



# Air Quality Impact Assessment

Littlehampton Premier Inn  
Avon Road

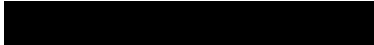
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## I. REVISION HISTORY

Revision	Date	Description	
1v1	10/04/2025	First Issue	
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## 1. INTRODUCTION

### 1.1 Scope

Stroma Built Environment Ltd has been commissioned to undertake an air quality assessment based on the potential impacts of existing and future traffic levels on a proposed development at Aon Road, Littlehampton. The pollutants modelled as part of this assessment are nitrogen oxides (NO<sub>x</sub>) and particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).

The impacts of vehicle emissions have been assessed using the techniques detailed within the 'LA105 Air Quality' of the Design Manual for Roads and Bridges (DMRB)<sup>1</sup>, the Local Air Quality Management Technical Guidance (LAQM.TG22)<sup>2</sup> and the London Local Air Quality Management Technical Guidance (LLAQM, TG19). The impact of road traffic emissions will be assessed using the ADMS-Roads air dispersion model. This model has been devised by Cambridge Environmental Research Consultants (CERC) and is described as a "comprehensive tool for investigating air pollution problems due to small networks of roads".

It should be noted that the short-term impacts of NO<sub>2</sub> and PM<sub>10</sub> emissions have not been modelled as dispersion models are inevitably poor at predicting short-term peaks in pollutant concentrations, which are highly variable from year to year, and from site to site. Notwithstanding this, general assumptions have been made about short term concentrations based on the modelled annual mean concentrations.

An assessment on the potential impact on local air quality from demolition and construction activities at the site has been undertaken in accordance with the IAQM guidance.

### 1.2 Site Description

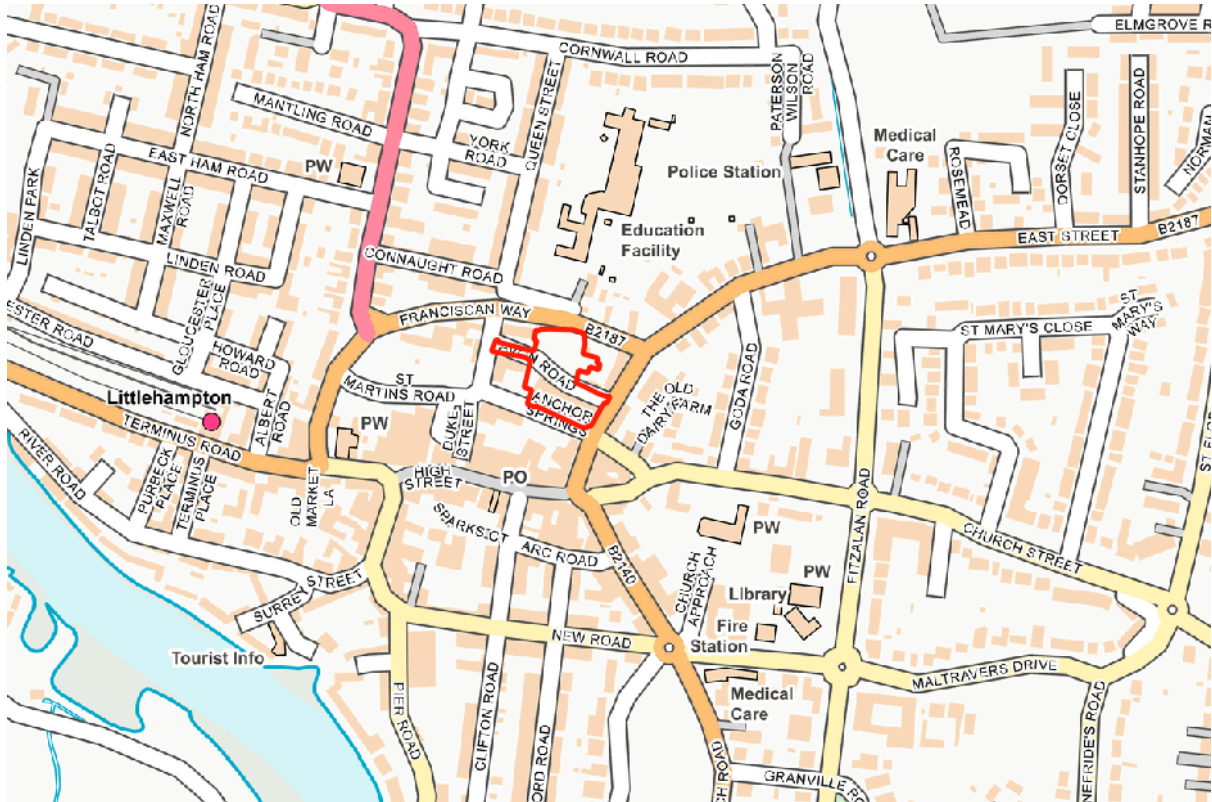
The proposed development site is located at Avon Road in Littlehampton. The proposed development is for a new Premier Inn.

A location plan can be found in Figure 1.

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<sup>1</sup> Design Manual for Roads and Bridges, Sustainability & Environment Appraisal LA 105 Air Quality  
<sup>2</sup> Part IV of the Environment Act 2021, Local Air Quality Management Technical Guidance (TG22), Defra, August 2022

Figure 1 – Site Location Plan



## 2 POLLUTANTS & LEGISLATION

### 2.1 Pollutant Overview

In most urban areas of the UK, traffic generated pollutants have become the most common pollutants. These are nitrogen dioxide (NO<sub>2</sub>), fine particulates (PM<sub>10</sub>), carbon monoxide (CO), 1,3-butadiene and benzene, as well as carbon dioxide (CO<sub>2</sub>). This air quality assessment focuses on NO<sub>2</sub> and PM<sub>10</sub>, as these pollutants are least likely to meet their Air Quality Strategy objectives near roads. Table 1 provides an overview of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>.

Table 1 – Overview of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>

Pollutant	Properties	Anthropogenic Sources	Natural Sources	Potential Effects
<b>Particles (PM<sub>10</sub>)</b>	Tiny particulates of solid or liquid nature suspended in the air	Road transport; Power generation plants; Production processes e.g. windblown dust	Soil erosion; Volcanoes; Forest fires; Sea salt crystals	Asthma; Lung cancer; Cardiovascular problems
<b>Particles (PM<sub>2.5</sub>)</b>	Tiny particulates of solid or liquid nature suspended in the air	Road transport; Power generation plants; Production processes e.g. windblown dust	Soil erosion; Volcanoes; Forest fires; Sea salt crystals	Asthma; Lung cancer; Cardiovascular problems Penetrates deeper into the lungs
<b>Nitrogen Dioxide (NO<sub>2</sub>)</b>	Reddish-brown coloured gas with a distinct odour	Road transport; Power generation plants; Fossil fuels – extraction & distribution; Petroleum refining	No natural sources, although nitric oxide (NO) can form in soils	Pulmonary edema; Various environmental impacts e.g. acid rain

### 2.2 Air Quality Strategy

The UK Government and the devolved administrations published the latest Air Quality Strategy for England on 28 April 2023<sup>3</sup>. The Strategy provides an over-arching strategic framework for air quality management in the UK.

With regards to this assessment, the Air Quality Strategy contains national air quality standards and objectives established by the Government to protect human health. The objectives for nitrogen dioxide and particulates (PM<sub>10</sub> and PM<sub>2.5</sub>) have been set, along with seven other pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, PAHs, sulphur dioxide and ozone). Those which are limit values required by EU Daughter Directives on Air Quality have been transposed into UK law through the Air Quality Standards Regulations 2016 which came into force on 31st December 2016. Table 2 provides

<sup>3</sup> Air Quality Strategy: framework for local authority, 28 April 2023

the UK Air Quality Objectives for NO<sub>2</sub> and PM<sub>10</sub>. Table 2 provides the UK Air Quality Objectives for NO<sub>2</sub> and PM<sub>10</sub>.

