**AIR QUALITY IMPACT ASSESSMENT**

**AT: 231 Watford Road**

**CLIENT: Fruition Properties Ltd**

**DATE: September 2021**

**STROMA PROJECT REF: 05-21-87650**

Please find below the link to the online feedback form:

http://www.stroma.com/built-environment/feedback-sheffield/

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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 231 Watford Road in the London Borough of Brent. The pollutants modelled as part of this assessment are nitrogen oxides (NOx) and particulate matter ($PM_{10}$).

The impacts of vehicle emissions have been assessed using the techniques detailed within Volume 11, Section 3 of the Design Manual for Roads and Bridges (DMRB)[1], the Local Air Quality Management Technical Guidance (LAQM.TG16)[2] 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 $NO_2$ and $PM_{10}$ 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 not been undertaken due to the information not being available at the time of reporting. A worst case scenario model has been used for the construction phases.

An Air Quality Neutral assessment for building and transport emissions has been undertaken in accordance with the London Plan.

## 1.2 Site Description

The proposed development site is located at 231 Watford Road in the London Borough of Brent. The proposed development is the redevelopment of the site into residential accommodation over five floors. The site is located in a residential area and has education facilities and a hospital nearby.

A location plan can be found in Figure 1.

[1] Design Manual for Roads and Bridges, Vol 11, Section 3, Part 1 – HA207/07, Highways Agency, May 2007
[2] Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance (TG16), Defra, February 2018

**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 ($NO_2$), fine particulates ($PM_{10}$), carbon monoxide (CO), 1,3-butadiene and benzene, as well as carbon dioxide ($CO_2$). This air quality assessment focuses on $NO_2$ and $PM_{10}$, as these pollutants are least likely to meet their Air Quality Strategy objectives near roads. Table 1 provides an overview of $NO_2$ and $PM_{10}$.

**Table 1 – Overview of $NO_2$ and $PM_{10}$**

| Pollutant | Properties | Anthropogenic Sources | Natural Sources | Potential Effects |
|---|---|---|---|---|
| **Particles ($PM_{10}$)** | Tiny particulates of solid or liquid nature suspended in the air | Road transport;<br>Power generation plants;<br>Production processes e.g. windblown dust | Soil erosion;<br>Volcanoes;<br>Forest fires;<br>Sea salt crystals | Asthma;<br>Lung cancer;<br>Cardiovascular problems |
| **Nitrogen Dioxide ($NO_2$)** | Reddish-brown coloured gas with a distinct odour | Road transport;<br>Power generation plants;<br>Fossil fuels – extraction & distribution;<br>Petroleum refining | No natural sources, although nitric oxide (NO) can form in soils | Pulmonary edema;<br>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, Scotland, Wales and Northern Ireland on 17 July 2007[3]. 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 ($PM_{10}$ and $PM_{2.5}$) 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 2010 which came into force on 11th June 2010 and amended in The Air Quality Standards (Amendment) Regulations 2016. Table 2 provides the UK Air Quality Objectives for $NO_2$ and $PM_{10}$. Table 2 provides the UK Air Quality Objectives for $NO_2$ and $PM_{10}$.

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

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

| Pollutant | Objective | Concentration measured as |
|---|---|---|
| **Nitrogen Dioxide ($NO_2$)** | 200µg/m$^3$ not to be exceeded more than 18 times a year | 1 hour mean |
| | 40µg/m$^3$ | Annual mean |
| **Particles ($PM_{10}$)** | 50µg/m$^3$ not to be exceeded more than 35 times a year | 24 hour mean |
| | 40µg/m$^3$ | Annual mean |
| **Particles ($PM_{2.5}$)** | 25µg/m$^3$ (except Scotland) | Annual Mean |

Objectives for $PM_{2.5}$ 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 $PM_{2.5}$ 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.

As defined in Table 4, background $PM_{2.5}$ concentrations are well below the limit value of 25 µg/m$^3$. As such, no further consideration has been given to $PM_{2.5}$ within this assessment.

## 2.3 London Local Air Quality Management (LLAQM)

At the core of LLAQM delivery are three pollutant objectives; these are: nitrogen dioxide ($NO_2$), particulate matter ($PM_{10}$) and sulphur dioxide ($SO_2$). All current Air Quality Management Areas (AQMAs) across the UK are declared for one or more of these pollutants, with $NO_2$ 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 London Borough of Brent

The Council has declared an Air Quality Management Area (AQMA). The AQMA has been declared for the Annual Mean of $NO_2$ and 24-Hour Mean of $PM_{10}$. Furthermore, the AQMA covers the entire area south of the North Circular Road and all housing, schools and hospitals along the North Circular Road, Harrow Road, Bridgewater Road, Ealing Road, Watford Road, Kenton Road, Kingsbury Road, Edgware Road, Blackbird Hill, Forty Lane, Forty Avenue and East Lane. As such the proposed development lies within this AQMA.

There are currently 187 Air Quality Focus areas which have been declared across the 33 London Boroughs. The proposed development does not lie within a focus area.

# 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)[4] for England, revised and released on 20th July 2021, 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[5].

Paragraph 174 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 186 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 Practise 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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[4] National Planning Policy Framework, Secretary of State for Ministry of Housing, Communities and Local Government, February 2019

[5] 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[6].

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.

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

## 3.2 Regional Planning Policy

### 3.2.1 The Mayor's Air Quality Strategy

In October 2010, the Mayor's Air Quality Strategy[7] was released. The strategy sets out a framework for delivering improvements to London's air quality and includes measures aimed at reducing emissions from transport, homes, offices and new developments, as well as raising awareness of air quality issues and its impact on health.

### 3.2.2 The New London Plan

The New London Plan was adopted by the Greater London Authority in February 2021 with the aim of providing a strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years. The Plan brings together the geographic and locational aspects of the Mayor's other strategies, including a range of environmental issues such as climate change (adaptation and mitigation), air quality, noise and waste.

Policy SI1 Improving Air Quality relates specifically to improving air quality and states the following:

*"Poor air quality is a major issue for London which is failing to meet requirements under legislation. Poor air quality has direct impacts on the health, quality of life and life expectancy of Londoners. The impacts tend to be most heavily felt in some of London's most deprived neighbourhoods, and by people who are most vulnerable to the impacts. London's air quality should be significantly improved and exposure to poor air quality, especially for vulnerable people, should be reduced."*

It goes on to state the following with regards to planning decisions:

1. Development proposals should not:
    a. lead to further deterioration of existing poor air quality
    b. create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits
    c. create unacceptable risk of high levels of exposure to poor air quality.
2. In order to meet the requirements in Part 1, as a minimum:
    a. Development proposals must be at least air quality neutral
    b. Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures
    c. Major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1
    d. Development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people, which do not demonstrate that design measures have been used to minimise exposure should be refused.

