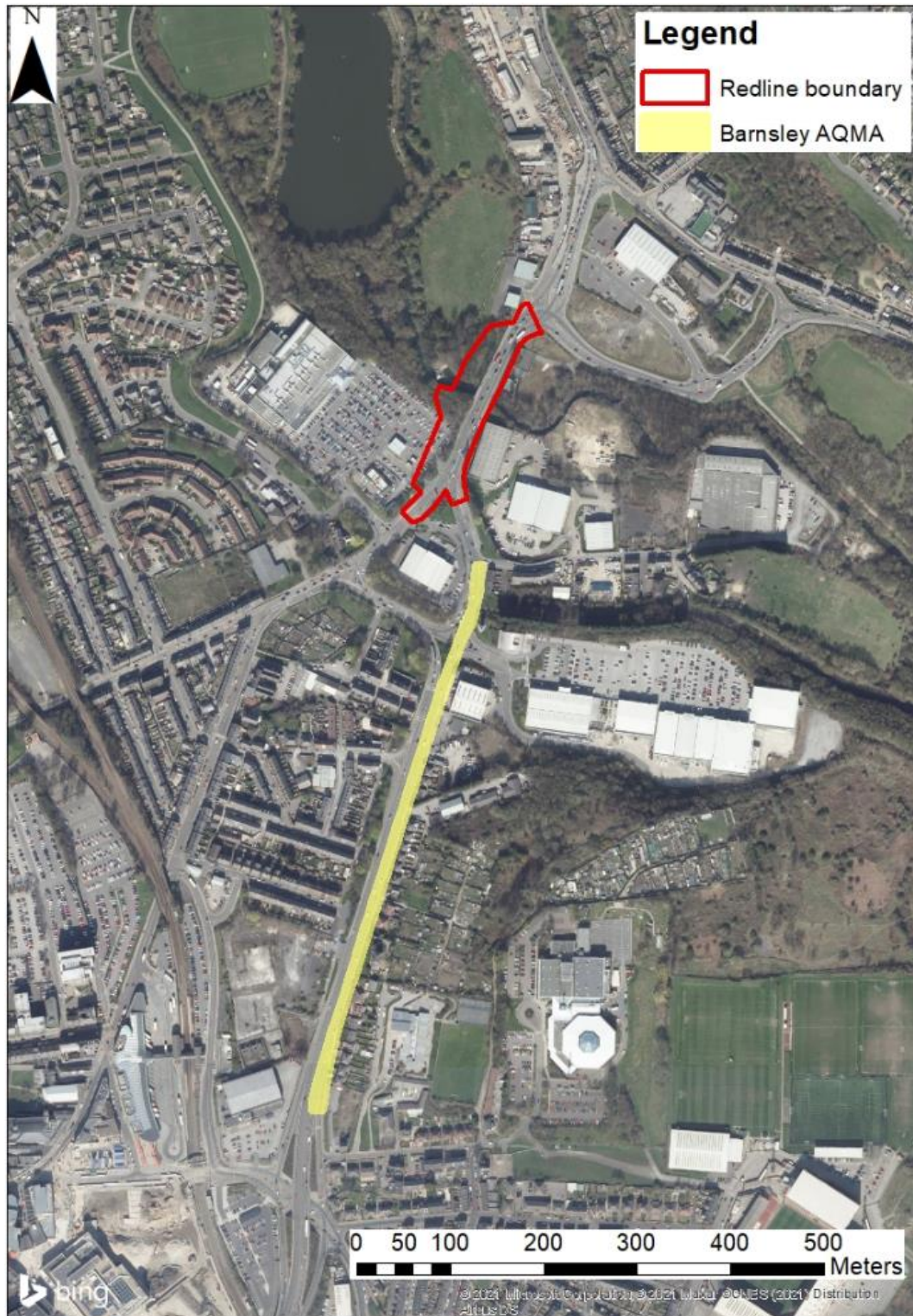
Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. This report reviews the existing air quality conditions in the vicinity of the site and the likely air quality impacts resulting from the construction and operation of the proposed scheme. The effects have been assessed in the context of relevant national, regional and local air quality policies and guidance.

The assessment focuses on the main pollutants of concern which are nitrogen dioxide (NO₂) and particulate matter (PM₁₀ and PM_{2.5}).

The scope of this assessment has been discussed and agreed with the environmental health officer at BMBC¹.

¹ Agreement via phone and email for the v2 report in 2019.

Figure 1: Location of the proposed scheme



2 Air Quality Standards and Guidelines

2.1 Environment Act 1995

Part IV of the Environment Act 1995² places a duty on the Secretary of State for the Environment to develop, implement and maintain an Air Quality Strategy with the aim of reducing atmospheric emissions and improving air quality. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland³ provides the framework for ensuring compliance with the air quality limit values based on a combination of international, national and local measures to reduce emissions and improve air quality. This includes the statutory duty, also under Part IV of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare AQMA where pollutant concentrations exceed the national air quality objectives. Where an AQMA is declared, the local authority needs to produce an Air Quality Action Plan (AQAP) which outlines the strategy for improving air quality in these areas.

2.2 Air Quality Standards Regulations 2010 (amended in 2016)

The Air Quality Standards Regulations 2010 (amended in 2016)⁴ defines the policy framework for 12 air pollutants known to have harmful effects on human health or the natural environment. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values.

Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long and short-term concentrations. Air quality limit values and objectives are quality standards for clean air. Therefore, in this assessment, the term 'air quality standard' has been used to refer to the national limit values. The regulation sets out the national air quality standards for NO₂, PM₁₀ and PM_{2.5}. Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards.

² Environment Act 1995, Chapter 25, Part IV Air Quality

³ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Volume 1, July 2007

⁴ The Air Quality Standards (Amendment) Regulations 2016, SI 2016/1184.