*Table 2 – UK Air Quality Objectives for Nitrogen Dioxide and Particulate Matter*

Pollutant	Objective	Concentration measured as
<b>Nitrogen Dioxide (NO<sub>2</sub>)</b>	200µg/m <sup>3</sup> not to be exceeded more than 18 times a year	1 hour mean
	40µg/m <sup>3</sup>	Annual mean
<b>Particles (PM<sub>10</sub>)</b>	50µg/m <sup>3</sup> not to be exceeded more than 35 times a year	24 hour mean
	40µg/m <sup>3</sup>	Annual mean
<b>Particles (PM<sub>2.5</sub>)</b>	20µg/m <sup>3</sup> (except Scotland)	Annual Mean

Objectives for PM<sub>2.5</sub> were also introduced by the UK Government and the Devolved Administrations in 2010. However, these are not included in Regulations as the Air Quality Strategy has adopted an “exposure reduction” approach for PM<sub>2.5</sub> in order to seek a more efficient way of achieving further reductions in the health effects of air pollution by providing a driver to improve air quality everywhere in the UK rather than just in a small number of localised hotspot areas.

### 2.3 London Local Air Quality Management (LLAQM)

At the core of LLAQM delivery are three pollutant objectives; these are: nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>10</sub>) and sulphur dioxide (SO<sub>2</sub>). All current Air Quality Management Areas (AQMAS) across the UK are declared for one or more of these pollutants, with NO<sub>2</sub> accounting for the majority. It is a statutory requirement for local authorities to regularly review and assess air quality in their area and take action to improve air quality when objectives set out in regulation cannot be met.

#### 2.3.1 Arun District Council

The Local Authority has not declared any AQMAS and as such the proposed development does not lie in an AQMA.



## 3 PLANNING POLICY & GUIDANCE

### 3.1 National Planning Policy & Guidance

#### 3.1.1 National Planning Policy Framework

On a national level, air quality can be a material consideration in planning decisions. The National Planning Policy Framework (NPPF)<sup>4</sup> for England, revised and released on 12th December 2024, is considered a key part of the Governments reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. The NPPF replaces the Planning Policy Statement 23 (PPS23) Planning and Pollution Control<sup>5</sup>.

Paragraph 187 within the NPPF states that “planning policies and decisions should contribute to and enhance the natural and local environment” and that developments “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”

It goes on to state in paragraph 199 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”.

#### 3.1.2 Planning Practice Guidance (PPG)

As defined within section 2, the UK Government has legally binding limits for concentrations of outdoor air pollutants. Development of any size can influence air quality through the construction and in use phases. The PPG for air quality outlines the considerations for developments in relation to air quality and the scenarios to be considered where appropriate.

Furthermore, the PPG outlines that any assessment needs to be “proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions”. Once these considerations and assessments have been undertaken, mitigation which is specific to the locality should be agreed between the planning authority and developer “to ensure new development is appropriate for its location and unacceptable risks are prevented”.

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<sup>4</sup> National Planning Policy Framework, Department for Levelling Up, Housing & Communities, December 2024

<sup>5</sup> Planning Policy Statement 23: Planning and Pollution Control, Office of the Deputy Prime Minister (ODPM), November 2004

### 3.1.3 Land-Use Planning & Development Control

In January 2017, Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) produced guidance to ensure that air quality is adequately considered in the land-use planning and development control processes<sup>6</sup>.

The guidance document is particularly applicable to assessing the effect of changes in exposure of members of the public resulting from residential and mixed-use developments, especially those within urban areas where air quality is poorer. It is also relevant to other forms of development where a proposal could affect local air quality and for which no other guidance exists.

### 3.1.4 Local Air Quality Plan

The local authority has produced an air quality strategy to address poor air quality in the area. Ongoing work is being carried out to improve air quality further, including continuing to monitor NO<sub>2</sub> across the district, reviewing taxi licence policy and tackling construction dust, among others.

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<sup>6</sup> Land-Use Planning & Development Control: Planning for Air Quality. Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes. EPUK & IAQM. January 2017

## 4 ASSESSMENT METHODOLOGY

### 4.1 Construction Phase

The Institute of Air Quality Management (IAQM) has published guidance on the assessment of dust from construction and demolition<sup>7</sup>. Based on this guidance, the main air quality impacts that may arise during construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM<sub>10</sub> concentrations, as a result of dust generating activities on site; and
- An increase in concentrations or airborne particles and nitrogen dioxide due to exhaust emissions from diesel powered vehicles and equipment on site.

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

“The most common impacts are dust soiling and increased ambient PM<sub>10</sub> concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of particulate matter in all size fractions.

Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed”.

The guidance continues by providing an assessment procedure. This includes sub-dividing construction activities into four types to reflect their different potential impacts. These are as follows:

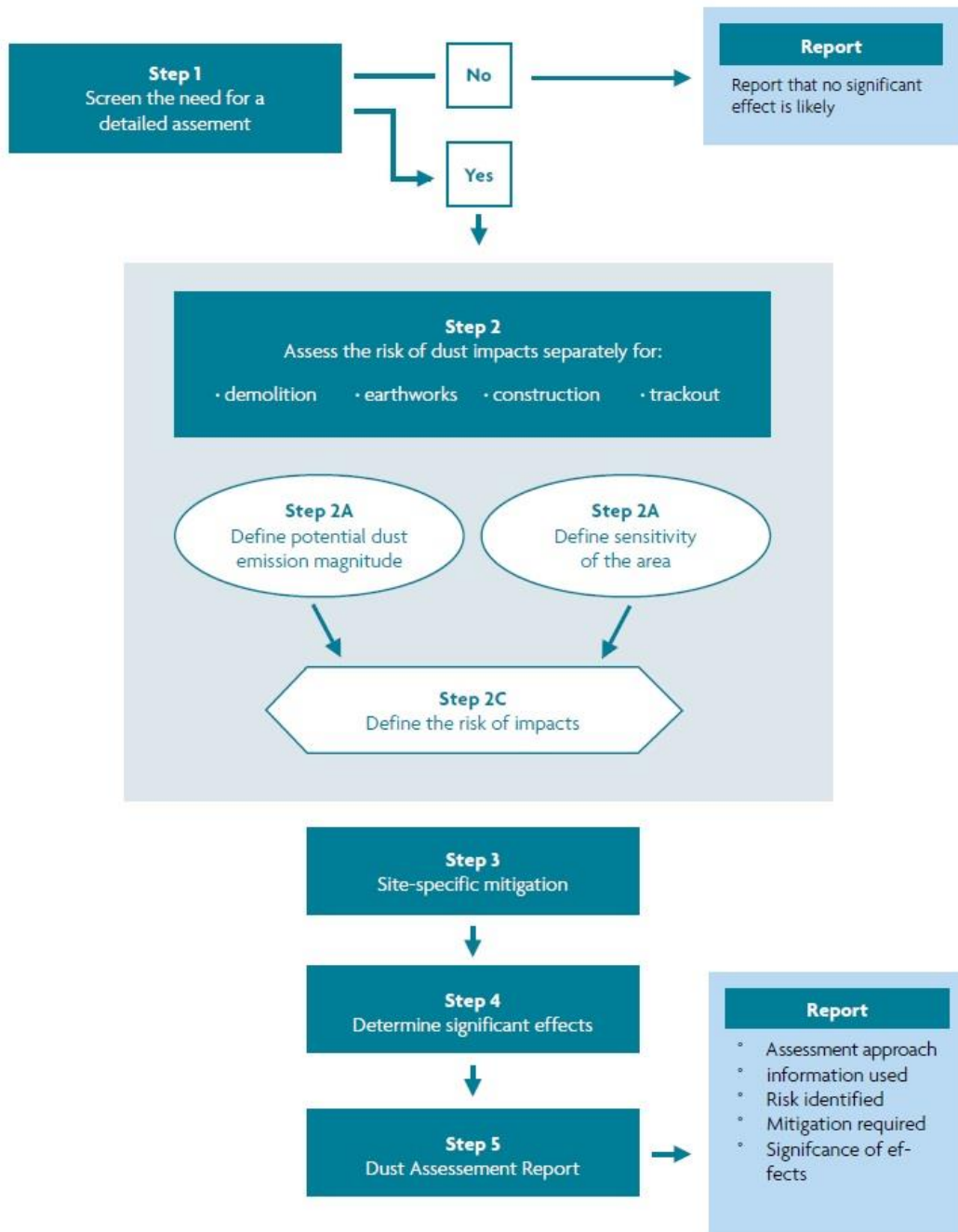
- Demolition;
- Earthworks;
- Construction; and
- Track out.

With regards to the proposed development the potential for dust emissions is assessed for each activity that is likely to take place. The assessment procedure assumes no mitigation measures are applied. The conditions with no mitigation thus form the baseline or “do-nothing” situation for a construction site. The assessment procedure uses the steps provided in the guidance and summarised in Figure 2.