[7] Clearing the Air: The Mayor's Air Quality Strategy. October 2010

### 3.2.3 Supplementary Planning Guidance (SPG)

#### *Control of Dust and Emissions during Construction and Demolition SPG*

The Greater London Authority (GLA) released the “Control of Dust and Emissions during Construction and Demolition” SPG in July 2014[8]. The guidance seeks to reduce emissions of dust and $PM_{10}$ from construction and demolition activities in London. It also aims to manage emissions of nitrogen oxides (NOx) from construction and demolition machinery. The SPG:

- Provides more detailed guidance on the implementation of all relevant policies in the London Plan and the Mayor’s Air Quality Strategy to neighbourhoods, boroughs, developers, architects, consultants and any other parties involved in any aspect of the demolition and construction process;
- Sets out the methodology for assessing the air quality impacts of construction and demolition in London; and
- Identifies good practice for mitigating and managing air quality impacts that is relevant and achievable, with the overarching aim of protecting public health and the environment.

The principles of the SPG apply to all developments in London as their associated construction and demolition activity may all contribute to poor air quality unless properly managed and mitigated.

#### *Sustainable Design and Construction SPG*

The Greater London Authority (GLA) released the “Sustainable Design and Construction” SPG in July 2014[9]. The SPG aims to support developers, local planning authorities and neighbourhoods to achieve sustainable development. It provides guidance on to how to achieve the London Plan objectives effectively, supporting the Mayor’s aims for growth, including the delivery of housing and infrastructure.

In relation to air quality the SPG provides guidance on the following key areas:

- assessment requirements;
- construction and demolition;
- design and occupation;
- air quality neutral policy for buildings and transport; and
- emissions standards for combustion plant

[8] The Control of Dust and Emissions during Construction and Demolition SPG. Greater London Authority, July 2014

[9] Sustainable Design and Construction SPG. Greater London Authority, July 2014

# 4 ASSESSMENT METHODOLOGY

## 4.1 Construction Phase

Based on the "*Control of Dust and Emissions during Construction and Demolition*" SPG discussed in the previous section, 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 $PM_{10}$ 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 $PM_{10}$ concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of particulate matter in all size fractions.*

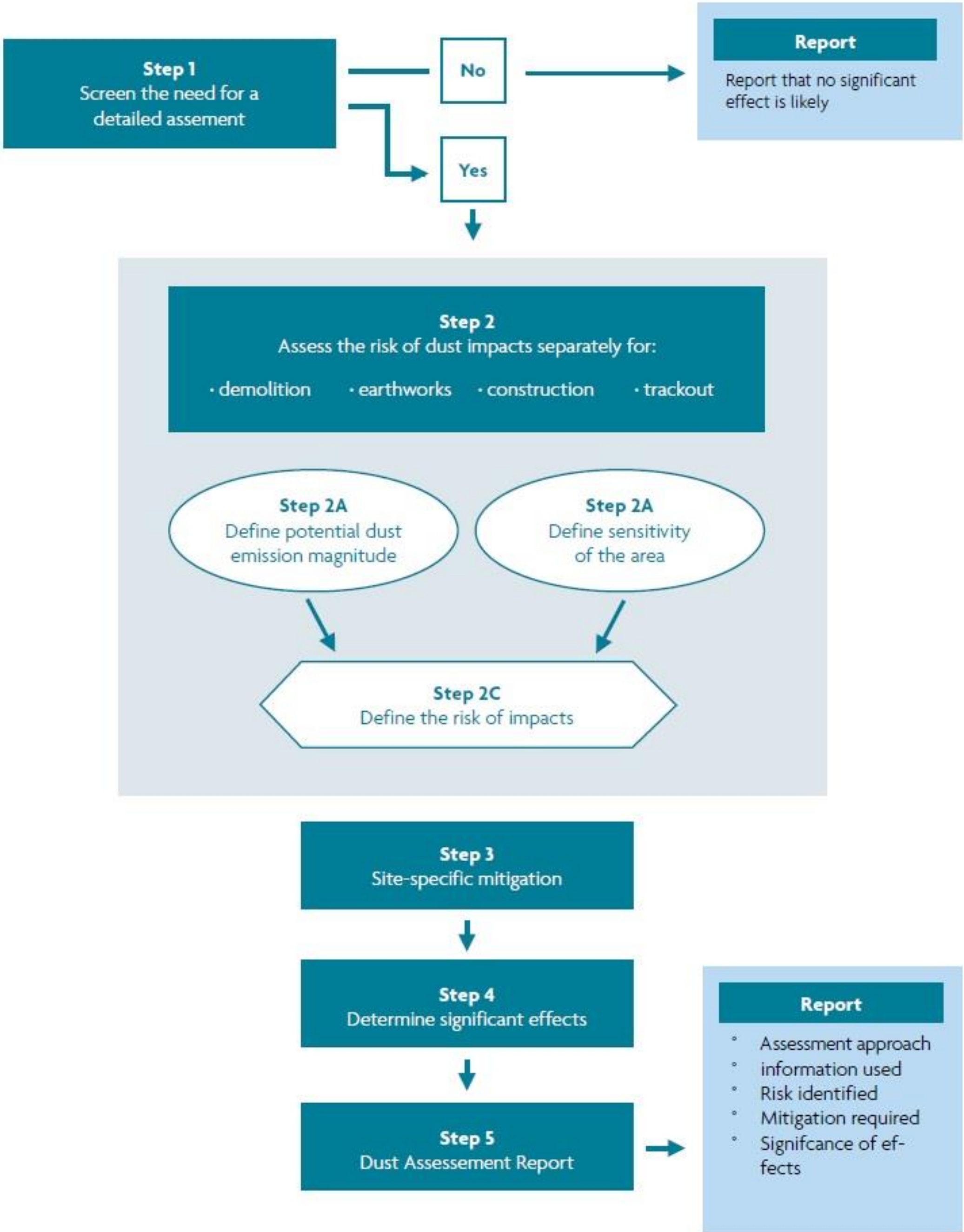
*Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed*".

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.

## Figure 2 – Dust Assessment Procedure



## 4.2 Operational Phase (Traffic Emissions)

### 4.2.1 Modelled Scenarios

A modelled baseline year of 2019 has been used as this corresponds with the latest year of monitoring undertaken by the Council. The future year has also been chosen (2023) 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 (2019); and
- **Scenario 2** – future impact of traffic emissions on the proposed development i.e. introduction of new exposure (2023)
- **Scenario 3 –** 2023 Future Baseline + Proposed Development (first complete year after opening)

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 has been undertaken using the latest version of the ADMS-Roads model[10]. 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 10.1) which incorporates updated NOx emissions factors and vehicle fleet information[11]. 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

Traffic flow data for the study area has been provided by Andrew Beard and is summarised in Table 3.

Projection of traffic data has been undertaken using growth factors specific to the local authority, obtained from TEMPro[12]. 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.

