

# South Yorkshire Passenger Transport Executive (SYPTE)

## A61 Phase 2

### 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.

Job number 253511-00

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**ARUP**

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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.

The proposed development comprises the widening of the A61 along Wakefield Road. The existing road currently comprises two lanes, with a right-turn filter lane along some sections and pedestrian footway on either side of the carriageway.

The scheme would widen Wakefield Road to deliver four lanes. Existing pedestrian footways would be retained on the west side of the road and new 2m footways where the road is widened on the east side. The scheme includes two bus stops. Land currently forming domestic curtilage and commercial forecourts would be required.

Retaining structures are proposed at the back of the footways and reconfiguration is necessary in existing car parks to the east to support the road widening.

Construction works will involve alterations to existing surface levels, requiring some resurfacing of the existing carriageway as well as formation of the new highway areas. There will also be some diversions of statutory utilities to move or lower them, and installation of new drainage.

The proposed scheme aims to reduce congestion along the A61.

Wakefield Road 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 1.2km north of the Barnsley No.4 Air Quality Management Area (AQMA), declared due to exceedance of the NO<sub>2</sub> annual mean air quality objective (40µg/m<sup>3</sup>).

## 1.1 Scope of Assessment

Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. This section provides details for the areas scoped into and out of this assessment. The effects have been assessed in the context of relevant national, regional and local air quality policies and guidance. A baseline assessment has been carried out to determine the existing conditions.

### **Construction impacts**

Construction impacts have the potential to result in dust nuisance or human health effects as result of the proposed works. An assessment of dust impacts has been scoped into this assessment.

### **Construction traffic**

Construction traffic volumes have not been finalised as a contractor has not been appointed. However, for a scheme of this size the volume of traffic is not likely to exceed the EPUK/IAQM screening thresholds<sup>1</sup> of 25 annual average daily traffic (AADT) heavy duty vehicles (HDV) and as such as been scoped out of requiring further assessment. However, it would be recommended that all HDVs associated with the scheme avoid travelling via the AQMA. This can be managed through the schemes construction traffic management plan (CTMP).

### **Operational traffic**

The schemes traffic consultants have confirmed that there would be a change in traffic greater than the EPUK/IAQM screening thresholds and as such as detailed air quality assessment is required in order to determine the magnitude and significance of changes to air pollutant concentrations.

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<sup>1</sup> EPUK/IAQM (2017) Land-Use Planning & Development Control: Planning for Air Quality.

## 2 Air Quality Standards and Guidelines

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This section summarises the relevant standards and guidelines which have been taken into consideration in this assessment.

### Environment Act 2021

The Environment Bill become an Act<sup>2</sup> (law) in November 2021. The Environment Act 2021 amends the Environment Act 1995<sup>3</sup>. It also amends the Clean Air Act 1993<sup>4</sup> to give local authorities more power at reducing local pollution, particularly that from domestic burning. It also amends the Environmental Protection Act 1990<sup>5</sup> to reduce smoke from residential chimneys by extending the system of statutory nuisance to private dwellings.

The following sections of the Environment Act 1995<sup>3</sup> have been transposed into the Environment Act 2021:

For the Secretary of State to develop, implement and maintain an Air Quality Strategy. 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 an 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.

The Act will implement key parts of the government's Clean Air Strategy and include targets for tackling air pollution in the UK.

Relevant to air quality<sup>6</sup>:

- For the Secretary of state for DEFRA to set long-term legally binding targets on air quality. These targets must be of at least 15 years in duration, and be proposed by late 2022;
- For the Secretary of State to publish a report reviewing the Air Quality Strategy every five years;
- For the government to set two targets by October 2022: the first on the amount of PM<sub>2.5</sub> pollutant in the ambient air (the figure and deadline for compliance remain unspecified) and a second long-term target set at least 15 years ahead to encourage stakeholder investment;

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<sup>2</sup> Environment Act 2021. Available at: <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>. Accessed 23/11/2021.

<sup>3</sup> Environment Act 1995, Chapter 25, Part IV Air Quality

<sup>4</sup> Clean Air Act 1993. Available at: <https://www.legislation.gov.uk/ukpga/1993/11/contents>. Accessed 23/11/2021.

<sup>5</sup> Environmental Protection Act 1990. Available at: <https://www.legislation.gov.uk/ukpga/1990/43/contents>. Accessed 23/1/2021.