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<sup>7</sup> Guidance on the assessment of dust from demolition and construction, August 2023 (version 2.1)

Figure 2 – Dust Assessment Procedure



## 4.2 Operational Phase (Traffic Emissions)

### 4.2.1 Modelled Scenarios

A modelled baseline year of 2023 has been used as this corresponds with the latest year of monitoring undertaken by the Council. The future year has also been chosen (2028) representing the first full year with the proposed development in place. Three scenarios have been adopted as part of the assessment. These are as follows:

- Scenario 1 – existing levels of air quality / model verification (2023); and
- Scenario 2 – future impact of traffic emissions on the proposed development i.e. introduction of new exposure (2028)
- Scenario 3 – 2028 Future Baseline + Proposed Development

Predicted concentrations will be compared to the Air Quality Strategy objectives. Background pollutant concentrations and vehicle emission rates for all modelled years are based on the latest data issued by Defra. These background concentrations and emission factors are discussed further in the following sections.

### 4.2.2 ADMS-Roads

Modelling the impact of traffic emissions on the proposed development will be undertaken using the latest version of the ADMS-Roads model<sup>8</sup>. ADMS-Roads is significantly more advanced than that of most other air dispersion models in that it incorporates the latest understanding of the boundary layer structure, and goes beyond the simplistic Pasquill-Gifford stability categories method with explicit calculation of important parameters. The model uses advanced algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions.

### 4.2.3 Emission Factors

Defra and the Devolved Administrations have provided an updated Emission Factors Toolkit (Version 13.0) which incorporates updated NO<sub>x</sub> emissions factors and vehicle fleet information<sup>9</sup>. These emission factors have been integrated into the latest ADMS-Roads modelling software. However, in order to undertake a worst-case assessment emission factors for 2019 have been used for all modelled years.

### 4.2.4 Traffic Data

Baseline flows along the local roads have been obtained from DfT website and traffic counts organised by the client. Baseline (2023) data from the DfT has been projected to 2028. Projection of traffic data has been undertaken using growth factors specific to the local authority, obtained from TEMPro<sup>10</sup>. The projected flow rates are provided in Table 3. It is assumed that the percentage HDV and speed will remain unchanged in future years.

Where a link approaches a junction a speed of 20 kmph has been modelled in order to represent queuing traffic at a junction. This is the approach recommended by LLAQM.

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<sup>8</sup> Model Version: 5.0.01. Interface Version 5.0.0.5313 (16/03/2020)

<sup>9</sup> [https://laqm.defra.gov.uk/documents/EFT2020\\_v13.0.xlsb](https://laqm.defra.gov.uk/documents/EFT2020_v13.0.xlsb)

<sup>10</sup> TEMPro (Trip End Model Presentation Program) version 7. Department for Transport

Table 3 – Annual Average Daily Traffic Flows, Percentage HDV and Speeds for Modelled Roads

Link Name	Baseline AADT 2023	Future Baseline AADT 2028	Future Baseline + Development 2028	HDV (%)	Speed (kmph)
Arundel Road	7,644	8,000	8,071	2.25	41
Terminus Road	12,528	13,113	13,184	1.89	34
Franciscan Way	14,224	14,931	15,072	1.94	41
Horsham Road	10,611	11,107	11,248	1.48	42
Beach Road	3,584	3,763	3,904	3.27	22

### 4.3 Background Concentrations

Background NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub> concentrations have been obtained from Defra<sup>11</sup>. These 1 km x 1 km grid resolution maps are derived from a base year of 2021 (for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> only), which are then projected to future years up to 2030. Background concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> derived from Defra are provided in Table 4.

Table 4 – Background NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations

Location	Pollutant	X	Y	2023
Proposed Development	NO <sub>2</sub>	502500	102500	9.4
	NO <sub>x</sub>			12.2
	PM <sub>10</sub>			10.6
	PM <sub>2.5</sub>			6.8

In order to undertake a worst-case assessment, 2023 background concentrations have been assumed for all modelled scenarios.

### 4.4 Surface Roughness

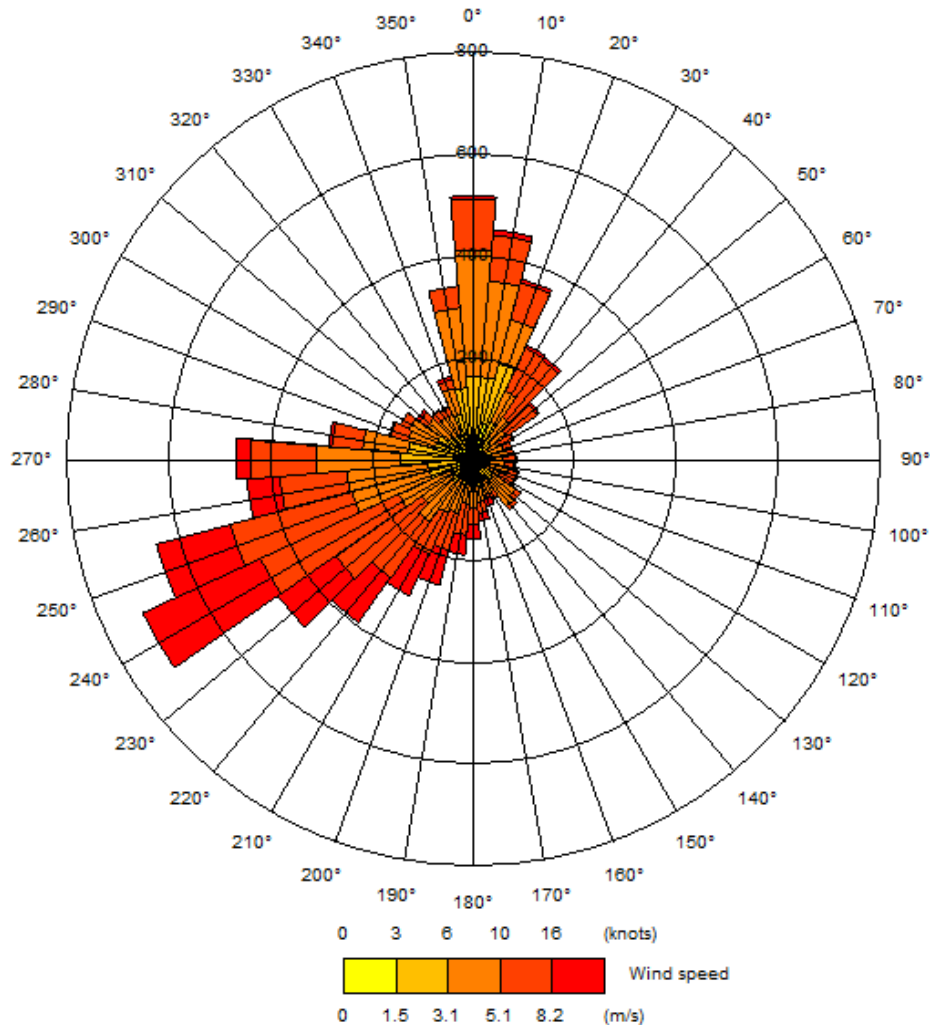
A surface roughness of 1.5 metres has been used in the model. This value is provided by ADMS-Roads as a typical roughness length for large urban areas. This value has been used across the modelled domain.

<sup>11</sup> <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>

## 4.5 Meteorological Data

Hourly sequential meteorological data from the Shoreham Airport meteorological station has been used. Wind speed and direction data from the Shoreham Airport meteorological station has been plotted as a wind rose in Figure 3.

Figure 3 – Wind Speed and Direction Data, Shoreham Airport (2023)



## 4.6 Model Output

### 4.6.1 NO<sub>x</sub>/NO<sub>2</sub> Relationship

Following recent evidence that shows the proportion of primary NO<sub>2</sub> in vehicle exhaust has increased<sup>12</sup>. As such, a new NO<sub>x</sub> to NO<sub>2</sub> calculator has been devised<sup>13</sup>. This new calculator has been used to determine NO<sub>2</sub> concentrations for this assessment, based on predicted NO<sub>x</sub> concentrations using ADMS-Roads. Converted NO<sub>2</sub> concentrations are initially compared to local monitoring data in order to verify the model output. If the model performance is considered unacceptable then the NO<sub>x</sub> concentrations are adjusted before conversion to NO<sub>2</sub>.