Table 1: Air Quality standards for human health

Pollutant	Averaging period	Limit value / Objective
Nitrogen Dioxide (NO ₂)	Annual mean	40µg/m ³
	1-hour mean	200µg/m ³ not to be exceeded more than 18 times a year (99.79 th percentile)
Fine Particulate Matter (PM ₁₀)	Annual mean	40µg/m ³
	24-hour mean	50µg/m ³ not to be exceeded more than 35 times a year (90.41 st percentile)
Very Fine Particulate Matter (PM _{2.5})	Annual mean	25µg/m ³

2.3 Dust Nuisance

Dust is the generic term which the British Standard document BS 6069 (Part Two) used to describe particulate matter in the size range 1–75µm (micrometers) in diameter. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990⁵, dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology, and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur.

However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

⁵ Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air.

3 Policies and Guidance

3.1 National Policy and Guidance

The land-use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land-use and its development can be a material planning consideration in the determination of planning applications, dependent on the details of the proposed development.

3.1.1 National Planning Policy Framework (2019)

The National Planning Policy Framework (NPPF)⁶ was updated in February 2019 with the purpose of planning to achieve sustainable development. Paragraph 181 of the NPPF on air quality 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.”

In addition, paragraph 103 states that:

“The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through 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.”

Paragraph 170 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. In relation to air quality, NPPF notes that this can be achieved by:

“e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable

⁶ Ministry of Housing, Communities & Local Government, National Planning Policy Framework, February 2019
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/779764/NPPF_Feb_2019_web.pdf

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.”

3.1.2 Planning Practice Guidance (2014)

Planning Practice Guidance (PPG)⁷ on various topics, including air quality was developed in order to support the NPPF. The guidance provides a concise outline as to how air quality should be considered in order to comply with the NPPF and states when air quality is considered relevant to a planning application. This includes factors such as changes in traffic volumes, vehicle speeds, congestion or traffic composition, the introduction of new point sources of air pollution, exposure of people to existing sources of air pollutants, and the potential to give rise to air quality impacts at nearby sensitive receptors.

3.1.3 Clean Air Strategy

The Department for Environment, Food and Rural Affairs (Defra) Clean Air Strategy⁸ was published in 2019 and sets targets for improving air quality across the country. It includes actions for reducing emissions from various sources, such as transport, domestic activities, farming and industry. There is also a long-term target for reducing population exposure to PM_{2.5} concentrations to meet the World Health Organisation's (WHO) target of 10µg/m³ as an annual mean. In particular, the Clean Air Strategy states:

“New legislation will create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.”

3.1.4 Local Air Quality Management Policy and Technical Guidance

The 2016 policy guidance note from Defra, LAQM.PG(16)⁹, provides additional guidance on the links between transport and air quality and guidance on the links between air quality and the land-use planning system. It summarises the main ways in which the land-use planning system can help deliver compliance with the air quality objectives. This guidance is relevant to any external organisations who may wish to engage with the local authority to assist in the delivery of their statutory duties on managing air quality.

⁷ Department for Communities and Local Government (2014) Planning Practice Guidance: Air Quality

⁸ Defra (2019) Clean Air Strategy 2019

⁹ Defra (2016) Local Air Quality Management Policy Guidance. PG(16)

The LAQM Technical Guidance, TG(16)¹⁰ is designed to support local authorities in carrying out their duties to review and assess air quality in their area. It provides detailed guidance on how to assess the impact of measures using existing air quality tools. Where relevant, this guidance has been taken in to account in this assessment.

3.2 Local Policy and Guidance

3.2.1 BMBC Adopted Local Plan 2019

The BMBC Local Plan¹¹ was adopted by Full Council on 3 January 2019. The Local Plan considers the future use of all land within the Barnsley borough upto 2033 and sets out how much development is needed to support the future population and economy. BMBC's Local Plan sets out the council's strategic vision and priorities for housing, employment and commercial development, including transport infrastructure and protection of our local environment.

Paragraph 9.178 states that:

“This rise in road traffic is affecting our environment and health and is contributing to a deterioration in air quality reflected by the declaration of 6 traffic related Air Quality Management Areas in the borough.”

Paragraph 9.180 states that:

“We will also continue to work to minimise the impact of air pollution on human health both within the AQMA's and in the borough generally. To this end we are currently updating our Air Quality Action Plan (initially published in 2004) to accommodate measures to improve air quality in the additional AQMA's that have been declared since 2004.”

CSP 41 states that:

“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.”

¹⁰ Defra (2016) Local Air Quality Management Technical Guidance.TG(16).

¹¹ Barnsley Metropolitan Borough Council (2019) Adopted Local Plan

3.3 Other Relevant Policy and Guidance

3.3.1 Institute of Air Quality Management Dust Guidance

The 2016 Institute of Air Quality Management (IAQM) guidance v1.1¹² provides guidance to development consultants and environmental health officers on how to assess air quality impacts from construction. The IAQM guidance provides a method for classifying the significance of effect from construction activities based on the ‘dust emission magnitude’ (high, medium or low) and sensitivity of the area (which is based on the number of sensitive receptors and their proximity to the site). The guidance recommends that once the significance of effect from construction is identified, the appropriate mitigation measures are implemented. Experience has shown that once the appropriate mitigation measures are applied in most cases the resulting dust impacts can be reduced to negligible levels.

3.3.2 EPUK/IAQM Land-Use Planning & Development Control (2017)

The 2017 update to the Land-Use Planning & Development Control guidance document¹³ provides a framework for professionals operating in the planning system to provide a means of reaching sound decisions, having regard to the air quality implications of development proposals.

The document provides guidance on when air quality assessments are required by providing screening criteria regarding the size of a development, changes to traffic flows/composition energy facilities or combustion processes associated with the development, as well as a framework to determine magnitude of air quality impact and the associated effect.

¹² IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.

¹³ EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality.