10 Model Version: 5.0.01. Interface Version 5.0.0.5313 (16/03/2020)
11 https://laqm.defra.gov.uk/documents/EFT2020_v10.1.xlsb
12 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 2019 | Future Baseline AADT 2023 | Future Baseline + Development AADT 2023 | HDV (%) | Speed (kmph) |
|---|---|---|---|---|---|
| **Watford Road** | 33,113 | 34,593 | 34,704 | 3.2 | 48 |
| **Sudbury Court Drive** | 17,644 | 18,433 | 18,492 | 2.4 | 64 |
| **Court Parade** | 17,645 | 18,434 | 18,493 | 3.5 | 48 |

## 4.3 Background Concentrations

Background NOx, $NO_2$ and $PM_{10}$ concentrations have been obtained from Defra[13]. These 1 km x 1 km grid resolution maps are derived from a base year of 2018 (for NOx, $NO_2$, $PM_{10}$ and $PM_{2.5}$ only), which are then projected to future years up to 2030. Background concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ derived from Defra are provided in Table 4.

**Table 4 – Background NOx, $NO_2$, $PM_{10}$ and $PM_{2.5}$ Concentrations**

| Location | Pollutant | X | Y | 2019 |
|---|---|---|---|---|
| **Proposed Development** | $NO_2$ | 516500 | 186500 | 20.7 |
| | NOx | | | 30.2 |
| | $PM_{10}$ | | | 16.6 |
| | $PM_{2.5}$ | | | 11.2 |

In order to undertake a worst-case assessment, 2019 background concentrations have been assumed for all modelled scenarios.

## 4.4 Surface Roughness

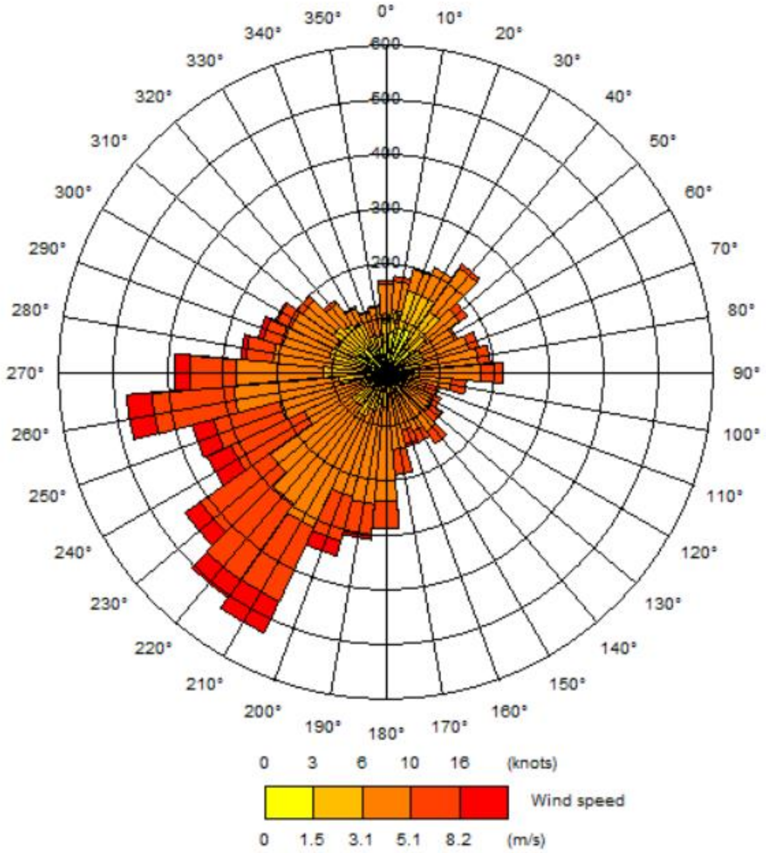
A surface roughness of 1.5 metres has been used in the model. This value is provided by ADMS-Roads as a typical roughness length for large urban areas. This value has been used across the modelled domain.

## 4.5 Meteorological Data

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

[13] https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018

**Figure 3 – Wind Speed and Direction Data, Heathrow Airport (2019)**




## 4.6 Model Output

### 4.6.1 NOx/$NO_2$ Relationship

Following recent evidence that shows the proportion of primary $NO_2$ in vehicle exhaust has increased[14]. As such, a new NOx to $NO_2$ calculator has been devised[15]. This new calculator has been used to determine $NO_2$ concentrations for this assessment, based on predicted NOx concentrations using ADMS-Roads. Converted $NO_2$ concentrations are initially compared to local monitoring data in order to verify the model output. If the model performance is considered unacceptable then the NOx concentrations are adjusted before conversion to $NO_2$.

### 4.6.2 Predicted Short Term Concentrations

As discussed in the introduction, it has not been possible to model the short-term impacts of $NO_2$ and $PM_{10}$. Research undertaken in 2003[16] has indicated that the hourly $NO_2$ objective is unlikely to be exceeded at a roadside location where the annual mean $NO_2$ concentration is less than 60 µg/m$^3$.

For $PM_{10}$, a relationship between the annual mean and the number of 24-hour mean exceedances has been devised and is as follows:

14 Trends in Primary Nitrogen Dioxide in the UK, Air Quality Expert Group, 2007
15 https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v8.1.xlsm
16 Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003

- No. 24-hour mean exceedances = -18.5 + 0.00145 x annual mean$^3$ + (206/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**

| Site ID | X | Y | Height (m) |
|---|---|---|---|
| **1** | 516929 | 188560 | 1.5 |
| **BRT 53** | 518303 | 185181 | 1.5 |

### 4.6.4 Receptor Locations

In order to assess the potential impact of the proposed development, the perimeter of the proposed development has 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.

Additional receptors on surrounding roads were also modelled based on the change in traffic flow criteria as per the IAQM guidance. The location of these model points can be found in Appendix A.

**Table 6 – Modelled Receptor Locations**

| Ground Floor receptors | | | |
|---|---|---|---|
| **Air Quality Assessment ID** | **X** | **Y** | **Height (m)** |
| GF_1 | 516408 | 186701 | 1.5 |
| GF_2 | 516404 | 186696 | 1.5 |
| GF_3 | 516397 | 186691 | 1.5 |
| GF_4 | 516390 | 186694 | 1.5 |
| GF_5 | 516389 | 186702 | 1.5 |
| GF_6 | 516387 | 186708 | 1.5 |
| GF_7 | 516381 | 186710 | 1.5 |
| GF_8 | 516376 | 186712 | 1.5 |
| GF_9 | 516377 | 186719 | 1.5 |

| First Floor receptors | | | |
|---|---|---|---|
| **Air Quality Assessment ID** | **X** | **Y** | **Height (m)** |
| 1F_1 | 516409.3 | 186703.8 | 4.5 |
| 1F_2 | 516406.1 | 186701.1 | 4.5 |
| 1F_3 | 516400.2 | 186692.1 | 4.5 |
| 1F_4 | 516396.6 | 186691.3 | 4.5 |
| 1F_5 | 516382.4 | 186709.9 | 4.5 |
| 1F_6 | 516388.3 | 186697.2 | 4.5 |
| 1F_7 | 516376.5 | 186718.8 | 4.5 |

| | | | |
|---|---|---|---|
| 1F_8 | 516383 | 186727.3 | 4.5 |
| 1F_9 | 516395.2 | 186721.8 | 4.5 |
| 1F_10 | 516401.1 | 186733 | 4.5 |
| 1F_11 | 516409.2 | 186735.6 | 4.5 |
| 1F_12 | 516415.9 | 186726.8 | 4.5 |
| 1F_13 | 516413.3 | 186716.6 | 4.5 |
| 1F_14 | 516410.5 | 186710.3 | 4.5 |