<sup>12</sup> Trends in Primary Nitrogen Dioxide in the UK, Air Quality Expert Group, 2007

<sup>13</sup> [https://laqm.defra.gov.uk/documents/NOx\\_to\\_NO2\\_Calculator\\_v8.1.xlsm](https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v8.1.xlsm)

#### 4.6.2 Predicted Short Term Concentrations

As discussed in the introduction, it has not been possible to model the short-term impacts of NO<sub>2</sub> and PM<sub>10</sub>. Research undertaken in 2003<sup>14</sup> has indicated that the hourly NO<sub>2</sub> objective is unlikely to be exceeded at a roadside location where the annual mean NO<sub>2</sub> concentration is less than 60 µg/m<sup>3</sup>.

For PM<sub>10</sub>, a relationship between the annual mean and the number of 24-hour mean exceedances has been devised and is as follows:

- No. 24-hour mean exceedances =  $-18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$

This relationship has been applied to the modelled annual mean concentrations in order to estimate the number of 24-hourly exceedances.

#### 4.6.3 Model Verification

The monitoring sites listed in Table 5 has been used for the purposes of model verification. These are the closest monitoring sites to the proposed development.

Table 5 – Modelled Verification Locations

ID	Site Location	X	Y	Height (m)
1	Terminus Road, Littlehampton	502568	102147	2.7
2	Worthing Road, Littlehampton	503438	103365	2.8
22	Lyminster Road, Littlehampton	502746	103857	2.7

#### 4.6.4 Receptor Locations

In order to assess the potential impact of the proposed development, the perimeter of the proposed development have been modelled. The location of these model points, together with their height above ground level is provided in Table 6 and represented in Figures 4 and 5. Existing receptors are shown in Figure 5.

Table 6 – Modelled Receptor Locations

Development Receptors			
Air Quality Assessment ID	X	Y	Height (m)
D1	502900	102200	1.5, 4.5, 7.5, 10.5
D2	502918	102194	1.5, 4.5, 7.5, 10.5
D3	502923	102182	1.5, 4.5, 7.5, 10.5
D4	502906	102183	1.5, 4.5, 7.5, 10.5
D5	502885	102190	1.5, 4.5, 7.5, 10.5
D6	502867	102196	4.5, 7.5, 10.5
D7	502862	102211	4.5, 7.5, 10.5
D8	502866	102223	4.5, 7.5, 10.5
D9	502878	102213	4.5, 7.5, 10.5
D10	502886	102205	4.5, 7.5, 10.5

<sup>14</sup> Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marnar, 2003

Existing Receptors			
E1	502634	102152	1.5, 4.5
E2	502655	102182	1.5, 4.5
E3	502648	102229	1.5, 4.5
E4	502694	102299	1.5, 4.5
E5	502767	102308	1.5, 4.5
E6	502849	102310	1.5, 4.5
E7	502916	102289	1.5, 4.5
E8	502957	102248	1.5, 4.5
E9	502979	102225	1.5, 4.5
E10	502942	102210	1.5, 4.5
E11	502925	102157	1.5, 4.5
E12	502897	102123	1.5, 4.5

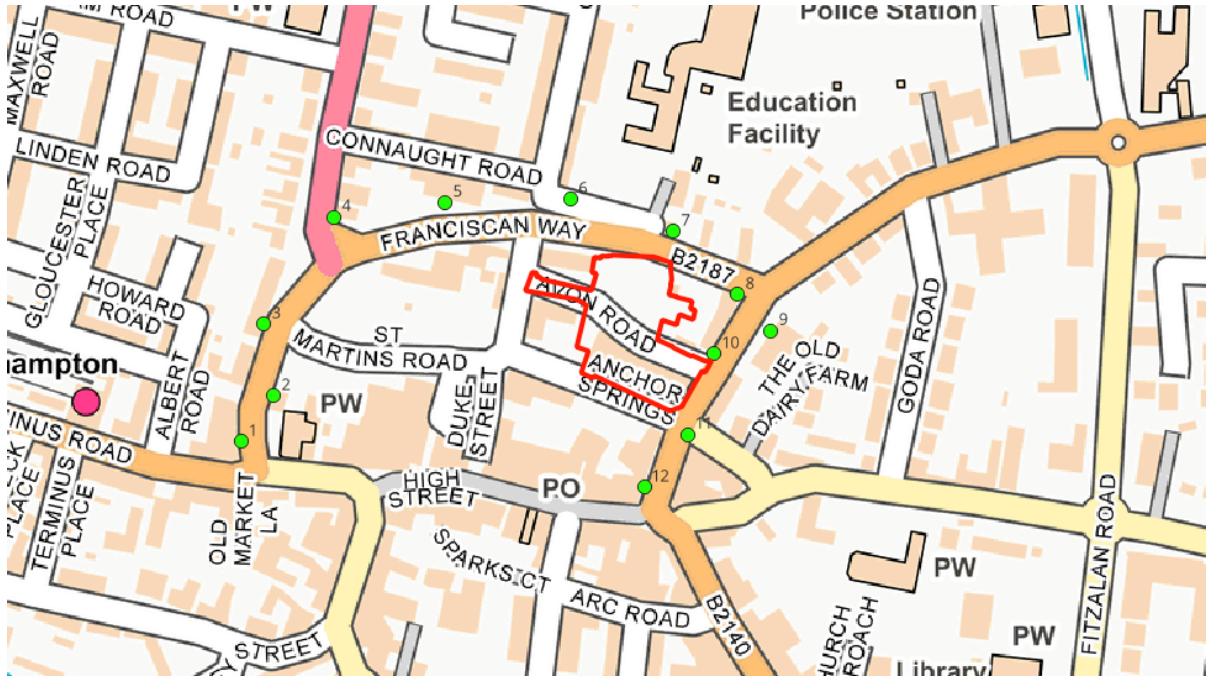
Figure 4 – Ground floor modelled receptor locations



**Figure 5 – First, Second and Third floor modelled receptor locations**



**Figure 6 – Existing Receptor Locations**



#### 4.7 Ecological Receptors

There is a Local Nature Reserve approximately 750m to the south of the development site. This is deemed a sufficient distance between the site and the Nature Reserve to not be an issue in terms of environmental impact so the ecological assessment has been screened out.

#### 4.8 Significance Criteria

##### 4.8.1 Construction Phase

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A development is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large (see Table 7); and
- the sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity.

These two factors are combined to determine the risk of dust impacts with no mitigation applied (see Table 8). The risk category assigned to the development can be different for each of the four potential activities (demolition, earthworks, construction and track out).

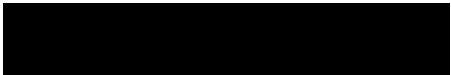


Table 7 – Dust Emission Magnitude

Activity	Dust Emission Class		
	Large	Medium	Small
<b>Demolition</b>	Total building volume >75,000 m <sup>3</sup> , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12 m above ground level	Total building volume 12,000 – 75 000m <sup>3</sup> , potentially dusty construction material, demolition activities 6-12 m above ground level	Total building volume <12,000 m <sup>3</sup> , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months
<b>Earthworks</b>	Total site area >110,000 m <sup>2</sup> , 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 >6 m in height	Total site area 18,000 – 110,000 m <sup>2</sup> , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height	Total site area <18,000 m <sup>2</sup> , soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3m in height
<b>Construction</b>	Total building volume >75,000 m <sup>3</sup> , piling, on site concrete batching; sandblasting	Total building volume 12,000 m <sup>3</sup> – 75,000 m <sup>3</sup> , potentially dusty construction material (e.g. concrete), piling, on site concrete batching	Total building volume <12,000 m <sup>3</sup> , construction material with low potential for dust release (e.g. metal cladding or timber)
<b>Track out</b>	>50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m	20 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100 m;	<20 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50 m.