4 Methodology of Assessment

4.1 Scope of Assessment

The overall approach to the air quality assessment comprises:

- A review of the existing air quality conditions at, and in the vicinity of, the proposed development;
- An assessment of the potential changes in air quality arising from the construction and operation of the proposed development, and
- Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

4.2 Methodology of Baseline Assessment

Existing or baseline ambient air quality refers to the concentration of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

A desk-based review of the following data sources has been undertaken to determine baseline conditions of air quality in this assessment:

- Local authority review and assessment reports and local air quality monitoring data¹⁴;
- The Defra Local Air Quality Management website¹⁵;
- The UK Air Information Resource website¹⁶;
- The Air Quality England website¹⁷; and,
- The Environment Agency website¹⁸.

The review identified the main sources of air pollution within 2km of the proposed development, local air quality monitoring data for recent years and local background pollutant concentrations.

¹⁴ Barnsley Metropolitan Borough Council, 2020 Air Quality Annual Status Report. <https://www.barnsley.gov.uk/media/16804/air-quality-status-report-2020.pdf> [Accessed: March 2021]

¹⁵ Defra Local Air Quality Management website; <http://laqm.defra.gov.uk/>; [Accessed: March 2021]

¹⁶ Defra, <http://uk-air.defra.gov.uk>, [Accessed March 2021]

¹⁷ Air Quality England website <http://www.airqualityengland.co.uk/>

¹⁸ Environment Agency website; <https://environment.data.gov.uk/public-register/view/search-industrial-installations>; [Accessed: March 2021]

4.3 Methodology of Construction Phase Assessment

The development will include demolition of parts of the existing bridge. The IAQM guidance¹² has been used to assess the impacts from dust on local sensitive receptors.

4.3.1 Construction Dust Assessment

The effects from demolition and construction have been assessed using the qualitative approach described in the latest guidance by the IAQM.

An ‘impact’ is described as a change in pollutant concentrations or dust deposition, while an ‘effect’ is described as the consequence of an impact. The main impacts that may arise during construction of the proposed development are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated PM₁₀ concentrations as a result of dust generating activities on site; and
- An increase in NO₂ and PM₁₀ concentrations due to exhaust emissions from NRMM and vehicles accessing the site.

The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new buildings and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.

For each of these dust-generating activities, the guidance considers three separate effects:

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

The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM₁₀ exposure. Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development.

The methodology takes into account the scale at which the above effects are likely to be generated (classed as small, medium or large), the levels of background PM₁₀ concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the

overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of the site.

There are five steps in the assessment process described in the IAQM guidance. These are summarised in Figure 2: and a further description is provided in the following paragraphs.

Step 1: Need for Assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary (*for ecological receptors that is 50m*) and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 500m from the site entrance(s).

Step 2: Assess the Risk of Dust Impacts

This step is split into three sections as follows:

- 2A. Define the potential dust emission magnitude;
- 2B. Define the sensitivity of the area; and
- 2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in Table A.1 (Appendix A).

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM₁₀ background concentrations and any other site-specific factors. Table A.2 – A.4 (Appendix A) show the criteria for defining the sensitivity of the area to different dust effects.

The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures (Table A.5, Appendix A) and an overall risk for the site derived.

Step 3: Determine the Site-Specific Mitigation

Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures beyond those required by legislation are necessary.

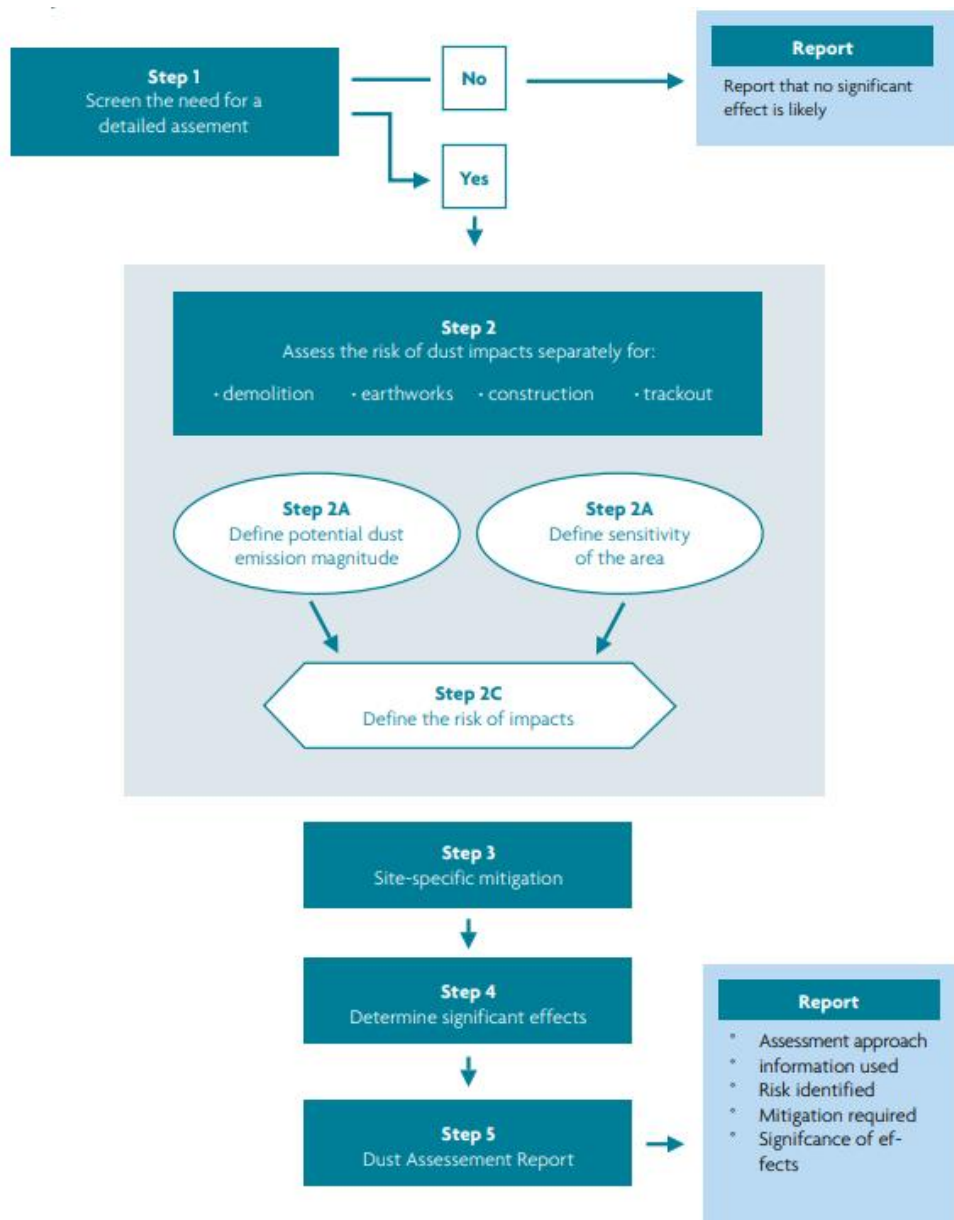
Step 4: Determine any Significant Residual Effects