**Figure 4 – Ground floor modelled receptor locations**

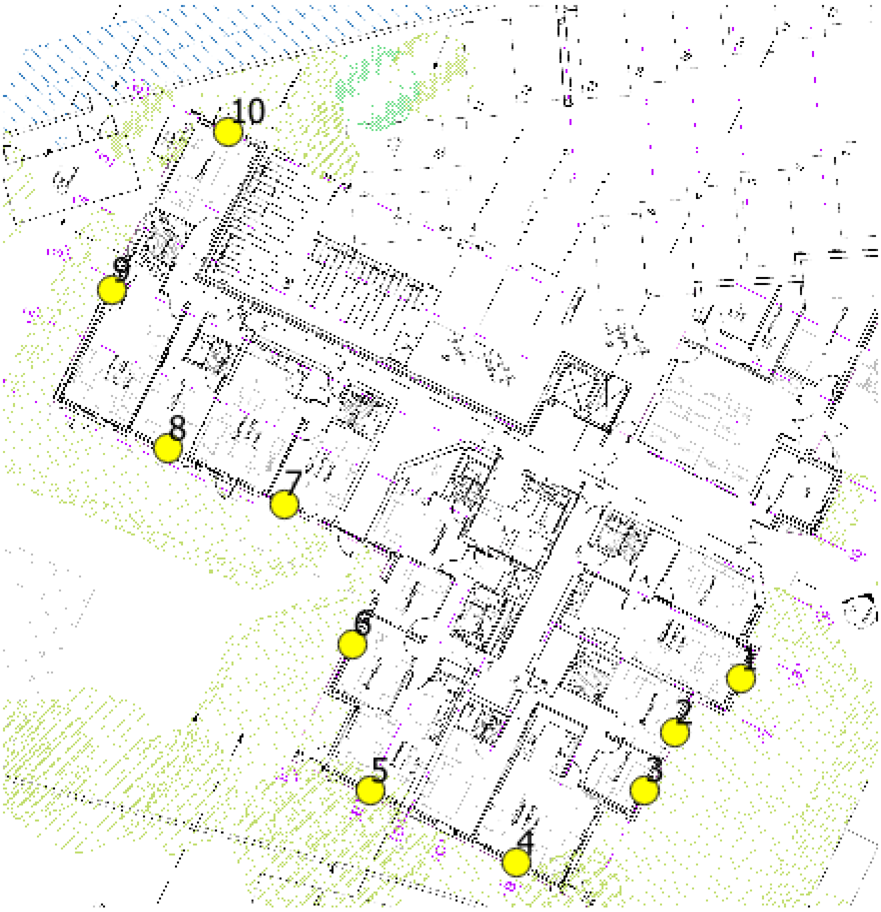
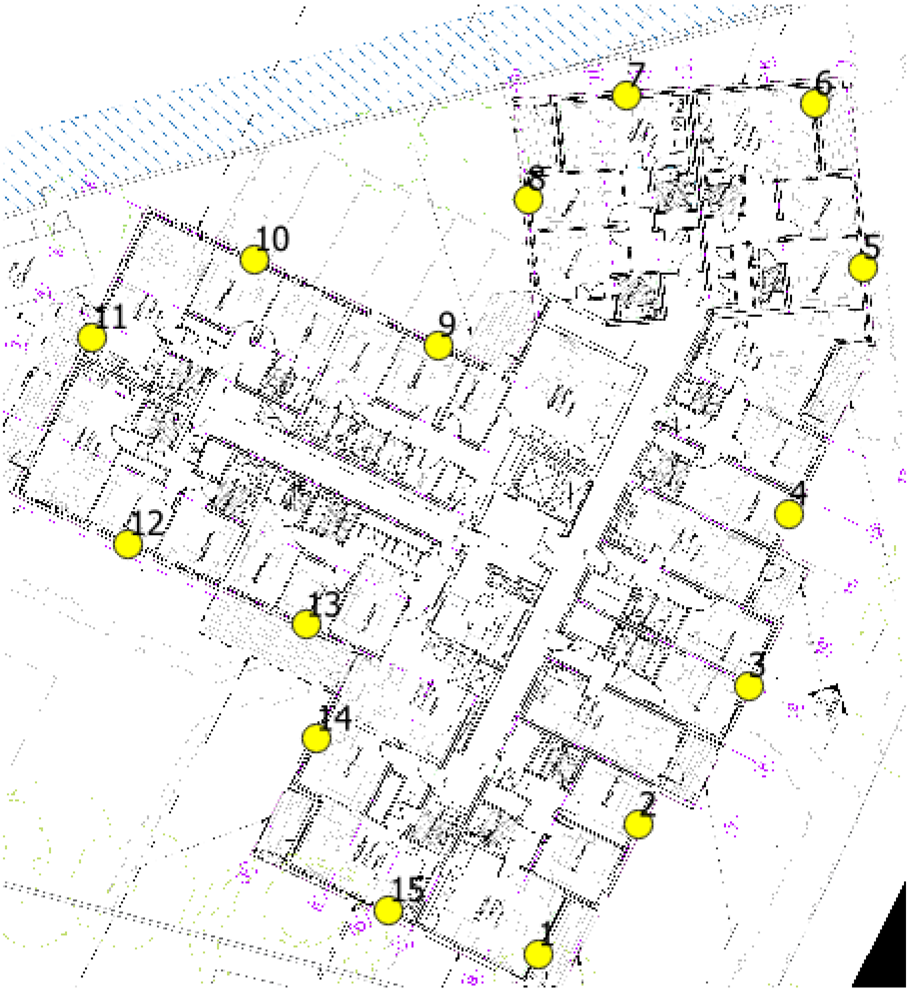