Table 8 – Risk of Dust Impacts

Construction Activity	Sensitivity of Area	Dust Emission Magnitude		
		Large	Medium	Small
<b>Demolition</b>	High	High Risk	Medium Risk	Medium Risk
	Medium	High Risk	Medium Risk	Low Risk
	Low	Medium Risk	Low Risk	Negligible
<b>Earthworks</b>	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible
<b>Construction</b>	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible
<b>Track out</b>	High	High Risk	Low Risk	Low Risk
	Medium	Medium Risk	Low Risk	Negligible
	Low	Low Risk	Low Risk	Negligible

#### 4.8.2 Operational Phase

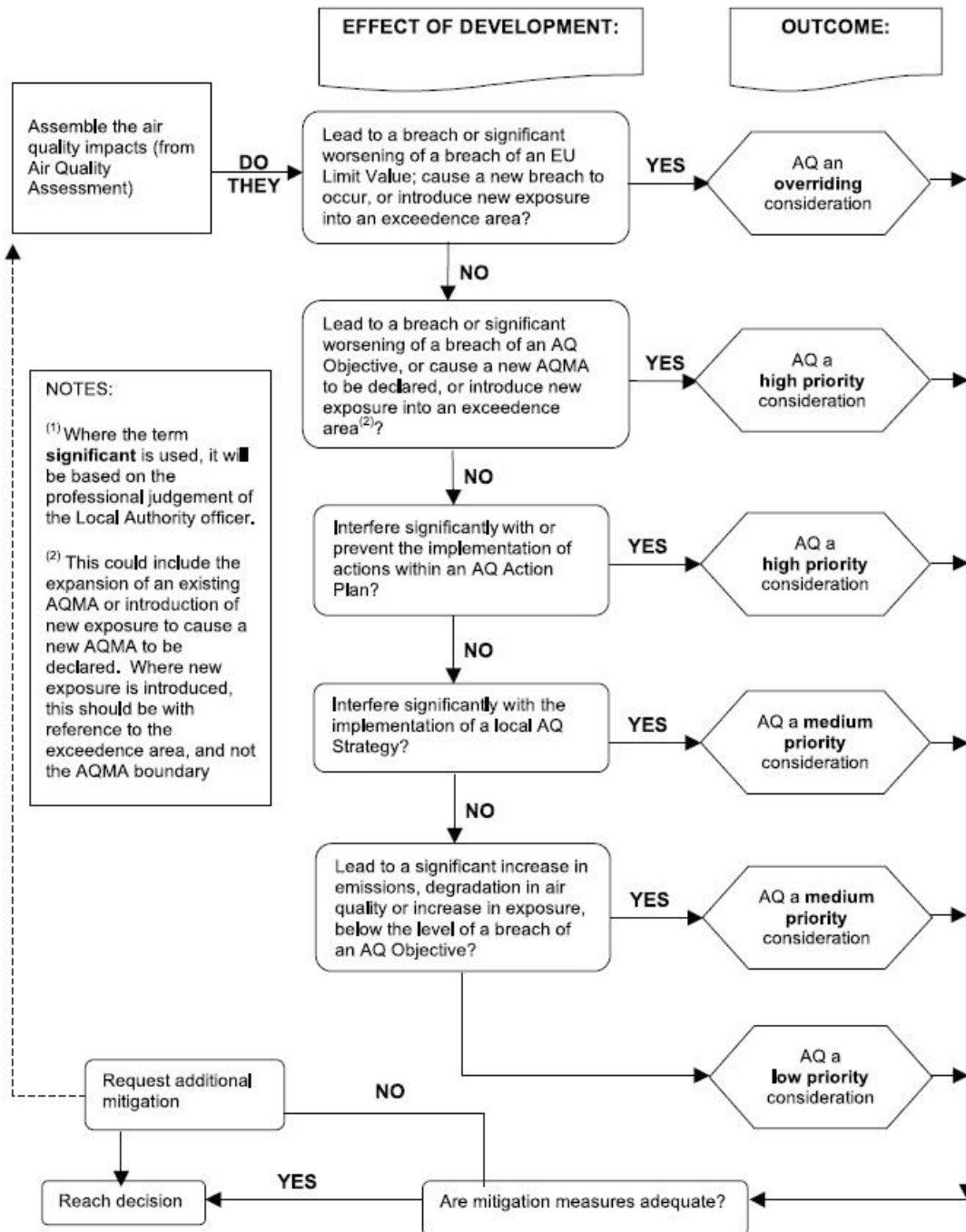
The guidance released by Environmental Protection UK (EPUK) provides steps for a Local Authority to follow in order to assess the significance of air quality impacts of a development proposal. This procedure, shown in Figure 7, will be applied to the modelled results.

The joint guidance released by EPUK and the IAQM provides impact descriptors for individual receptors. These descriptors are provided in Table 9.

*Table 9 – Impact Descriptors for Individual Receptors*

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQ objective			
	1%	2-5%	6-10%	>10%
75% or less of AQ objective	Negligible	Negligible	Slight	Moderate
76-94% of AQ objective	Negligible	Slight	Moderate	Moderate
95-102% of AQ objective	Slight	Moderate	Moderate	Substantial
103-109% of AQ objective	Moderate	Moderate	Substantial	Substantial
110% or more of AQ objective	Moderate	Substantial	Substantial	Substantial

Figure 7 – Assessing the Significance of Air Quality Impacts of a Development Proposal



## 5 AIR QUALITY ASSESSMENT

### 5.1 Impact from Construction Activities

The assessment of construction activities has focused on demolition, earthworks, construction and track out activities at the site. Using the criteria provided in Table 7 the dust emission magnitude for each activity is as follows:

- Demolition = Medium;
- Earthworks = Medium;
- Construction = Medium; and
- Track out = Small.

Based on the IAQM guidance the sensitivity of the surrounding area is summarised in Table 10.

*Table 10 – Sensitivity of the Surrounding Area*

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low

The dust emission magnitudes and sensitivity of the surrounding area are combined to determine the risk of dust impacts with no mitigation applied. These are summarised in Table 11.

*Table 11 – Summary of Dust Risk*

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium	Low
Human Health	Low	Low	Low	Negligible

It should also be noted that the likelihood of an adverse impact occurring is correlated to wind speed and wind direction. As such, unfavourable wind speeds and wind directions must occur at the same time as a dust generating activity in order to generate an adverse impact. The overall impacts also assume that the dust generating activities are occurring over the entirety of the site meaning that as an activity moves further away from a potential receptor the magnitude and significance of the impact will be further reduced.

## 5.2 Impact of Vehicle Emissions

### 5.2.1 Model Verification

Using the guidance provided within the London Local Air Quality Management Technical Guidance TG(19), the modelled output has been verified against the monitoring data obtained from the site listed in Table 12. The following tables provide a summary of the model verification process for NO<sub>x</sub>/NO<sub>2</sub> and PM<sub>10</sub> concentrations.

*Table 12 – Comparison of Modelled and Monitored NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)*

Verification Location	Modelled Concentration	Monitored Concentration	Difference [(modelled - monitored)/monitored] x100
1	12.9	18.4	-29.7%
2	15.8	23.1	-31.7%
22	13.1	20.6	-36.5%

As described in the Technical Guidance (LLAQM.TG19), in order to provide more confidence in the model predictions and the decisions based on these, the majority of results should be within ±25% (ideally ±10%) of the monitored concentrations. In order to improve the confidence in modelled concentrations across the modelled domain the model output has been adjusted. This is described further in the next section.

### 5.2.2 Model Adjustment

In order to undertake model adjustment, it is first necessary to derive the monitored and modelled road contributions of NO<sub>x</sub> (excluding background). The modelled road contribution NO<sub>x</sub> is taken directly from the ADMS-Roads output before it has been converted to NO<sub>2</sub> using the NO<sub>x</sub> to NO<sub>2</sub> calculator described in Section 4.6.1. The NO<sub>x</sub> to NO<sub>2</sub> calculator can also be used to derive monitored road contributions of NO<sub>x</sub> from NO<sub>2</sub> diffusion tube results. A summary of these calculations is provided in Table 13.

*Table 13 – Monitored NO<sub>x</sub> and NO<sub>2</sub> concentrations*

Verification Location	Monitored Total NO <sub>2</sub>	Defra Background NO <sub>2</sub>	Monitored road contribution NO <sub>2</sub> (total – background)	Monitored road contribution NO <sub>x</sub> (total – background)	Modelled road contribution NO <sub>x</sub> (excludes background)	Ratio of monitored road contribution NO <sub>x</sub> / modelled road contribution NO <sub>x</sub>
1	18.4	9.4	9.0	16.9	6.4	2.62
2	23.1	9.1	14.0	26.8	12.3	2.17
22	20.6	9.8	10.8	20.6	6.1	3.38

Once the monitored and modelled road contributions of NO<sub>x</sub> (excluding background) have been derived the contributions of NO<sub>x</sub> are compared and a ratio derived. In this case it is 2.447 and is used to adjust the modelled road contribution of NO<sub>x</sub>. This is shown in Table 14.