Once the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. The IAQM guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Step 5: Prepare a Dust Assessment Report

The last step of the assessment is the preparation of a dust assessment report. This forms part of this report (see Section 7).

Figure 2: IAQM dust assessment methodology



4.4 Methodology for Assessment of Effects from Construction and Operational Traffic

There is the potential for impacts from construction vehicles using the local road network arriving at and leaving the site. There is also a potential for impacts from traffic during the operation of the proposed scheme. The traffic generated may result in an increase in NO₂, PM₁₀ and PM_{2.5} concentrations due to exhaust

emission. A screening assessment has been undertaken using the criteria contained in the EPUK/IAQM land-use guidance to determine the potential local air quality effects associated with the potential trip generation related to the construction and operation phase of the proposed development.

The EPUK/IAQM guidance provide screening criteria for traffic inside and outside AQMAs. The criteria for sites inside AQMAs have been used in this assessment to screen traffic impacts and to establish the extent of the road network where significant impact may be present:

- A change of Light Duty Vehicle flows of more than 100 Annual Average Daily Traffic (AADT) movements
- A change of Heavy Duty Vehicle (HDV) flows of more than 25 AADT movements
- A realignment of a road by 5m or more
- Introduction or removal of a junction which causes traffic acceleration/deceleration to change significantly.

The construction traffic data provided by Arup transport team shows an increase in HGVs of less than 25 AADT. Therefore, assessment of road traffic emissions in the construction phase has been scoped out of the assessment.

The operational phase traffic data provided by Arup's transport team shows there is no predicted increase in vehicle numbers predicted with the proposed scheme in operation. The proposed scheme will relieve congestion which will improve flow of traffic during peak times but there is no change in overall AADT. The proposed scheme will result in change in speed, however, this is not a criterion for triggering an air quality assessment of road traffic emissions. Therefore, assessment of road traffic emissions in the operational phase has been scoped out of the assessment.

5 Baseline Assessment

5.1 Sources of Air Pollution

5.1.1 Industrial Processes

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met, and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes and are regulated through the Pollution Prevention and Control (PPC) system^{19,20}. The larger more polluting processes are regulated by the Environment Agency (EA), and the smaller less polluting ones by the local authorities. Local authorities focus on regulation for emissions to air, whereas the EA regulates emissions to air, water and land.

There is one regulated Part A process with releases to air relevant to this assessment within 2km of the proposed scheme listed on the EA website²¹ and are presented in Table 2. The contribution of all industrial processes to local air quality are included within the background concentrations for this assessment.

Table 2: Part A industrial processes within 2km of the proposed scheme

Operator	Industry	Distance from proposed site (km)	Direction from proposed site
Royston Lead Limited	Supplier and Manufacturer of Specialist Lead (non-ferrous metal)	1.68	SW

5.1.2 Local Air Quality

The Environment Act 1995²² required local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an assessment and an Annual Status Report (ASR). If the ASR identifies potential hotspot areas likely to exceed air quality objectives, then a detailed assessment of those areas is required. Where objectives are predicted not to be met, local authorities must declare the area as an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP) which includes measures to improve air quality within the AQMA.

¹⁹ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

²⁰ The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390.

²¹ Environment Agency website, Search installation permits; <https://environment.data.gov.uk/public-register/view/search-industrial-installations>; [Accessed: April 2018].

²² Environment Act (1995) Chapter 25, Part IV Air Quality.

A review of the Defra website²³ showed that BMBC declared the Barnsley AQMA No.4 in July 2008 to cover “*an area encompassing the southbound carriageway of the A61 Harborough Hill Road from the PC World gyratory to the southbound slip road of the A61 near to its junction with Queens Road*”. This AQMA was declared due to exceedances of the annual mean NO₂ objective.

5.1.3 Local Monitoring

A review of existing local air quality conditions in the vicinity of the proposed scheme has been undertaken. BMBC undertake both automatic and passive monitoring.