**Figure 5 – First floor modelled receptor locations**



## 4.7 Significance Criteria

### 4.7.1 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 trackout).

**Table 7 – Dust Emission Magnitude**

| Activity | Dust Emission Class | | |
|---|---|---|---|
| | Large | Medium | Small |
| **Demolition** | Total building volume >50,000 m³, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level | Total building volume 20,000 – 50 000m³, potentially dusty construction material, demolition activities 10-20 m above ground level | Total building volume <20,000 m³, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months |
| **Earthworks** | Total site area >10,000 m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes | Total site area 2,500 – 10,000 m², moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m - 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes | Total site area <2,500 m², soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months |
| **Construction** | Total building volume >100,000 m³, piling, on site concrete batching; sandblasting | Total building volume 25,000 m³ – 100,000 m³, potentially dusty construction material (e.g. concrete), piling, on site concrete batching | Total building volume <25,000 m³, construction material with low potential for dust release (e.g. metal cladding or timber) |
| **Track out** | >50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m | 10 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100 m; | <10 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 |
| Demolition | High | High Risk | Medium Risk | Medium Risk |
| | Medium | High Risk | Medium Risk | Low Risk |
| | Low | Medium Risk | Low Risk | Negligible |
| Earthworks | High | High Risk | Medium Risk | Low Risk |
| | Medium | Medium Risk | Medium Risk | Low Risk |
| | Low | Low Risk | Low Risk | Negligible |
| Construction | High | High Risk | Medium Risk | Low Risk |
| | Medium | Medium Risk | Medium Risk | Low Risk |
| | Low | Low Risk | Low Risk | Negligible |
| Track out | High | High Risk | Low Risk | Low Risk |
| | Medium | Medium Risk | Low Risk | Negligible |
| | Low | Low Risk | Low Risk | Negligible |

### 4.7.2 Operational Phase

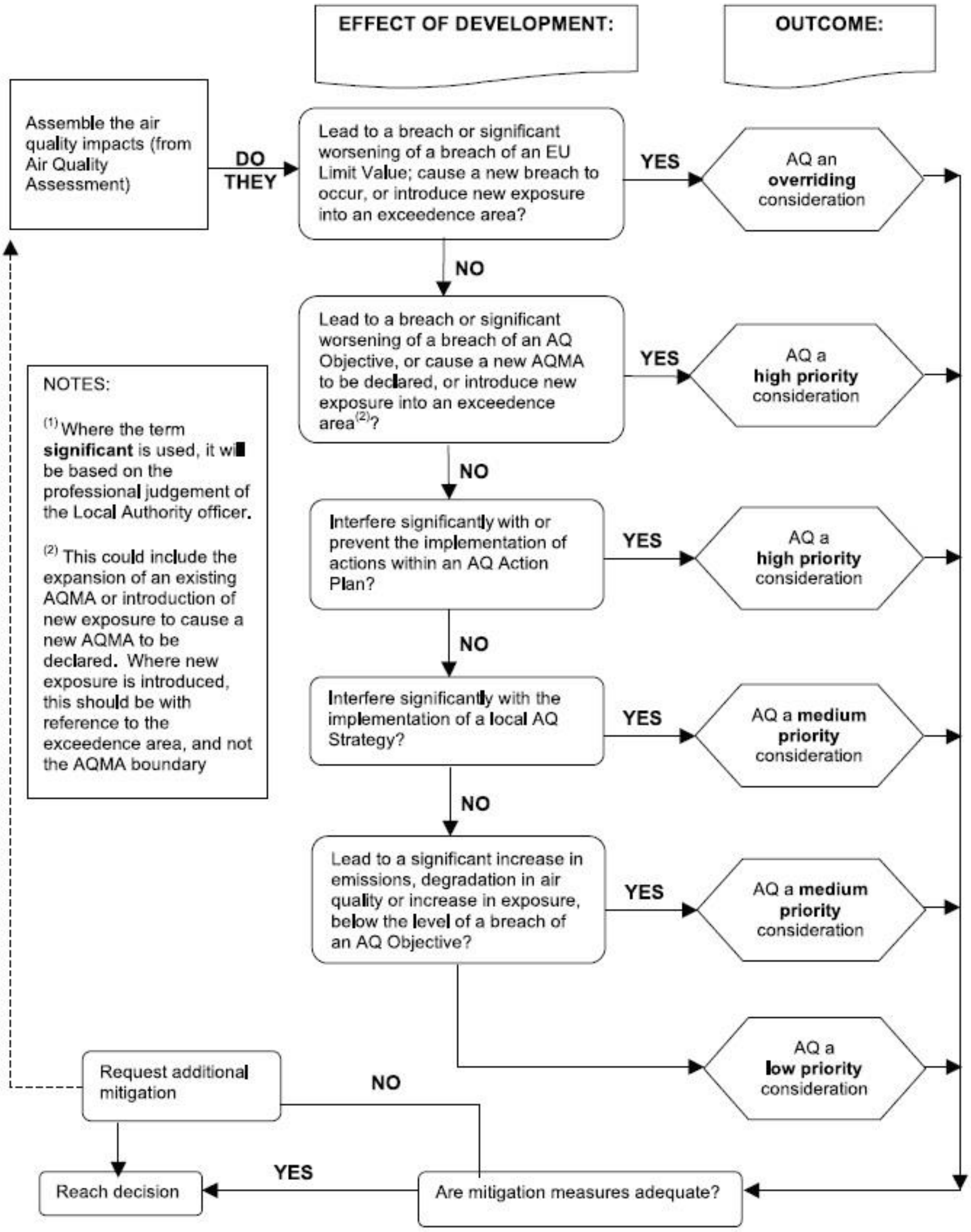
The guidance released by Environmental Protection UK (EPUK) provides steps for a Local Authority to follow in order to assess the significance of air quality impacts of a development proposal. This procedure, shown in Figure 6, will be applied to the modelled results.

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 6 – 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 = Large;
- Earthworks = Large;
- Construction = Large; and
- Track out = Large.

Based on the SPG 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 | Medium | Medium | Medium | Medium |
| 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 | High | Medium | Medium | Medium |
| Human Health | Low | Low | Low | Low |

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 $NOx/NO_2$ and $PM_{10}$ concentrations.

**Table 12 – Comparison of Modelled and Monitored $NO_2$ Concentrations ($\mu g/m^3$)**

| Location ID | Modelled Concentration | Monitored Concentration | Difference [(modelled - monitored)/ monitored] x100 |
|---|---|---|---|
| **1** | 30.9 | 30.3 | 2.0% |
| **BRT 53** | 33.3 | 49.8 | -33.2% |

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 NOx (excluding background). The modelled road contribution NOx is taken directly from the ADMS-Roads output before it has been converted to $NO_2$ using the NOx to $NO_2$ calculator described in Section 4.6.1. The NOx to $NO_2$ calculator can also be used to derive monitored road contributions of NOx from $NO_2$ diffusion tube results. A summary of these calculations is provided in Table 13.

**Table 13 – Monitored NOx and $NO_2$ concentrations**

| Location ID | Monitored Total $NO_2$ | Defra Background $NO_2$ | Monitored road contribution $NO_2$ (total – background) | Monitored road contribution NOx (total – background) | Modelled road contribution NOx (excludes background) | Ratio of monitored road contribution NOx / modelled road contribution NOx |
|---|---|---|---|---|---|---|
| 1 | 30.3 | 20.0 | 10.3 | 20.6 | 21.8 | 0.94 |
| BRT 53 | 49.8 | 23.8 | 26.0 | 57.2 | 19.2 | 2.99 |

Once the monitored and modelled road contributions of NOx (excluding background) have been derived the contributions of NOx are compared and a ratio derived. In this case it is 1.965 and is used to adjust the modelled road contribution of NOx. This is shown in Table 14.