Figure 8 – Linear Regression of Modelled and Monitored NO<sub>2</sub>

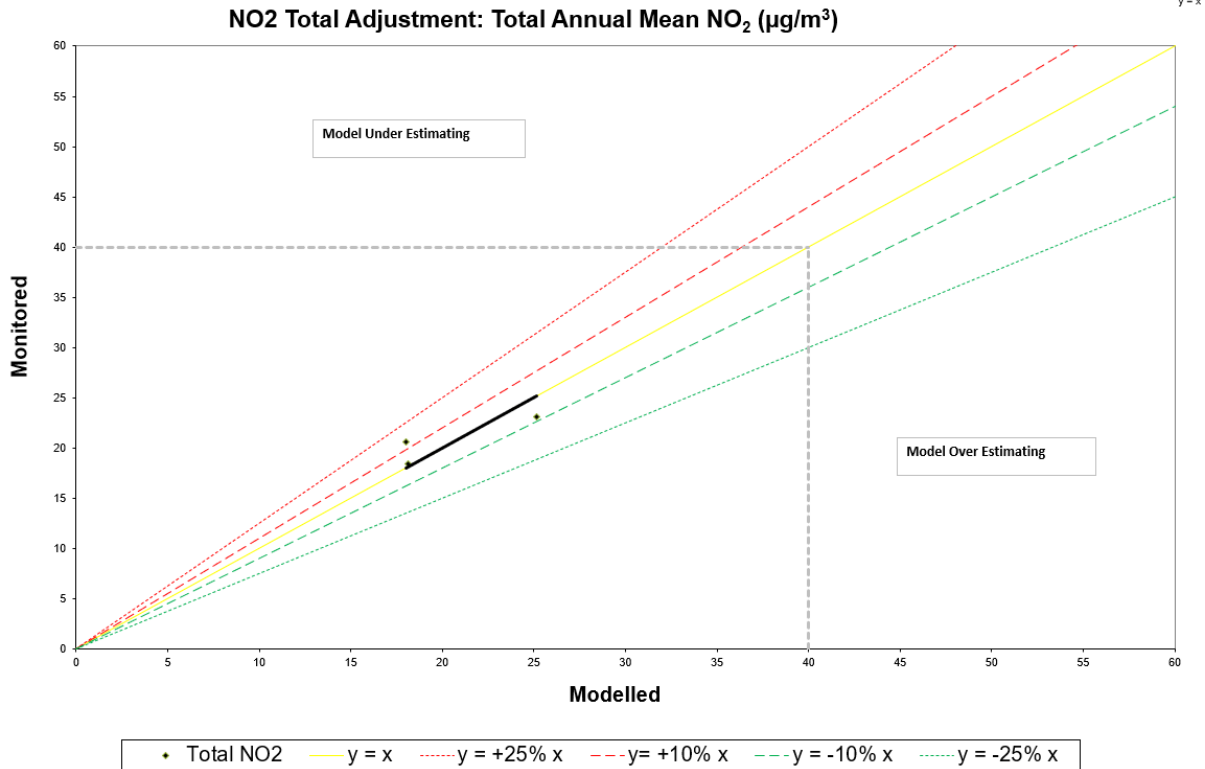


Table 14 – Adjustment of Modelled NO<sub>x</sub> Contributions

Verification Location	Adjustment factor for modelled road contribution	Adjusted modelled road contribution NO <sub>x</sub>	Modelled total NO <sub>2</sub> (based on empirical NO <sub>x</sub> /NO <sub>2</sub> relationship)	Monitored total NO <sub>2</sub>	% Difference [(modelled – monitored) / monitored] x 100
1	2.447	15.8	17.8	18.4	-3.0%
2	2.447	30.1	24.7	23.1	7.1%
22	2.447	14.9	17.7	20.6	-14.0%

Following adjustment of the modelled NO<sub>x</sub> concentrations by a factor of 2.447 the total NO<sub>2</sub> concentration at the model verification location has been calculated using the method described in Section 4.6.1. The revised NO<sub>2</sub> concentration, shown in Table 14, indicates a more acceptable model performance when compared against the monitored NO<sub>2</sub> concentrations. As such, an adjustment factor of 2.447 has been applied to all modelled NO<sub>x</sub> concentrations across the model domain before conversion to NO<sub>2</sub>.

### 5.2.3 Nitrogen Dioxide

Predicted annual mean concentrations for NO<sub>2</sub> at the proposed development in 2023 and 2028 are provided in Table 15. As mentioned in Section 4.6.1, NO<sub>2</sub> concentrations have been calculated from the predicted NO<sub>x</sub> concentrations using the latest NO<sub>x</sub>-NO<sub>2</sub> conversion spreadsheet available from the Air Quality Archive.

Table 15 – Comparison of Predicted Annual Mean NO<sub>2</sub> Concentrations (µg/m<sup>3</sup>)

Ground Floor Receptors (1.5m)				
Receptor ID	Baseline (2023)	Future Baseline (2028)	Future Baseline + Development (2028)	Above/ Below AQO
GF_1	11.4	11.5	11.5	Below
GF_2	11.8	11.9	12.0	Below
GF_3	12.6	12.8	12.9	Below
GF_4	11.4	11.5	11.6	Below
GF_5	11.1	11.2	11.2	Below
First Floor Receptors (4.5m)				
1F_1	11.2	11.3	11.4	Below
1F_2	11.5	11.7	11.7	Below
1F_3	12.0	12.1	12.2	Below
1F_4	11.2	11.3	11.4	Below
1F_5	11.0	11.1	11.1	Below
1F_6	11.0	11.1	11.1	Below
1F_7	11.1	11.2	11.3	Below
1F_8	11.3	11.4	11.5	Below
1F_9	11.2	11.3	11.3	Below
1F_10	11.2	11.3	11.3	Below
Second Floor Receptors (7.5m)				
2F_1	11.0	11.1	11.1	Below
2F_2	11.2	11.3	11.3	Below
2F_3	11.3	11.4	11.4	Below
2F_4	11.0	11.1	11.1	Below
2F_5	10.8	10.9	11.0	Below
2F_6	10.8	10.9	10.9	Below
2F_7	11.0	11.1	11.1	Below
2F_8	11.1	11.2	11.2	Below
2F_9	11.0	11.1	11.1	Below
2F_10	11.0	11.1	11.1	Below
Third Floor Receptors (10.5m)				
3F_1	10.8	10.8	10.9	Below
3F_2	10.8	10.9	10.9	Below
3F_3	10.8	10.9	10.9	Below
3F_4	10.7	10.8	10.8	Below
3F_5	10.7	10.7	10.7	Below
3F_6	10.7	10.7	10.7	Below
3F_7	10.8	10.8	10.9	Below

<b>3F_8</b>	10.9	10.9	11.0	Below
<b>3F_9</b>	10.8	10.9	10.9	Below
<b>3F_10</b>	10.7	10.8	10.8	Below

The ADMS predictions for annual mean NO<sub>2</sub> concentrations in 2023 and 2028 indicate that the annual mean objective (40 µg/m<sup>3</sup>) would be achieved at the modelled receptor locations on the ground floor.

Nitrogen dioxide also has an hourly objective of 200 µg/m<sup>3</sup> not to be exceeded more than 18 times in one year. However, the hourly mean concentration has not been calculated directly by ADMS Roads. This is as a result of an evaluation of continuous monitoring data from across the UK that revealed that the relationship between the annual mean and hourly mean NO<sub>2</sub> concentrations was very weak. Nonetheless, research undertaken in 2003<sup>15</sup> has indicated that the hourly NO<sub>2</sub> objective is unlikely to be exceeded at a roadside location where the annual mean NO<sub>2</sub> concentration is less than 60 µg/m<sup>3</sup>. Given that predicted NO<sub>2</sub> concentration in 2023 and 2028 are below 60 µg/m<sup>3</sup> at the modelled receptor locations, the likelihood of the short-term objective for NO<sub>2</sub> being exceeded is low.

#### 5.2.4 Particulate Matter (PM<sub>10</sub>)

Predicted annual mean concentrations for PM<sub>10</sub> in 2023 and 2028 are provided in Table 16.