5.1.3.1 Automatic Monitoring

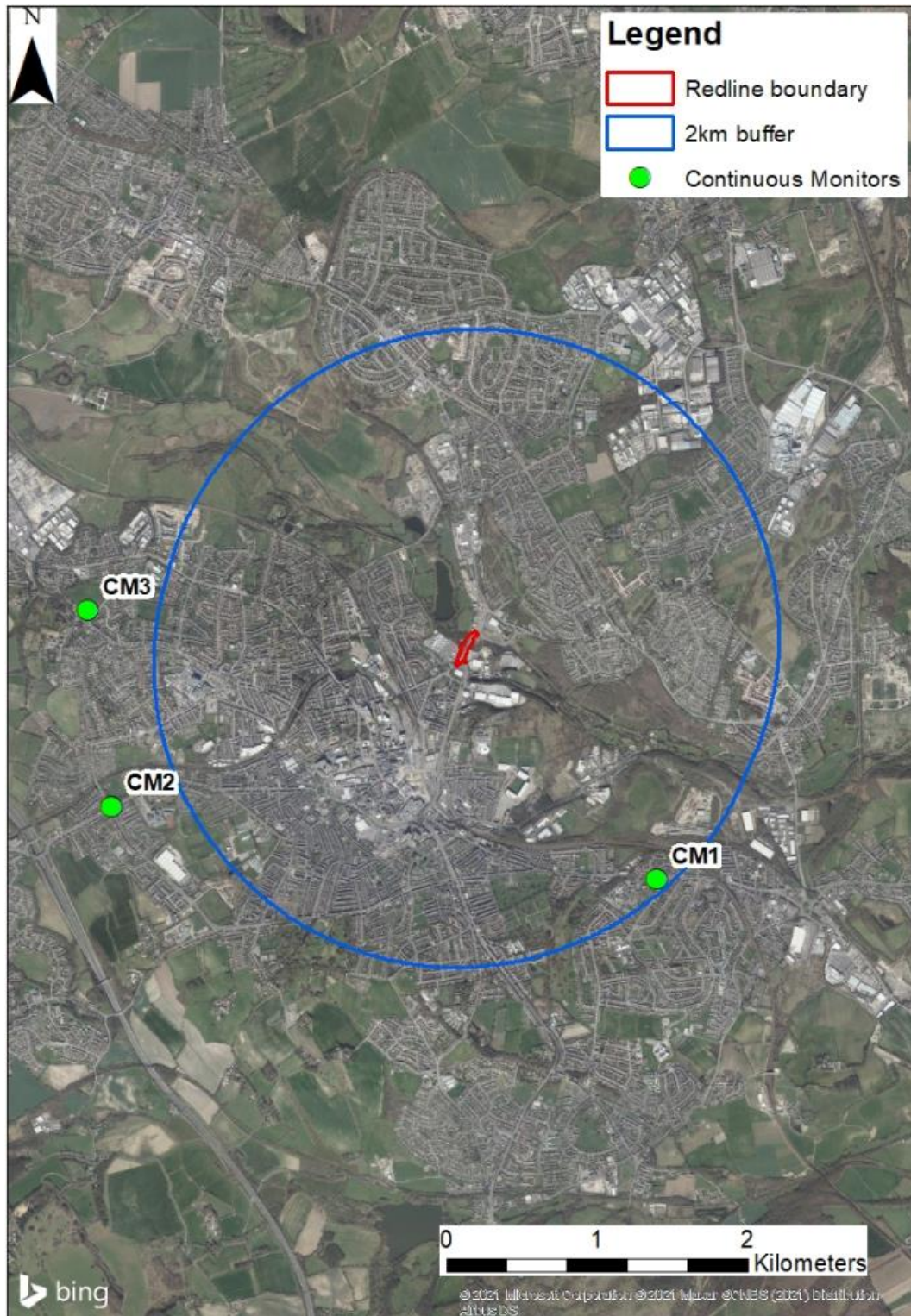
Automatic or continuous monitoring involves drawing air through an analyser continuously to obtain near real-time pollutant concentration data. A review of the most recent annual status report (ASR) from BMBC¹⁴ showed that BMBC operates no automatic monitoring stations within 2km of the proposed scheme that monitor NO₂. Site CM1 lies within 2km of the proposed scheme however it only monitors PM₁₀. Both CM2 and CM3 monitor NO₂ and lie approximately 2.5km from the proposed scheme and are hence not considered in this assessment. Locations and details of all the continuous monitors operated by BMBC within 2km of the proposed development are presented in Table 3 and shown in Figure 3.

Table 3: Locations of BMBC automatic monitoring sites

Site ID	Site location	OS Grid Reference		Site type	Distance to kerb of nearest road (m)
		X	Y		
CM1	Barnsley A635 Roadside	436298	405691	Roadside	N/A

²³ Defra (2016) Air quality management areas; <http://uk-air.defra.gov.uk/aqma/list> [Accessed: April 2018].

Figure 3: Locations of BMBC automatic monitoring sites



Annual mean concentrations of PM₁₀ have been below the air quality objective between 2016 and 2019 as shown in Table 4.

Table 4: Automatic annual mean PM₁₀ monitoring result for 2016-2019

Site ID	Site location	PM ₁₀ annual mean concentration (µg/m ³)			
		2016	2017	2018	2019
CM1	Barnsley A635 Roadside	22.0	17.0	18.0	20.0
Air quality objective		40			

5.1.3.2 Non-automatic Monitoring

The ASR report¹⁴ shows that BMBC has 64 diffusion tubes monitoring NO₂ in the borough, 27 of which are within 2km of the proposed scheme. Of those locations in the vicinity of the proposed scheme, 20 of these are “Roadside” sites with the remaining seven being “Kerbside” sites. The locations of the sites of interest for this assessment are shown in Figure 4. Details of the diffusion tubes are given in Table 5 and recent monitoring results are given in

Table 6Table 6.