<sup>6</sup> Environment Act 2021. Part 4 Air Quality and Environmental Recall.

- For the Office for Environmental Protection to be established<sup>7</sup> to substitute the watchdog function previously exercised by the European Commission;
- For local authorities' powers to be extended under the current Local Air Quality Management framework, including responsibilities to improve local air quality and to reduce public exposure to excessive levels of air pollution;
- For “air quality partners” to have a duty to share responsibility for dealing with local air pollution among public bodies; and
- Introduces a new power for the government to compel vehicle manufacturers to recall vehicles and non-road mobile machinery if they are found not to comply with the environmental standards that they are legally required to meet.

### Air Quality Standards Regulations 2010 (amended in 2016)

The Air Quality Standards Regulations 2010 (amended in 2016)<sup>8</sup> 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 NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards.

Table 1: Air Quality standards for human health

| Pollutant                           | Averaging period | Limit value / Objective                                                                               |
|-------------------------------------|------------------|-------------------------------------------------------------------------------------------------------|
| Nitrogen Dioxide (NO <sub>2</sub> ) | Annual mean      | 40µg/m <sup>3</sup>                                                                                   |
|                                     | 1-hour mean      | 200µg/m <sup>3</sup><br>not to be exceeded more than 18 times a year (99.79 <sup>th</sup> percentile) |
|                                     |                  |                                                                                                       |

<sup>7</sup> Environment Act 2021. Chapter 2. The Office for Environmental Protection.

<sup>8</sup> The Air Quality Standards (Amendment) Regulations 2016, SI 2016/1184.

| Pollutant                                         | Averaging period | Limit value / Objective                                                                              |
|---------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------|
| Fine Particulate Matter (PM <sub>10</sub> )       | Annual mean      | 40µg/m <sup>3</sup>                                                                                  |
|                                                   | 24-hour mean     | 50µg/m <sup>3</sup><br>not to be exceeded more than 35 times a year (90.41 <sup>st</sup> percentile) |
| Very Fine Particulate Matter (PM <sub>2.5</sub> ) | Annual mean      | 20µg/m <sup>3</sup>                                                                                  |

## 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 1990<sup>9</sup>, 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).

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<sup>9</sup> Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air.

## 3 Policies and Guidance

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### 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.

#### National Planning Policy Framework (2021)

The National Planning Policy Framework (NPPF)<sup>10</sup> was updated in July 2021 with the purpose of planning to achieve sustainable development. Paragraph 186 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 105 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 174(e) 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 levels of soil, air, water or noise pollution or land instability. Development*

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<sup>10</sup> Ministry of Housing, Communities & Local Government, National Planning Policy Framework, July 2021  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf)

*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.”*

### **Clean Air Strategy**

The Department for Environment, Food and Rural Affairs (Defra) Clean Air Strategy<sup>11</sup> 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<sub>2.5</sub> concentrations to meet the World Health Organisation’s (WHO) target of 10µg/m<sup>3</sup> 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.”*

### **Local Air Quality Management Policy and Technical Guidance**

The 2016 policy guidance note from Defra, LAQM.PG(16)<sup>12</sup>, 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.

The LAQM Technical Guidance, TG(16)<sup>13</sup> 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**

### **BMBC Adopted Local Plan 2019**

The BMBC Local Plan<sup>14</sup> was adopted by Full Council on 3 January 2019. The Local Plan considers the future use of all land within the Barnsley borough up to 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

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<sup>11</sup> Defra (2019) Clean Air Strategy 2019

<sup>12</sup> Defra (2016) Local Air Quality Management Policy Guidance. PG(16)

<sup>13</sup> Defra (2016) Local Air Quality Management Technical Guidance.TG(16).

<sup>14</sup> Barnsley Metropolitan Borough Council (2019) Adopted Local Plan

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.”*

### 3.3 Other Relevant Policy and Guidance

#### **Institute of Air Quality Management Dust Guidance**

The 2016 Institute of Air Quality Management (IAQM) guidance v1.1<sup>15</sup> 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.

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<sup>15</sup> IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction v1.1.

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

The 2017 update to the Land-Use Planning & Development Control guidance document<sup>1</sup> 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.