Table 16 – Predicted PM<sub>10</sub> Concentrations, Annual Mean (µg/m<sup>3</sup>)

<b>Ground floor receptors (1.5m)</b>				
<b>Receptor ID</b>	<b>Baseline (2023)</b>	<b>Future Baseline (2028)</b>	<b>Future Baseline + Development (2028)</b>	<b>Above/ Below AQO</b>
<b>GF_1</b>	10.9	10.9	10.9	Below
<b>GF_2</b>	10.9	11.0	11.0	Below
<b>GF_3</b>	11.0	11.1	11.1	Below
<b>GF_4</b>	10.9	10.9	10.9	Below
<b>GF_5</b>	10.9	10.9	10.9	Below
<b>First Floor Receptors (4.5m)</b>				
<b>1F_1</b>	10.9	10.9	10.9	Below
<b>1F_2</b>	10.9	10.9	10.9	Below
<b>1F_3</b>	11.0	11.0	11.0	Below
<b>1F_4</b>	10.9	10.9	10.9	Below
<b>1F_5</b>	10.9	10.9	10.9	Below
<b>1F_6</b>	10.9	10.9	10.9	Below
<b>1F_7</b>	10.9	10.9	10.9	Below
<b>1F_8</b>	10.9	10.9	10.9	Below
<b>1F_9</b>	10.9	10.9	10.9	Below
<b>1F_10</b>	10.9	10.9	10.9	Below
<b>Second Floor Receptors (7.5m)</b>				
<b>2F_1</b>	10.9	10.9	10.9	Below

<sup>15</sup> Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003

<b>2F_2</b>	10.9	10.9	10.9	Below
<b>2F_3</b>	10.9	10.9	10.9	Below
<b>2F_4</b>	10.8	10.9	10.9	Below
<b>2F_5</b>	10.8	10.8	10.8	Below
<b>2F_6</b>	10.8	10.8	10.8	Below
<b>2F_7</b>	10.9	10.9	10.9	Below
<b>2F_8</b>	10.9	10.9	10.9	Below
<b>2F_9</b>	10.9	10.9	10.9	Below
<b>2F_10</b>	10.8	10.9	10.9	Below
<b>Third Floor Receptors (10.5m)</b>				
<b>3F_1</b>	10.8	10.8	10.8	Below
<b>3F_2</b>	10.8	10.8	10.8	Below
<b>3F_3</b>	10.8	10.8	10.8	Below
<b>3F_4</b>	10.8	10.8	10.8	Below
<b>3F_5</b>	10.8	10.8	10.8	Below
<b>3F_6</b>	10.8	10.8	10.8	Below
<b>3F_7</b>	10.8	10.8	10.8	Below
<b>3F_8</b>	10.8	10.8	10.9	Below
<b>3F_9</b>	10.8	10.8	10.8	Below
<b>3F_10</b>	10.8	10.8	10.8	Below

The ADMS predictions for annual mean PM<sub>10</sub> concentrations in 2023 and 2028 indicate that the annual mean objective (40 µg/m<sup>3</sup>) would be achieved at all the modelled receptor locations. In addition, the maximum number of days when PM<sub>10</sub> concentrations are more than 50 µg/m<sup>3</sup> is 2, less than the 35 exceedances allowed in the regulations.

### 5.2.5 Particulate Matter (PM<sub>2.5</sub>)

Predicted annual mean concentrations for PM<sub>2.5</sub> in 2023 and 2028 are provided in Table 17.

Table 17 – Predicted PM<sub>2.5</sub> Concentrations, Annual Mean (µg/m<sup>3</sup>)

<b>Ground Floor receptors (1.5m)</b>				
Receptor ID	Baseline (2023)	Future Baseline (2028)	Future Baseline + Development (2028)	Above/ Below AQO
<b>GF_1</b>	7.3	7.4	7.4	Below
<b>GF_2</b>	7.4	7.4	7.5	Below
<b>GF_3</b>	7.6	7.6	7.6	Below
<b>GF_4</b>	7.3	7.4	7.4	Below
<b>GF_5</b>	7.3	7.3	7.3	Below
<b>First Floor Receptors (4.5m)</b>				
<b>1F_1</b>	7.3	7.3	7.3	Below
<b>1F_2</b>	7.4	7.4	7.4	Below
<b>1F_3</b>	7.4	7.5	7.5	Below
<b>1F_4</b>	7.3	7.3	7.3	Below
<b>1F_5</b>	7.2	7.3	7.3	Below
<b>1F_6</b>	7.2	7.3	7.3	Below

1F_7	7.3	7.3	7.3	Below
1F_8	7.3	7.4	7.4	Below
1F_9	7.3	7.3	7.3	Below
1F_10	7.3	7.3	7.3	Below
<b>Second Floor Receptors (7.5m)</b>				
2F_1	7.2	7.3	7.3	Below
2F_2	7.3	7.3	7.3	Below
2F_3	7.3	7.3	7.3	Below
2F_4	7.2	7.2	7.3	Below
2F_5	7.2	7.2	7.2	Below
2F_6	7.2	7.2	7.2	Below
2F_7	7.3	7.3	7.3	Below
2F_8	7.3	7.3	7.3	Below
2F_9	7.3	7.3	7.3	Below
2F_10	7.2	7.3	7.3	Below
<b>Third Floor Receptors (10.5m)</b>				
3F_1	7.2	7.2	7.2	Below
3F_2	7.2	7.2	7.2	Below
3F_3	7.2	7.2	7.2	Below
3F_4	7.2	7.2	7.2	Below
3F_5	7.2	7.2	7.2	Below
3F_6	7.2	7.2	7.2	Below
3F_7	7.2	7.2	7.2	Below
3F_8	7.2	7.2	7.2	Below
3F_9	7.2	7.2	7.2	Below
3F_10	7.2	7.2	7.2	Below

The ADMS predictions for annual mean PM<sub>2.5</sub> concentrations in 2023 and 2028 indicate that the annual mean objective (25 µg/m<sup>3</sup>) would be achieved at all the modelled receptor locations.

### 5.2.6 Significance of additional modelled receptors

As highlighted in Section 4.6.4 and represented in Table 6 and Figure 6, additional receptor locations have been modelled as part of the assessment. The nature of the receptors are residential buildings as well as shops with what appears to be residential dwellings upstairs.

Predictions for annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations in 2028 at the additional receptor locations are provided in Table 18, Table 19 and Table 20.

**Table 18 – Comparison of Predicted Annual Mean NO<sub>2</sub> Concentrations at additional modelled receptor locations**

<b>Ground Floor Receptors (1.5m)</b>				
<b>Receptor ID</b>	<b>Baseline (2023)</b>	<b>Future Baseline (2028)</b>	<b>Future Baseline + development (2028)</b>	<b>Change</b>
GF_E1	16.9	17.3	17.3	0.0
GF_E2	18.4	18.9	18.9	0.1
GF_E3	14.4	14.6	14.6	0.0
GF_E4	17.6	18.0	18.1	0.1
GF_E5	14.4	14.7	14.7	0.1
GF_E6	14.0	14.3	14.3	0.0
GF_E7	16.1	16.4	16.5	0.1
GF_E8	19.4	19.9	20.0	0.1
GF_E9	14.6	14.9	15.0	0.1
GF_E10	14.0	14.2	14.3	0.1
GF_E11	15.1	15.4	15.6	0.2
GF_E12	11.5	11.7	11.7	0.1
<b>First Floor Receptors (4.5m)</b>				
1F_E1	15.0	15.3	15.3	0.0
1F_E2	16.1	16.4	16.5	0.0
1F_E3	13.2	13.4	13.4	0.0
1F_E4	15.4	15.7	15.8	0.0
1F_E5	13.6	13.8	13.8	0.0
1F_E6	13.3	13.5	13.5	0.0
1F_E7	14.5	14.7	14.8	0.1
1F_E8	16.2	16.5	16.6	0.1
1F_E9	13.7	13.9	14.0	0.1
1F_E10	12.9	13.1	13.2	0.1
1F_E11	13.2	13.4	13.5	0.1
1F_E12	11.2	11.3	11.3	0.1

**Table 19 – Comparison of Predicted Annual Mean PM<sub>10</sub> Concentrations at additional modelled receptor locations**