Figure 4: Locations of diffusion tube monitoring sites

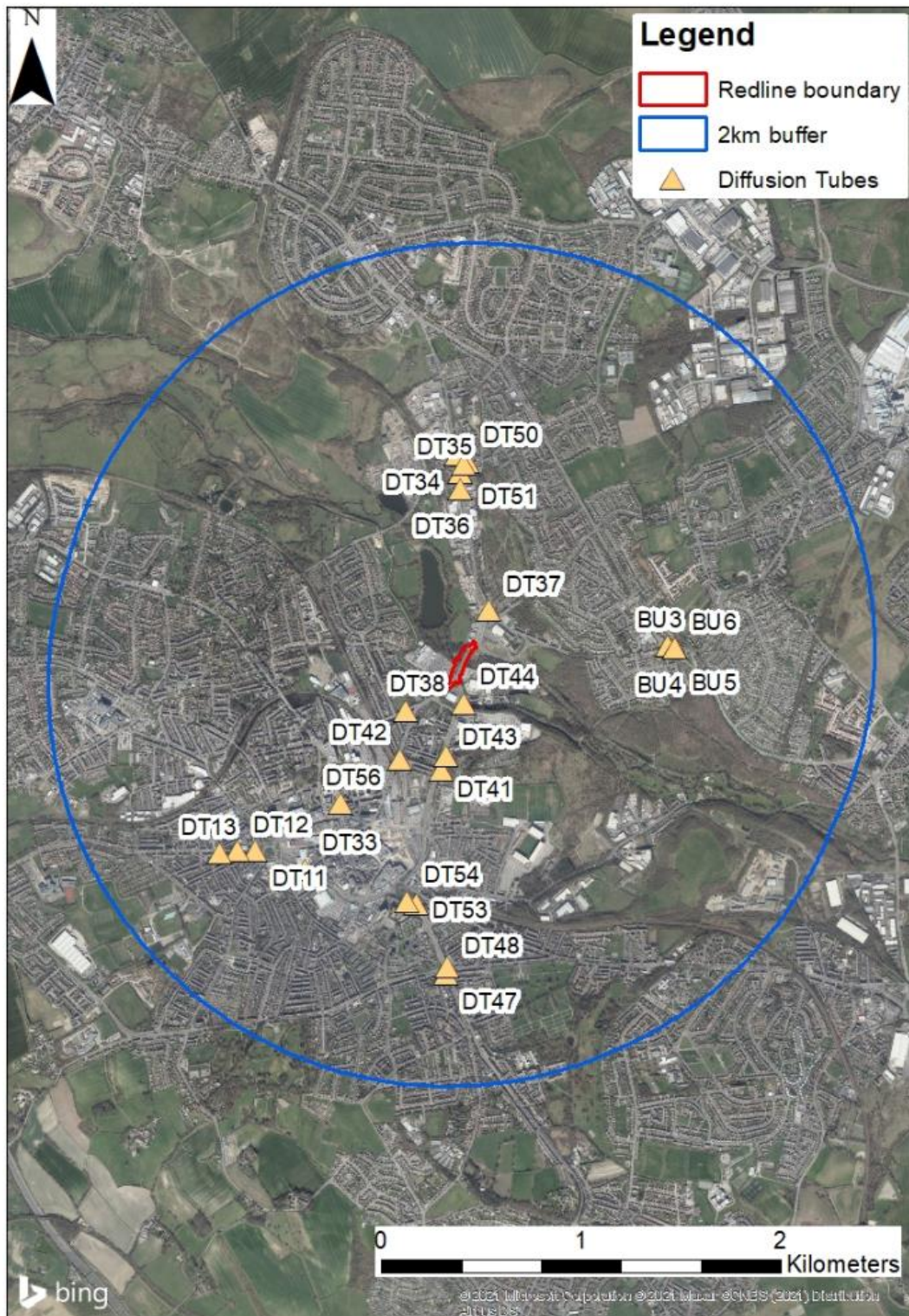


Table 5: Locations of diffusion tube monitoring sites

Site ID	Site Location	OS Grid Reference		Site Type	Distance from kerb of nearest road (m)
		X	Y		
DT11	Dodworth Road	434000	406292	Roadside	N/A
DT12	Dodworth Road	433910	406290	Roadside	N/A
DT13	Traffic Lights Dodworth Rd	433820	406278	Roadside	2.5
DT33	Westway	434251	406199	Roadside	N/A
DT34	Wakefield Road / Carlton Road	435011	408281	Roadside	2.0
DT35	Wakefield Road / Carlton Road	435027	408190	Roadside	N/A
DT36	Wakefield Road / Smithies Lane (North)	435027	408104	Roadside	2.0
DT37	Wakefield Road – Burton Road junction	435174	407499	Roadside	1.7
DT38	Old Mill Lane / Honeywell Street	434757	406995	Kerbside	0.3
DT39	Burton Road – app Rotherham Rd junc.	436072	407320	Kerbside	0.5
DT41	Harborough Hill Road	434933	406695	Roadside	2.0
DT42	Mottram Street / Eldon Street	434727	406753	Roadside	N/A
DT43	Harborough Hill Road	434955	406769	Roadside	2.0
DT44	Harborough Hill Road, adj. gyratory	435047	407033	Roadside	N/A
DT47	Sheffield Road / Park Road Xrds	434958	405672	Roadside	N/A
DT48	Sheffield Road / Cemetery Road Xrds	434964	405709	Roadside	2.0
DT50	Carlton Road (W'fd Road junction) uphill	435062	408244	Roadside	1.5
DT51	Carlton Road (W'fd Road junction) downhill	435049	408229	Roadside	1.3
DT53	Sheffield Road, town centre	434809	406023	Roadside	0.25
DT54	Alhambra R/bt	434763	406038	Roadside	3.0
DT56	Junction Church Street / Regent Street	434430	406529	Roadside	1.8
BU1	Burton Road, 30 mph sign	436069	407321	Roadside	1.8
BU2	Burton Road, co- located DT 39	436072	407320	Kerbside	0.5
BU3	Burton Road, co- located DT 39	436072	407320	Kerbside	0.5
BU4	Burton Road, LC 33 - Downhill	436107	407307	Kerbside	0.1
BU5	Burton Road, LC 33 - Downhill	436107	407307	Kerbside	0.1
BU6	Burton Road, LC 33 - Downhill	436107	407307	Kerbside	0.1