## 4 Methodology of Assessment

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### 4.1 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 data<sup>16</sup>;
- The Defra Local Air Quality Management website<sup>17</sup>;
- The UK Air Information Resource website<sup>18</sup>;
- The Air Quality England website<sup>19</sup>; and,
- The Environment Agency website<sup>20</sup>.

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.

### 4.2 Methodology of Construction Phase Assessment

#### 4.2.1 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 PM<sub>10</sub> concentrations as a result of dust generating activities on site; and

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<sup>16</sup> Barnsley Metropolitan Borough Council, 2020 Air Quality Annual Status Report. <https://www.barnsley.gov.uk/media/16804/air-quality-status-report-2020.pdf> [Accessed: October 2021]

<sup>17</sup> Defra Local Air Quality Management website; <http://laqm.defra.gov.uk/>; [Accessed: October 2021]

<sup>18</sup> Defra, <http://uk-air.defra.gov.uk>, [Accessed October 2021]

<sup>19</sup> Air Quality England website <http://www.airqualityengland.co.uk/>

<sup>20</sup> Environment Agency website; <https://environment.data.gov.uk/public-register/view/search-industrial-installations>; [Accessed: October 2021]

- An increase in NO<sub>2</sub> and PM<sub>10</sub> 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 PM<sub>10</sub> exposure.

The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM<sub>10</sub> 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 PM<sub>10</sub> 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 1: 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 PM<sub>10</sub> 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.

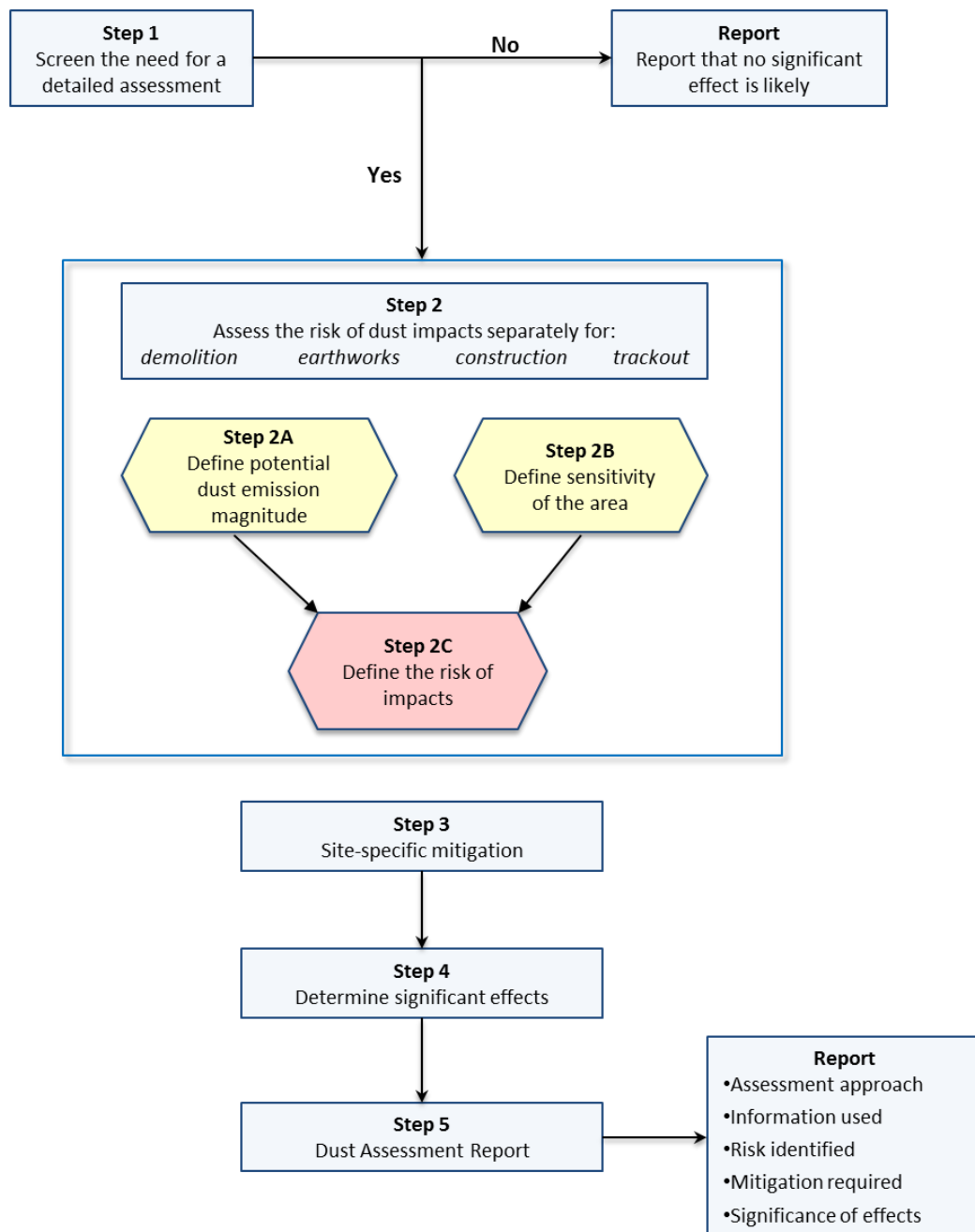
### **Step 4: Determine any Significant Residual Effects**