**Figure 7 – Linear Regression of Modelled and Monitored $NO_2$**

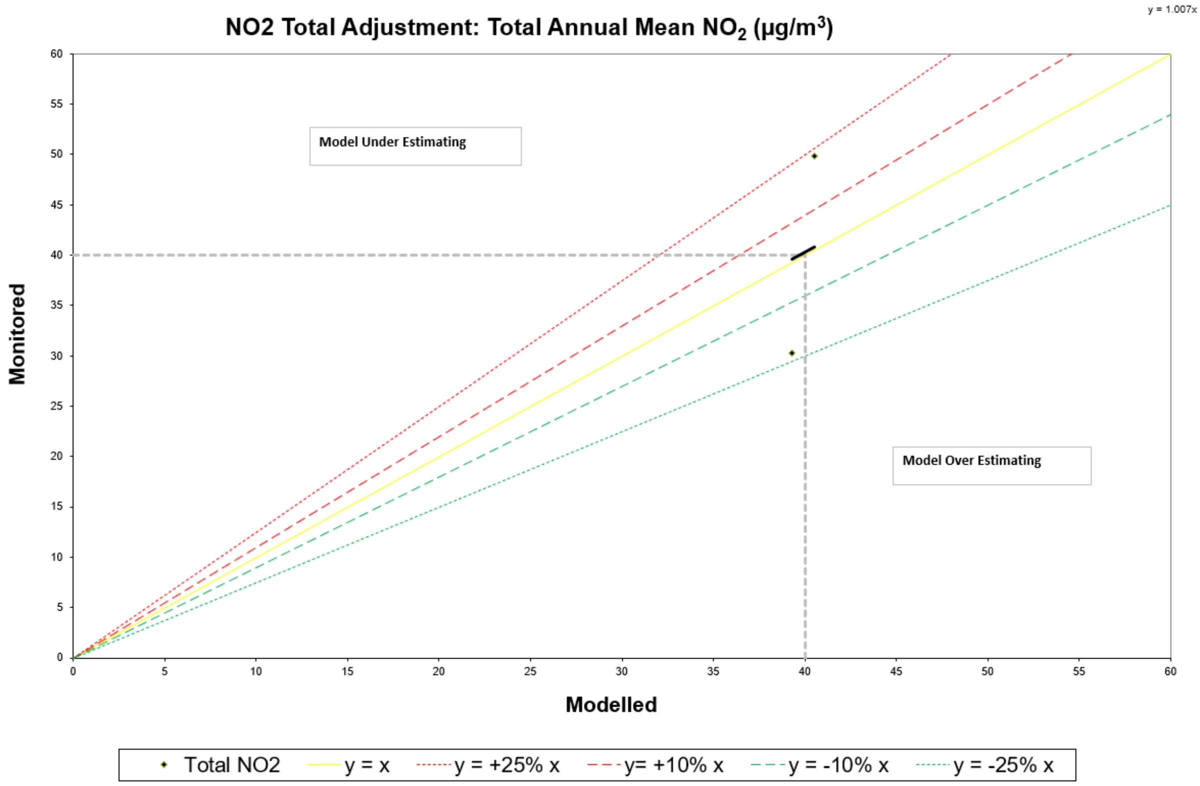



**Table 14 – Adjustment of Modelled NOx Contributions**

| Location ID | Adjustment factor for modelled road contribution | Adjusted modelled road contribution NOx | Modelled total $NO_2$ (based on empirical NOx/$NO_2$ relationship) | Monitored total $NO_2$ | % Difference [(modelled – monitored) / monitored] x 100 |
|---|---|---|---|---|---|
| **1** | 1.965 | 42.9 | 40.4 | 30.3 | 33.4% |
| **BRT 53** | 1.965 | 37.6 | 41.6 | 49.8 | -16.4% |

Following adjustment of the modelled NOx concentrations by a factor of 1.965 the total $NO_2$ concentration at the model verification location has been calculated using the method described in Section 4.6.1. The revised $NO_2$ concentration, shown in Table 14, indicates a more acceptable model performance when compared against the monitored $NO_2$ concentrations. As such, an adjustment factor of 1.965 has been applied to all modelled NOx concentrations across the model domain before conversion to $NO_2$.

### 5.2.3 Nitrogen Dioxide

Predicted annual mean concentrations for $NO_2$ at the proposed development in 2019 and 2023 are provided in Table 15. As mentioned in Section 4.6.1, $NO_2$ concentrations have been calculated from the predicted NOx concentrations using the latest NOx-$NO_2$ conversion spreadsheet available from the Air Quality Archive.

**Table 15 – Comparison of Predicted Annual Mean $NO_2$ Concentrations (µg/m$^3$)**

| Ground floor receptors (1.5m) | | | | | |
|---|---|---|---|---|---|
| **Receptor ID** | **Baseline (2019)** | **Future Baseline (2023)** | **Future Baseline + Development Flows (2023)** | **Change** | **Above/ Below Air Quality Objective** |
| GF_1 | 32.8 | 33.2 | 33.3 | 0.0 | Below |
| GF_2 | 32.1 | 32.5 | 32.5 | 0.0 | Below |
| GF_3 | 31.9 | 32.3 | 32.3 | 0.0 | Below |
| GF_4 | 30.6 | 31.0 | 31.0 | 0.0 | Below |
| GF_5 | 29.1 | 29.4 | 29.4 | 0.0 | Below |
| GF_6 | 28.7 | 29.0 | 29.0 | 0.0 | Below |
| GF_7 | 28.0 | 28.3 | 28.3 | 0.0 | Below |
| GF_8 | 27.4 | 27.6 | 27.6 | 0.0 | Below |
| GF_9 | 27.0 | 27.2 | 27.2 | 0.0 | Below |
| GF_10 | 27.3 | 27.5 | 27.5 | 0.0 | Below |
| **First Floor Receptors (4.5m)** | | | | | |
| 1F_1 | 30.2 | 30.5 | 30.5 | 0.0 | Below |
| 1F_2 | 30.8 | 31.1 | 31.2 | 0.0 | Below |
| 1F_3 | 31.6 | 31.9 | 32.0 | 0.0 | Below |
| 1F_4 | 31.5 | 31.9 | 31.9 | 0.0 | Below |
| 1F_5 | 31.7 | 32.1 | 32.1 | 0.0 | Below |
| 1F_6 | 30.7 | 31.1 | 31.1 | 0.0 | Below |
| 1F_7 | 29.0 | 29.3 | 29.3 | 0.0 | Below |
| 1F_8 | 28.5 | 28.8 | 28.8 | 0.0 | Below |
| 1F_9 | 28.2 | 28.4 | 28.5 | 0.0 | Below |
| 1F_10 | 27.2 | 27.4 | 27.4 | 0.0 | Below |
| 1F_11 | 26.7 | 26.8 | 26.9 | 0.0 | Below |
| 1F_12 | 27.0 | 27.2 | 27.2 | 0.0 | Below |
| 1F_13 | 27.9 | 28.1 | 28.1 | 0.0 | Below |
| 1F_14 | 28.1 | 28.4 | 28.4 | 0.0 | Below |
| 1F_15 | 28.9 | 29.2 | 29.2 | 0.0 | Below |

The ADMS predictions for annual mean $NO_2$ concentrations in 2019 and 2023 indicate that the annual mean objective (40 µg/m$^3$) would be achieved at the modelled receptor locations on all floors.