Table 6: NO₂ diffusion tube monitoring results 2016-2019

Site ID	Site location	NO ₂ annual mean concentration (µg/m ³)			
		2016	2017	2018	2019
DT11	Dodworth Road	43.2	38.5	35	39.1
DT12	Dodworth Road	45.5	41.8	38.9	38.9
DT13	Traffic Lights Dodworth Rd	45.1	43.9	39	43.3
DT33	Westway	31.8	30.9	29	31.2
DT34	Wakefield Road / Carlton Road	34.9	35.2	33.1	32.2
DT35	Wakefield Road / Carlton Road	40.7	38.7	37.4	35.9
DT36	Wakefield Road / Smithies Lane (North)	42.9	43.4	40.1	40.3
DT37	Wakefield Road – Burton Road junction	34.3	33.4	30.2	32.3
DT38	Old Mill Lane / Honeywell Street	41.9	43.4	40.4	37.8
DT39	Burton Road – app Rotherham Rd junc.	46.4	45	44.4	41.9
DT41	Harborough Hill Road	69.1	68.7	59.3	60.3
DT42	Mottram Street / Eldon Street	34	33.6	31.4	28.1
DT43	Harborough Hill Road	66.5	65.8	59.7	58.9
DT44	Harborough Hill Road, adj. gyratory	41.1	42.6	37.2	39.1
DT47	Sheffield Road / Park Road Xrds	39	38.6	30.3	33.5
DT48	Sheffield Road / Cemetery Road Xrds	54.7	48.4	43.4	47.4
DT50	Carlton Road (W'fd Road junction) uphill	N/A	N/A	N/A	37.4
DT51	Carlton Road (W'fd Road junction) downhill	N/A	N/A	N/A	31.0
DT53	Sheffield Road, town centre	N/A	N/A	N/A	59
DT54	Alhambra R/bt	N/A	N/A	N/A	44.6
DT56	Junction Church Street / Regent Street	N/A	N/A	N/A	26.2
BU1	Burton Road, 30 mph sign	N/A	30.3	33.9	36.3
BU2	Burton Road, co- located DT 39	N/A	33.9	38.8	44.1
BU3	Burton Road, co- located DT 39	N/A	35.2	40.3	44.4
BU4	Burton Road, LC 33 - Downhill	N/A	39.4	33.9	41.6
BU5	Burton Road, LC 33 - Downhill	N/A	36.8	34.7	38.7
BU6	Burton Road, LC 33 - Downhill	N/A	40.3	37.2	39.8
Note: bold indicates the data exceeds the annual mean NO ₂ objective					

Of the 27 diffusion tube monitoring locations, 17 locations exceeded the NO₂ objective (40µg/m³) for each of the years during the period between 2014 and 2016. Out of the 17 locations experiencing high concentrations of annual mean NO₂, 12 locations are at roadside sites. This indicates roadside concentrations at the scheme location will be close to or exceeding the air quality objective.

5.1.4 Background Concentrations

Defra publishes background pollutant mapping²⁴ for every 1km x 1km OS grid square across the UK for NO_x, NO₂ and PM₁₀. Background pollutant mapping has been reviewed for the grid squares in which the proposed scheme lies (434500,407500 and 435500,407500) and the surrounding grid squares. The background concentrations are presented in Table 7.

Table 7: Defra 2021 background concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5}

OS Grid Square		Annual Mean Concentration (µg/m ³)			
X	Y	NO _x	NO ₂	PM ₁₀	PM _{2.5}
434500	406500	15.9	21.9	11.4	7.5
435500	406500	11.7	15.6	12.0	8.2
434500	407500	11.2	14.9	10.5	6.9
435500	407500	12.3	16.5	11.3	7.4
Average		12.8	17.2	11.3	7.5

Defra background concentrations are below the air quality objectives for annual mean NO₂ and PM₁₀ and PM_{2.5}.

²⁴ Defra, Background Pollutant Mapping, <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>; [Accessed June 2018].

6 Assessment of Effects from Construction

This section provides the results of the assessment of construction-related activities on air quality.

The IAQM guidance¹² takes into consideration four dust-generating activities: demolition, earthworks, construction and trackout. The site of the proposed scheme covers an area of 1 hectare, which is currently existing road and shrubs surrounding the river and part of an existing carpark.

6.1 Sensitive Receptors

Sensitive receptors are defined in this assessment as those residential properties/schools/hospitals/businesses or areas where people may spend time that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction and operation of the proposed development.

The phasing of the proposed scheme will be completed in one stage. A pessimistic scenario is considered in which construction works are assumed to occur across the whole site area. There would be 10-100 receptors within 100m of the site boundary.

There are no ecological designated sites sensitive to dust soiling and PM₁₀ exposure within 50m of the proposed development. The nearest designated ecological site is Dearne Valley Park, a Local Nature Reserve approximately 160m from the proposed scheme. Impact on ecological receptors has therefore not been considered further in this assessment.

6.2 Dust Emission Magnitude

Following the methodology outlined in section 4.3, each dust-generating activity has been assigned a dust emission magnitude as shown in Table 8. In regard to earthworks, it has been assumed that these will occur in the whole site area as a worst-case assumption.

Table 8: Dust emission magnitude for all activities

Activity	Dust emission magnitude	Reasoning
Demolition	Medium	Assumed to be potentially dusty construction material.
Earthworks	Small	Total material moved is assumed to be <20,000 tonnes
Construction	Medium	Potentially dusty construction material (e.g. concrete)
Trackout	Small	Assumed as <10 HDV outward movements in any one day, and surface material with low potential for dust release.

6.3 Sensitivity of the Area

There will be 10-100 high sensitivity receptors (residential dwellings) within 100m of the proposed scheme boundary. As such, the areas sensitivity to dust soiling has been classified as *Low* in accordance with the IAQM guidance.

The average Defra PM₁₀ background concentration in the grid square where the proposed development is located is 11.3µg/m³, which falls below the 24µg/m³ threshold. The sensitivity of the area to human health has therefore been assigned as *Low* as there are 10-100 receptors within 100m of the proposed scheme boundary.