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 1: IAQM dust assessment methodology



## **4.3 Method of Operational Phase Assessment**

The method for the detailed air quality assessment is to be added.

## 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<sup>21,22</sup>. 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 website<sup>23</sup> 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 1995<sup>24</sup> 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.

<sup>21</sup> Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).

<sup>22</sup> The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390.

<sup>23</sup> Environment Agency website, Search installation permits; <https://environment.data.gov.uk/public-register/view/search-industrial-installations>; [Accessed: October 2021].

<sup>24</sup> Environment Act (1995) Chapter 25, Part IV Air Quality.

A review of the Defra website<sup>25</sup> 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 NO<sub>2</sub> 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. The nearest automatic monitoring is located over 2km from the proposed scheme, as such are not likely to be representative of the site and are not considered further in this assessment.

#### 5.1.3.1 Non-automatic Monitoring

The ASR report<sup>16</sup> shows that BMBC has 64 diffusion tubes monitoring NO<sub>2</sub> 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. Details of the diffusion tubes are given in Table 3 and recent monitoring results are given in

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<sup>25</sup> Defra (2016) Air quality management areas; <http://uk-air.defra.gov.uk/aqma/list> [Accessed: October 2021].

Table 4Table 6.

Table 3: 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 4: NO<sub>2</sub> diffusion tube monitoring results 2016-2019

| Site ID                                                                                | Site location                              | NO <sub>2</sub> annual mean concentration (µg/m <sup>3</sup> ) |             |             |             |
|----------------------------------------------------------------------------------------|--------------------------------------------|----------------------------------------------------------------|-------------|-------------|-------------|
|                                                                                        |                                            | 2016                                                           | 2017        | 2018        | 2019        |
| DT11                                                                                   | Dodworth Road                              | <b>43.2</b>                                                    | 38.5        | 35          | 39.1        |
| DT12                                                                                   | Dodworth Road                              | <b>45.5</b>                                                    | <b>41.8</b> | 38.9        | 38.9        |
| DT13                                                                                   | Traffic Lights Dodworth Rd                 | <b>45.1</b>                                                    | <b>43.9</b> | 39          | <b>43.3</b> |
| 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              | <b>40.7</b>                                                    | 38.7        | 37.4        | 35.9        |
| DT36                                                                                   | Wakefield Road / Smithies Lane (North)     | <b>42.9</b>                                                    | <b>43.4</b> | <b>40.1</b> | <b>40.3</b> |
| DT37                                                                                   | Wakefield Road – Burton Road junction      | 34.3                                                           | 33.4        | 30.2        | 32.3        |
| DT38                                                                                   | Old Mill Lane / Honeywell Street           | <b>41.9</b>                                                    | <b>43.4</b> | <b>40.4</b> | <b>37.8</b> |
| DT39                                                                                   | Burton Road – app Rotherham Rd junc.       | <b>46.4</b>                                                    | <b>45</b>   | <b>44.4</b> | <b>41.9</b> |
| DT41                                                                                   | Harborough Hill Road                       | <b>69.1</b>                                                    | <b>68.7</b> | <b>59.3</b> | <b>60.3</b> |
| DT42                                                                                   | Mottram Street / Eldon Street              | 34                                                             | 33.6        | 31.4        | 28.1        |
| DT43                                                                                   | Harborough Hill Road                       | <b>66.5</b>                                                    | <b>65.8</b> | <b>59.7</b> | <b>58.9</b> |
| DT44                                                                                   | Harborough Hill Road, adj. gyratory        | <b>41.1</b>                                                    | <b>42.6</b> | 37.2        | 39.1        |
| DT47                                                                                   | Sheffield Road / Park Road Xrds            | 39                                                             | 38.6        | 30.3        | 33.5        |
| DT48                                                                                   | Sheffield Road / Cemetery Road Xrds        | <b>54.7</b>                                                    | <b>48.4</b> | <b>43.4</b> | <b>47.4</b> |
| 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         | <b>59</b>   |
| DT54                                                                                   | Alhambra R/bt                              | N/A                                                            | N/A         | N/A         | <b>44.6</b> |
| 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        | <b>44.1</b> |
| BU3                                                                                    | Burton Road, co- located DT 39             | N/A                                                            | 35.2        | <b>40.3</b> | <b>44.4</b> |
| BU4                                                                                    | Burton Road, LC 33 - Downhill              | N/A                                                            | 39.4        | 33.9        | <b>41.6</b> |
| BU5                                                                                    | Burton Road, LC 33 - Downhill              | N/A                                                            | 36.8        | 34.7        | 38.7        |
| BU6                                                                                    | Burton Road, LC 33 - Downhill              | N/A                                                            | <b>40.3</b> | 37.2        | 39.8        |
| Note: <b>bold</b> indicates the data exceeds the annual mean NO <sub>2</sub> objective |                                            |                                                                |             |             |             |