<b>Ground Floor Receptors (1.5m)</b>				
<b>Receptor ID</b>	<b>Baseline (2023)</b>	<b>Future Baseline (2028)</b>	<b>Future Baseline + development (2028)</b>	<b>Change</b>
GF_E1	11.7	11.8	11.8	0.0
GF_E2	11.9	12.0	12.0	0.0
GF_E3	11.3	11.4	11.4	0.0
GF_E4	11.7	11.8	11.8	0.0
GF_E5	11.4	11.4	11.4	0.0
GF_E6	11.3	11.4	11.4	0.0

<b>GF_E7</b>	11.6	11.7	11.7	0.0
<b>GF_E8</b>	11.9	11.9	12.0	0.0
<b>GF_E9</b>	11.3	11.3	11.3	0.0
<b>GF_E10</b>	11.2	11.2	11.2	0.0
<b>GF_E11</b>	11.3	11.4	11.4	0.0
<b>GF_E12</b>	10.9	10.9	10.9	0.0
<b>First Floor Receptors (4.5m)</b>				
<b>1F_E1</b>	11.4	11.5	11.5	0.0
<b>1F_E2</b>	11.6	11.6	11.6	0.0
<b>1F_E3</b>	11.2	11.2	11.2	0.0
<b>1F_E4</b>	11.4	11.5	11.5	0.0
<b>1F_E5</b>	11.2	11.3	11.3	0.0
<b>1F_E6</b>	11.2	11.2	11.2	0.0
<b>1F_E7</b>	11.4	11.4	11.4	0.0
<b>1F_E8</b>	11.5	11.5	11.5	0.0
<b>1F_E9</b>	11.2	11.2	11.2	0.0
<b>1F_E10</b>	11.1	11.1	11.1	0.0
<b>1F_E11</b>	11.1	11.1	11.1	0.0
<b>1F_E12</b>	10.9	10.9	10.9	0.0

Nitrogen dioxide also has an hourly objective of 200  $\mu\text{g}/\text{m}^3$  not to be exceeded more than 18 times in one year. However, the hourly mean concentration has not been calculated directly by ADMS Roads. This is as a result of an evaluation of continuous monitoring data from across the UK that revealed that the relationship between the annual mean and hourly mean  $\text{NO}_2$  concentrations was very weak. Nonetheless, research undertaken in 2003<sup>16</sup> has indicated that the hourly  $\text{NO}_2$  objective is unlikely to be exceeded at a roadside location where the annual mean  $\text{NO}_2$  concentration is less than 60  $\mu\text{g}/\text{m}^3$ . Given that predicted  $\text{NO}_2$  concentration in 2028 are below 60  $\mu\text{g}/\text{m}^3$  at the additional modelled receptor locations, the likelihood of the short-term objective for  $\text{NO}_2$  being exceeded is low.

**Table 20 – Comparison of Predicted Annual Mean  $\text{PM}_{2.5}$  Concentrations at additional modelled receptor locations**

<b>Ground floor receptors (1.5m)</b>				
<b>Receptor ID</b>	<b>Baseline (2023)</b>	<b>Future Baseline (2028)</b>	<b>Future Baseline + development (2028)</b>	<b>Change</b>
<b>GF_E1</b>	8.9	9.0	9.0	0.0
<b>GF_E2</b>	9.3	9.4	9.4	0.0
<b>GF_E3</b>	8.1	8.2	8.2	0.0
<b>GF_E4</b>	8.8	8.9	8.9	0.0
<b>GF_E5</b>	8.2	8.3	8.3	0.0
<b>GF_E6</b>	8.1	8.2	8.2	0.0
<b>GF_E7</b>	8.7	8.8	8.8	0.0
<b>GF_E8</b>	9.1	9.3	9.3	0.0
<b>GF_E9</b>	8.0	8.1	8.1	0.0

<sup>16</sup> Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003

<b>GF_E10</b>	7.9	7.9	8.0	0.0
<b>GF_E11</b>	8.1	8.2	8.2	0.0
<b>GF_E12</b>	7.3	7.4	7.4	0.0
<b>First Floor Receptors (4.5m)</b>				
<b>1F_E1</b>	8.3	8.4	8.4	0.0
<b>1F_E2</b>	8.6	8.7	8.7	0.0
<b>1F_E3</b>	7.8	7.9	7.9	0.0
<b>1F_E4</b>	8.3	8.4	8.4	0.0
<b>1F_E5</b>	8.0	8.0	8.0	0.0
<b>1F_E6</b>	7.9	8.0	8.0	0.0
<b>1F_E7</b>	8.2	8.3	8.3	0.0
<b>1F_E8</b>	8.4	8.5	8.5	0.0
<b>1F_E9</b>	7.8	7.9	7.9	0.0
<b>1F_E10</b>	7.6	7.7	7.7	0.0
<b>1F_E11</b>	7.7	7.8	7.8	0.0
<b>1F_E12</b>	7.3	7.3	7.3	0.0

The ADMS predictions for annual mean PM<sub>2.5</sub> concentrations in 2023 and 2028 indicate that the annual mean objective (20 µg/m<sup>3</sup>) would be achieved at all the modelled receptor locations.



## 6 CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Impact from Construction Activities

A qualitative assessment of dust levels associated with the proposed development has been carried out. Whilst the likely impact of dust soiling and PM<sub>10</sub> are negligible mitigation measures have been listed in Table 21 and are applicable for a medium risk site. Implementation of these Best Practice Measures will help reduce the impact of the construction activities.

With these mitigation measures enforced, the likelihood of nuisance dust episodes occurring at those receptors adjacent to the development are considered low to negligible. Notwithstanding this, the developer should take into account the potential impact of air quality and dust on occupational exposure standards (in order to minimise worker exposure) and breaches of air quality objectives that may occur outside the site boundary. Monitoring is not recommended at this stage, however, continuous visual assessment of the site should be undertaken and a complaints log maintained in order to determine the origin of a particular dust nuisance. Keeping an accurate and up to date complaints log will isolate particular site activities to a nuisance dust episode and help prevent it from reoccurring in the future.

*Table 21 – Mitigation of Construction Activities*

Construction Activity	Mitigation Measures
<b>Communications</b>	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/ engineer or the site manager.
	Display the head or regional office contact information.
	Develop and implement a dust management plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in the Construction Dust Guidance document. The desirable measures should be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real time PM <sub>10</sub> continuous monitoring and/ or visual inspections.
<b>Site Management</b>	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 a complaints log available to the local authority when asked.
	Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.
<b>Monitoring</b>	Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked.
	Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided if necessary.
	Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce

	dust and emissions and dust are being carried out, and during prolonged dry or windy conditions.
	Agree dust deposition, dust flux, or real time PM <sub>10</sub> continuous monitoring locations with the local authority. Where possible commence baseline monitoring at least three months before work commences on site or, if a large site, before work on a phase commences.
<b>Preparing and maintaining the site</b>	Plan site layout: machinery and dust causing activities should be located away from receptors.
	Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period
	Avoid site runoff of water or mud.
	Keep site fencing, barriers and scaffolding clean using wet methods
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping
<b>Operating Vehicle/Machinery and Sustainable Travel</b>	Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the nominated undertaker and with the agreement of the local authority, where appropriate)
	Ensure all vehicles switch off engines when stationary – no idling vehicles.
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where possible.
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
<b>Operations</b>	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 mitigation (using recycled water where possible).
	Use enclosed chutes, conveyors and covered skips.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
<b>Waste Management</b>	Avoid bonfires and burning of waste materials.
<b>Demolition</b>	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)
	Ensure water suppression is used during demolition operations
	Avoid explosive blasting, using appropriate manual or mechanical alternatives
	Bag and remove any biological debris or damp down such material before demolition
<b>Earthworks</b>	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil
	Only remove secure covers in small areas during work and not all at once
<b>Construction</b>	Avoid scabbling (roughening of concrete surfaces) if possible
	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place



	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery
	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust
<b>Trackout</b>	Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site
	Avoid dry sweeping of large areas
	Ensure vehicles entering and leaving sites are securely covered to prevent escape of material during transport
	Record all inspections of haul routes and any subsequent action in a site log book
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned
	Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable)
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits
	Access gates to be located at least 10m from receptors where possible
	Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site

## 6.2 Impact of Vehicle Emissions

The projected NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations at the development site are below the Air Quality Objective. It is also projected that the impact on nearby receptors will be negligible in the future year.