

AIR QUALITY MITIGATION STATEMENT HARLINGTON SCHOOL

Stroma Built Environment Ltd.
SBE Ref: 09-19-79638

Revision	Date	Description		
1	28/05/2021	First Issue		
		Compiled By	Authorised By	
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Introduction

Discussions by telephone between Val Beale (London Borough of Hillingdon Air Quality Officer) and James Browne (Stroma Built Environment Senior Air Quality Consultant) have taken place on 16/03/2021 regarding the likely air quality impact resulting from the proposed development. During these discussions, it was agreed that as per the Mayor of London's Air Quality for Schools Toolkit an air quality statement would be required to support the planning application.

The Harlington School development is located south of Pinkwell Lane and to the north of the M4 in the Hayes area, UB3 1PB. It consists of the school with car parking, as well as outdoor play areas to the north of the development and playing fields to the south.

Air Quality Assessment

As stated in the Air Quality Assessment (reference 09-19-79638 Air Quality Assessment 1v1), *"the proposed development is below the Air Quality Objective. Furthermore it is not predicted that the change in concentrations at nearby sensitive receptors will be significant. As such the proposal can be determined to be a low priority in terms of air quality."*

The annual development NO_x and PM₁₀ emissions were assessed as being below the Air Quality Neutral Transport Emissions Benchmarks. These benchmarks have been defined in accordance with the Air Quality Neutral Guidance provided by the Mayor of London and the assessment was undertaken based on data provided the project transport and M&E consultant.

Mitigation Measures

During discussions between Val Beale and James Browne, specific attention was directed towards key areas of the Mayor of London toolkit. It should be noted that the measures outlined below are those which fall within the responsibility of the contractor. Within the greater Mayor of London toolkit, there are measures which are not applicable for this type of development or are beyond the remit of the contractor.

Numerous mitigation measures have been proposed to help combat the threat of poor air quality in and around the development. These measures have the aim of not only improving air quality at the proposed development but also within the local area. These measures add air quality value to the grounds, ranging from additional parking, travel plans and use of green infrastructure.

Construction Phase

Mitigation measures for the construction phase have been proposed. These measures are based on the likely risk of nuisance to residents in the local area from the construction and earthworks phase. Whilst air quality monitoring isn't recommended at this stage, continuous visual monitoring will be undertaken and action taken according to the Construction Environmental Management Plan where required. A full breakdown of the mitigation measures proposed can be found within the planning application.

Transport

In total 140 additional scooter / cycle parking spaces are being provided, as well as 7 active and 7 passive EV staff charging spaces (5 active and 5 passive in the east car park and 2 passive and 2 active in the west car park). The intention of these is to promote zero emission travel to and from the area. Furthermore this will help future proof the development to accommodate the expected modal shift to cleaner zero emission vehicles.

There will be a school travel plan and an 'anti idling' policy in order to reduce traffic build up. This will be submitted as part of the wider planning application and the school travel plan will contain a number of measures and targets to promote/encourage sustainable travel choices to the development. The anti-idling policy will reduce the build up of emissions in areas of exposure.

Landscaping

Strategic landscaping in the form of planting forms a key part of the air quality strategy by acting as a barrier between the pollution source and recipient. A separate walkway to the building will be introduced to further help with the anti-congestion aims. Play areas and sports pitches will be located further north, away from the motorway with trees, shrubs and hedges introduced to help buffer the area from pollution. As per the planting plan, the height of the vegetation will vary ensuring maximum possible coverage from the pollution source.

Boilers

Low NOx boilers will be installed and meet the requirements within the requirements of the Mayor of London's guidance on air quality. The boiler flues will terminate approximately 1.5m above roof level and 12.3m above ground level providing suitable conditions for dispersion.

Air Filtration

Fresh air will be provided to the building using a combination of larger MVHR units serving larger spaces and local hybrid ventilation units in teaching spaces.

The main MVHR air-handling units will have G4 filters. Classroom hybrid ventilation units do not have integral filters as they are part of a mixed-mode ventilation solution that also allows windows to be opened when it is warm enough to do so, or when the CO₂ detector in the room indicates that additional fresh air is required.

Acoustic Survey

The contractor has undertaken an acoustic survey of the background noise and the building design meets the DfE requirements for reduction in external noise levels. The Hillingdon requirement for additional thermal insulation to meet carbon reduction targets has contributed to this.

Conclusion

The implementation of the discussed measures show a commitment to follow the guidance set out in the Mayor's Air Quality for School's Toolkit. The plans will help to reduce air pollution in the area and minimise the adverse health impacts of poor air quality on human health. It can therefore be concluded that the overall impact on human health will not be detrimental.