Of the 27 diffusion tube monitoring locations, 17 locations exceeded the NO<sub>2</sub> objective (40µg/m<sup>3</sup>) for each of the years during the period between 2014 and 2016. Out of the 17 locations experiencing high concentrations of annual mean NO<sub>2</sub>, 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 mapping<sup>26</sup> for every 1km x 1km OS grid square across the UK for NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub>. Background pollutant mapping has been reviewed for the grid squares in which the proposed scheme lies and the surrounding grid squares. The background concentrations are presented in Table 5.

Table 5: Defra 2021 background concentrations of NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>

| OS Grid Square |        | Annual Mean Concentration (µg/m <sup>3</sup> ) |                 |                  |                   |
|----------------|--------|------------------------------------------------|-----------------|------------------|-------------------|
| X              | Y      | NO <sub>x</sub>                                | NO <sub>2</sub> | PM <sub>10</sub> | PM <sub>2.5</sub> |
| 435500         | 408500 | 17.2                                           | 10.7            | 10.8             | 7.1               |

Defra background concentrations are below the air quality objectives for annual mean NO<sub>2</sub> and PM<sub>10</sub> and PM<sub>2.5</sub>.

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<sup>26</sup> Defra, Background Pollutant Mapping, <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>

## 6 Assessment of Effects from Construction

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

The IAQM guidance<sup>15</sup> takes into consideration four dust-generating activities: demolition, earthworks, construction and trackout.

### 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 PM<sub>10</sub> exposure within 50m of the proposed development. The nearest designated ecological site is Dearne Valley Park, a Local Nature Reserve approximately 500m 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 4.2, each dust-generating activity has been assigned a dust emission magnitude as shown in Table 6. In regard to earthworks, it has been assumed that these will occur in the whole site area as a worst-case assumption.

Table 6: 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 PM<sub>10</sub> background concentration in the grid square where the proposed development is located is 10.8µg/m<sup>3</sup>, which falls below the 24µg/m<sup>3</sup> 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 7). Specific mitigation to minimise the risk of dust soiling and human health impacts of the proposed development is described in Section 7.

Table 7: Summary dust risk table prior to mitigation

| Activity            | Dust soiling | Human health |
|---------------------|--------------|--------------|
| <b>Demolition</b>   | Low risk     | Low risk     |
| <b>Earthworks</b>   | Negligible   | Negligible   |
| <b>Construction</b> | Low risk     | Negligible   |
| <b>Trackout</b>     | Negligible   | Negligible   |

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

## 7 Assessment of Effects from Operational Traffic

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To be added

## 8 Mitigation

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### 8.1 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.

### **8.1.1 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.

## 9 Conclusion

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This report presents the air quality assessment for the proposed scheme to modify the A61 in 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.

Results for the operational phase traffic are to be added.

## Appendix A

### Construction Dust Methodology Tables

Table A1: Dust emission magnitude

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

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

| Background PM <sub>10</sub> 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       |