6.4 Risk of Impacts

Taking into consideration the dust emission magnitude and the sensitivity of the area, the development has been classified as *Low* risk to dust soiling and *Low* risk to human health impacts from demolition, earthworks, construction and trackout (Table 9). Specific mitigation to minimise the risk of dust soiling and human health impacts of the proposed development is described in Section 7.

Table 9: Summary dust risk table prior to mitigation

Activity	Dust soiling	Human health
Demolition	Low risk	Low risk
Earthworks	Negligible	Negligible
Construction	Low risk	Negligible
Trackout	Negligible	Negligible

Following implementation of appropriate mitigation, the effects of dust soiling and on human health should be negligible and the impacts not significant.

Figure 5: Construction dust buffers



7 Mitigation

7.1 Construction Dust

The dust emitting activities assessed can be greatly reduced or eliminated by applying the site-specific mitigation measures for the site according to the IAQM guidance. The guidance notes that it is anticipated that, with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Low risk mitigation measures are included following the assessment result and to ensure best practice is followed for all on-site activities. The following measures from the guidance are relevant and should be included in the Construction Environmental Management Plan (CEMP) for the site.

General

- 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; and
- Display the head or regional office contact information.

Site Management

- 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, and
- Record any exceptional incidents that cause dust and/or air emissions, either on-site or off-site and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results and make an inspection log available to the local authority, when asked; and
- 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.

Site Maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site; and
- Avoid site runoff of water or mud;

Operating vehicle/machinery and sustainable travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles; and
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable, and

Operations

- 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; and
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate.

Waste management

- Avoid bonfires and burning of waste materials.

7.1.1 Specific Measures**Measures specific to demolition**

- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;
- Avoid explosive blasting, using appropriate manual or mechanical alternatives, and
- Bag and remove any biological debris or damp down such material before demolition.

8 Conclusion

This report presents the air quality assessment for the proposed scheme to modify the A61 in central Barnsley. A review of current legislation and planning policy relevant to air quality and a baseline assessment describing the current air quality conditions in the vicinity of the proposed scheme have been undertaken. An assessment of potential effects on local air quality has been carried out for both the construction and operational traffic phases of the proposed scheme.

Construction effects have been assessed using the qualitative approach described in the latest IAQM guidance and it was concluded there is a *Low* risk from dust-generating activities on site. With the appropriate best practice mitigation measures in place, which are listed in section 7, there are likely to be no significant effects from the construction phase.

There is no predicted change in traffic movements from the widening and re-decking of the proposed A61. The proposed scheme will relieve congestion resulting in change in vehicle speeds. However, this is not a criterion for an air quality assessment of traffic emissions. As a result, the effect of the proposed scheme on local air quality is therefore considered to be not significant.

Appendix A

Construction Dust Methodology Tables

Table A1: Dust emission magnitude

Dust Emission Magnitude		
Small	Medium	Large
Demolition		
• total building volume <20,000m³ • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10m above ground • demolition during wetter months	• total building volume 20,000 - 50,000m³ • potentially dusty construction material • demolition activities 10 - 20m above ground level	• total building volume >50,000m³ • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20m above ground level
Earthworks		
• total site area <2,500m² • soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4m in height • total material moved <10,000 tonnes • earthworks during wetter months	• total site area 2,500m² - 10,000m² • moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • formation of bunds 4 - 8m in height • total material moved 20,000 - 100,000 tonnes	• total site area >10,000m² • 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 >8m in height • total material moved >100,000 tonnes
Construction		
• total building volume <25,000 m³ • construction material with low potential for dust release (e.g. metal cladding or timber)	• total building volume 25,000 - 100,000m³ • potentially dusty construction material (e.g. concrete) • on-site concrete batching	• total building volume >100,000m³ • on-site concrete batching • sandblasting
Trackout		
• <10 HDV (>3.5t) outward movements in any one day • surface material with low potential for dust release • unpaved road length <50m	• 10 – 50 HDV (>3.5t) outward movements in any one day • moderately dusty surface material (e.g. high clay content) • unpaved road length 50 – 100m;	• >50 HDV (>3.5t) outward movements in any one day • potentially dusty surface material (e.g. high clay content) • unpaved road length >100m

Table A2: Sensitivity of the area to dust soiling effects

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		< 20	< 50	< 100	< 350
High	> 100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

Table A3: Sensitivity of the area to human health impacts

Background PM ₁₀ concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
High receptor sensitivity						
> 32µg/m ³	> 100	High	High	High	Medium	Low
	10 – 100			Medium	Low	
	< 10		Medium	Low		
28 – 32µg/m ³	> 100	High	High	Medium	Low	Low
	10 – 100		Medium	Low		
	< 10					
24 – 28µg/m ³	> 100	High	Medium	Low	Low	Low
	10 – 100					
	< 10	Medium	Low			
< 24µg/m ³	> 100	Medium	Low	Low	Low	Low
	10 – 100	Low				
	< 10					
Medium receptor sensitivity						
> 32µg/m ³	> 10	High	Medium	Low	Low	Low
	< 10	Medium	Low			
28 – 32µg/m ³	> 10	Medium	Low	Low	Low	Low
	< 10	Low				
24 – 28µg/m ³	> 10	Low	Low	Low	Low	Low
	< 10					
< 24µg/m ³	> 10	Low	Low	Low	Low	Low
	< 10					
Low receptor sensitivity						

Background PM ₁₀ concentrations (annual mean)	Number of receptors	Distance from the source (m)				
		< 20	< 50	< 100	< 200	< 350
–	> 1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area for ecological impacts

Receptor sensitivity	Distance from the source (m)	
	< 20	< 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A5: Risk of dust impacts

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
<i>Demolition</i>			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
<i>Earthworks</i>			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
<i>Construction</i>			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
<i>Trackout</i>			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Low risk site	Negligible
Low	Low risk site	Low risk site	Negligible