Nitrogen dioxide also has an hourly objective of 200 µg/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

$NO_2$ concentrations was very weak. Nonetheless, research undertaken in 2003[17] has indicated that the hourly $NO_2$ objective is unlikely to be exceeded at a roadside location where the annual mean $NO_2$ concentration is less than 60 µg/m$^3$. Given that predicted $NO_2$ concentration in 2019 and 2023 are below 60 µg/m$^3$ at the modelled receptor locations, the likelihood of the short-term objective for $NO_2$ being exceeded is low.

### 5.2.4 Particulate Matter

Predicted annual mean concentrations for $PM_{10}$ in 2019 and 2023 are provided in Table 16.

**Table 16 – Predicted $PM_{10}$ Concentrations, Annual Mean (µg/m$^3$)**

| Ground floor receptors (1.5m) | | | | |
|---|---|---|---|---|
| Receptor ID | Baseline (2019) | Future Baseline (2023) | Future Baseline + Development Flows (2023) | Change |
| GF_1 | 18.5 | 18.6 | 18.6 | 0.0 |
| GF_2 | 18.4 | 18.5 | 18.5 | 0.0 |
| GF_3 | 18.4 | 18.5 | 18.5 | 0.0 |
| GF_4 | 18.2 | 18.2 | 18.2 | 0.0 |
| GF_5 | 17.9 | 18.0 | 18.0 | 0.0 |
| GF_6 | 17.8 | 17.9 | 17.9 | 0.0 |
| GF_7 | 17.7 | 17.8 | 17.8 | 0.0 |
| GF_8 | 17.6 | 17.7 | 17.7 | 0.0 |
| GF_9 | 17.6 | 17.6 | 17.6 | 0.0 |
| GF_10 | 17.6 | 17.7 | 17.7 | 0.0 |
| **First Floor Receptors (4.5m)** | | | | |
| 1F_1 | 18.1 | 18.2 | 18.2 | 0.0 |
| 1F_2 | 18.2 | 18.3 | 18.3 | 0.0 |
| 1F_3 | 18.3 | 18.4 | 18.4 | 0.0 |
| 1F_4 | 18.3 | 18.4 | 18.4 | 0.0 |
| 1F_5 | 18.4 | 18.4 | 18.4 | 0.0 |
| 1F_6 | 18.2 | 18.3 | 18.3 | 0.0 |
| 1F_7 | 17.9 | 18.0 | 18.0 | 0.0 |
| 1F_8 | 17.8 | 17.9 | 17.9 | 0.0 |
| 1F_9 | 17.8 | 17.8 | 17.8 | 0.0 |
| 1F_10 | 17.6 | 17.6 | 17.6 | 0.0 |
| 1F_11 | 17.5 | 17.5 | 17.5 | 0.0 |
| 1F_12 | 17.6 | 17.6 | 17.6 | 0.0 |
| 1F_13 | 17.7 | 17.7 | 17.8 | 0.0 |
| 1F_14 | 17.7 | 17.8 | 17.8 | 0.0 |
| 1F_15 | 17.9 | 17.9 | 17.9 | 0.0 |

The ADMS predictions for annual mean $PM_{10}$ concentrations in 2018 and 2023 indicate that the annual mean objective (40 µg/m$^3$) would be achieved at all the modelled receptor

[17] Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003

locations. In addition, the maximum number of days when $PM_{10}$ concentrations are more than 50 µg/$m^3$ is 4, less than the 35 exceedances allowed in the regulations.

### 5.2.5 Significance of additional modelled receptors

As highlighted in Section 4.6.4 and represented in Appendix A, additional receptor locations have been modelled as part of the assessment. The nature of the receptors are residential properties and an educational facility to the north of the development.

Predictions for annual mean $NO_2$ and $PM_{10}$ concentrations in 2023 at the additional receptor locations are provided in Table 17 and Table 18.

**Table 17 – Comparison of Predicted Annual Mean $NO_2$ Concentrations at additional modelled receptor locations**

| Ground floor receptors (1.5m) | | | | |
|---|---|---|---|---|
| Receptor ID | Future Baseline (2023) | Future Baseline + Development Flows (2023) | Change | Magnitude of Change |
| 1 | 42.9 | 43.0 | 0.1 | Negligible |
| 2 | 32.5 | 32.5 | 0.0 | Negligible |
| 3 | 38.7 | 38.8 | 0.0 | Negligible |
| 4 | 31.8 | 31.9 | 0.0 | Negligible |
| 5 | 32.3 | 32.3 | 0.0 | Negligible |
| 6 | 31.7 | 31.8 | 0.0 | Negligible |
| 7 | 32.0 | 32.0 | 0.0 | Negligible |
| 8 | 32.1 | 32.1 | 0.0 | Negligible |

**Table 18 – Comparison of Predicted Annual Mean $PM_{10}$ Concentrations at additional modelled receptor locations**

| Ground floor receptors (1.5m) | | | | |
|---|---|---|---|---|
| Receptor ID | Future Baseline (2023) | Future Baseline + Development Flows (2023) | Change | Magnitude of Change |
| 1 | 20.4 | 20.5 | 0.0 | Negligible |
| 2 | 18.6 | 18.6 | 0.0 | Negligible |
| 3 | 20.4 | 20.4 | 0.0 | Negligible |
| 4 | 18.7 | 18.8 | 0.0 | Negligible |
| 5 | 18.9 | 18.9 | 0.0 | Negligible |
| 6 | 18.8 | 18.8 | 0.0 | Negligible |
| 7 | 18.9 | 18.9 | 0.0 | Negligible |
| 8 | 18.9 | 18.9 | 0.0 | Negligible |

Nitrogen dioxide also has an hourly objective of 200 µg/$m^3$ 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

$NO_2$ concentrations was very weak. Nonetheless, research undertaken in 2003[18] has indicated that the hourly $NO_2$ objective is unlikely to be exceeded at a roadside location where the annual mean $NO_2$ concentration is less than 60 µg/m$^3$. Given that predicted $NO_2$ concentration in 2023 are below 60 µg/m$^3$ at the additional modelled receptor locations, the likelihood of the short-term objective for $NO_2$ being exceeded is low.

# 6 AIR QUALITY NEUTRAL ASSESSMENT

## 6.1 Introduction

Policy 7.14 within the London Plan states that every "major" development in Greater London be at least "air quality neutral" and not lead to further deterioration of existing poor air quality. This definition comes from the Town and Country Planning Order[19], to which the London Plan refers.

Within the London Plan, a "major" development is defined by the following criteria:

- 10 or more residential dwellings (or where the number is not given, an area of more than 0.5 ha); or
- For all other uses, where floor space is 1,000 sq m or more (or the site is 1 ha or more).

As such, the proposed development is classified as a "major" development in accordance with 1,000 sq m or more floor space.

The air quality neutral assessment has followed the methodology outlined in the Sustainable Design and Construction Supplementary Planning Guidance (SPG)[20] and the Air Quality Neutral Planning Support Update[21]. Within these documents, benchmarks have been provided in relation to building and transport emissions, together with a methodology for calculating the building related emissions for a particular development. The building and transport related emissions are then compared to the Building Emissions Benchmarks (BEBs) and Transport Emissions Benchmarks (TEBs) to determine whether the benchmarks are being exceeded. If so, then mitigation measures are required to reduce the site emissions, either by on-site measures or by off-setting.

## 6.2 Building Emissions

Heating and hot water will be provided by air source heat pumps so carrying out an assessment is not necessary.

## 6.3 Transport Emissions

As per the Air Quality Neutral Planning Update, the 'residential dwellings' land use class has been used. The Transport Emissions Benchmarks (TEBs) are calculated by multiplying the relevant emission benchmarks by the number of dwellings or floor area for commercial use. This is summarised in Table 19.

[18] Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marner, 2003

[19] Town and Country Planning (Development Management Procedure)(England) Order, March 2015

[20] Sustainable Design and Construction Supplementary Planning Guidance (SPG), Mayor of London, April 2014

[21] Air Quality Neutral Planning Support Update: GLA 80371, April 2014

**Table 19 – Transport Emissions Benchmarks (NOx and $PM_{10}$)**

| NOx | | | | |
|---|---|---|---|---|
| **Land Use** | **No of Dwellings or Floor Area** | **Transport Emission Benchmark (g/dwelling/annum)** | **Transport Emissions (g/annum)** | **Transport Emissions (kg/annum)** |
| **C3** | 45 | 1,553 | 69,885 | 70 |
| **Total Benchmarked Transport NOx Emission** | | | **69,885** | **70** |
| **$PM_{10}$** | | | | |
| **Land Use** | **No of Dwellings or Floor Area** | **Transport Emission Benchmark (g/dwelling/annum)** | **Transport Emissions (g/annum)** | **Transport Emissions (kg/annum)** |
| **C3** | 45 | 267 | 12,015 | 12 |
| **Total Benchmarked Transport $PM_{10}$ Emission** | | | **12,015** | **12** |

The proposed development will generate 229 daily vehicle movements (83,585 per annum) from the proposed residential flats. As such, the total trip emissions for NOx and $PM_{10}$ have been calculated in Table 20.

**Table 20 – Total Transport Emissions (NOx and $PM_{10}$)**

| Land Use | Total Trips Per Annum | Total Distance (veh-km/annum) | Total Transport Emissions (g/annum) | Total Transport Emissions (kg/annum) |
|---|---|---|---|---|
| **NOx** | | | | |
| **C3** | 85,585 | 952,869 | 336,363 | 336 |
| **Total Transport NOx Emission** | | | 336,363 | **336** |
| **$PM_{10}$** | | | | |
| **C3** | 85,585 | 952,869 | 57,744 | 58 |
| **Total Transport $PM_{10}$ Emission** | | | 57,744 | **58** |

Based on the comparison between the total transport emissions and Transport Emissions Benchmarks (see Table 21) the proposed development does not meet the air quality neutral requirements and therefore mitigation or calculation of abatement costs (if applicable) are required.

**Table 21 – Comparison of Total Transport Emissions and Transport Emissions Benchmarks**

| Pollutant | Total Benchmarked Transport Emissions (kg/annum) | Total Transport Emissions (kg/annum) | Difference (kg/annum) |
|---|---|---|---|
| **NOx** | **70** | **336** | 266.5 |
| **$PM_{10}$** | **12** | **58** | 45.7 |

# 7 CONCLUSIONS AND RECOMMENDATIONS

## 7.1 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 $PM_{10}$ are negligible mitigation measures have been listed in Table 22 and are applicable for a high 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 22 – Mitigation of Construction Activities

| Construction Activity | Mitigation Measures |
|---|---|
| **Site Management** | Develop and implement a stakeholder communications plan that includes community engagement before work commences on site |
| | Display the head or regional office contact information. |
| | Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary. |
| | Develop a Dust Management Plan |
| | 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. |
| | Hold regular liaison meetings with other high risk construction sites within 500m of the site boundary to ensure plans are coordinated and dust and particulate matter emissions are minimised. |
| **Monitoring** | 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. |
| | 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. |
| **Preparing and maintaining the site** | 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 actives for an extensive period |
| | Avoid site runoff of water or mud. |
| | Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution. |
| | 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 |
| | Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary. |
| | Provide showers and ensure a change of shoes and clothes are required before going off-site to reduce transport of dust. |
| | Agree monitoring locations with the local authority |
| | Where possible, commence baseline monitoring at least three months before phase begins |
| | Put in place real-time and air quality pollutant monitors across the site and ensure they are checked regularly. |
| **Operating Vehicle/Machinery and Sustainable Travel** | Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance. |
| | Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone. |
| | 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. |
| | Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). |
| | Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing). |

| | |
|---|---|
| | Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials |
| **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 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. |
| **Waste Management** | Reuse and recycle waste to reduce dust from waste materials |
| | Avoid bonfires and burning of waste materials. |

| Construction Activity | Mitigation Measure |
|---|---|
| **Demolition** | 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 |
| **Earthworks** | 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. |
| **Construction** | Avoid scabbing (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. |
| **Trackout** | 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 materials during transport. |
| | Record all inspections of haul routes and any subsequent action in a site logbook |
| | 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 |

## 7.2 Impact of Vehicle Emissions

It is understood that the ventilation strategy is to be based upon a mechanical system with trickle vents. Further information on this can be found within the Building Services statement and the wider planning application.

Air quality at the development is all comfortably below the Air Quality Objective with the highest value being marginally over 80% of the AQO. With respect to existing receptors, only 1 location on the nearby roundabout exceeded the 40µgm$^{-3}$ but the contribution from the development is negligible. It is therefore unlikely that the air quality objective will be breached and mitigation would be required via mechanical ventilation.

## 7.3 Impact of Air Quality Neutral Assessment

The Air Quality Neutral Transport Assessment for the proposed development demonstrated that it is above the benchmark. As such, the development is not considered air quality neutral in regards to transport emissions and further mitigation measures are required either by on-site measures or by off-setting.