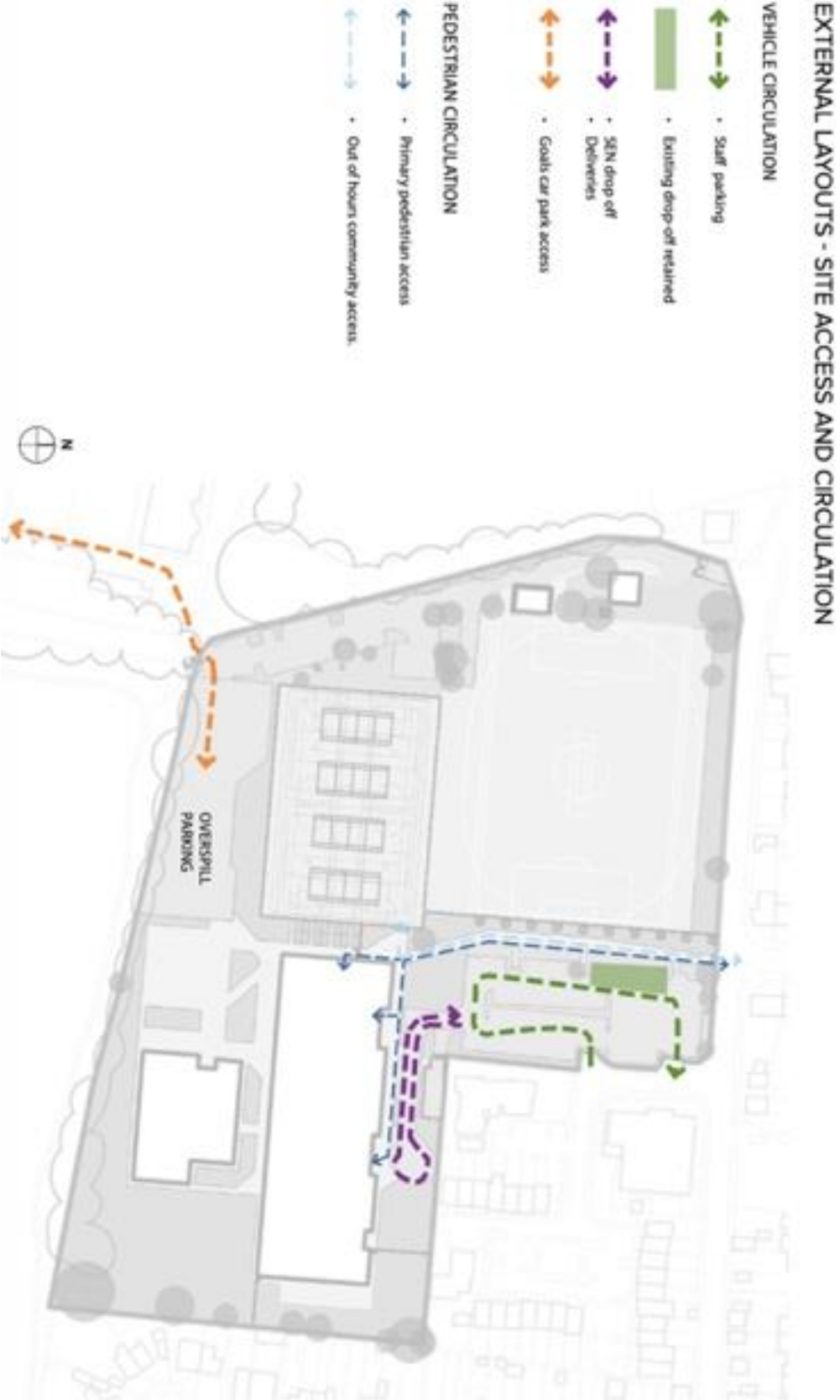
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Appendix B - Evidence of play areas located to the south west of the site



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Appendix D - Evidence of internal travel route and staff car parks



Appendix E Air Quality Assessment submitted for planning



AIR QUALITY IMPACT ASSESSMENT

AT: Harlington School

CLIENT: Wates

DATE: August 2020

STROMA PROJECT REF: 09-19-79638

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 have been instructed by Wates Construction to prepare an Air Quality Impact Assessment in support of a planning application for the proposed Harlington School development. The pollutants modelled as part of this assessment are nitrogen oxides (NO_x) and particulate matter (PM₁₀).

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 and the Local Air Quality Management Technical Guidance (LAQM.TG16)². 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 NO₂ and PM₁₀ 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 with mitigation measures proposed.

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 comprises the construction of a new three-storey building, sports hall, external play provisions and associated landscaping.

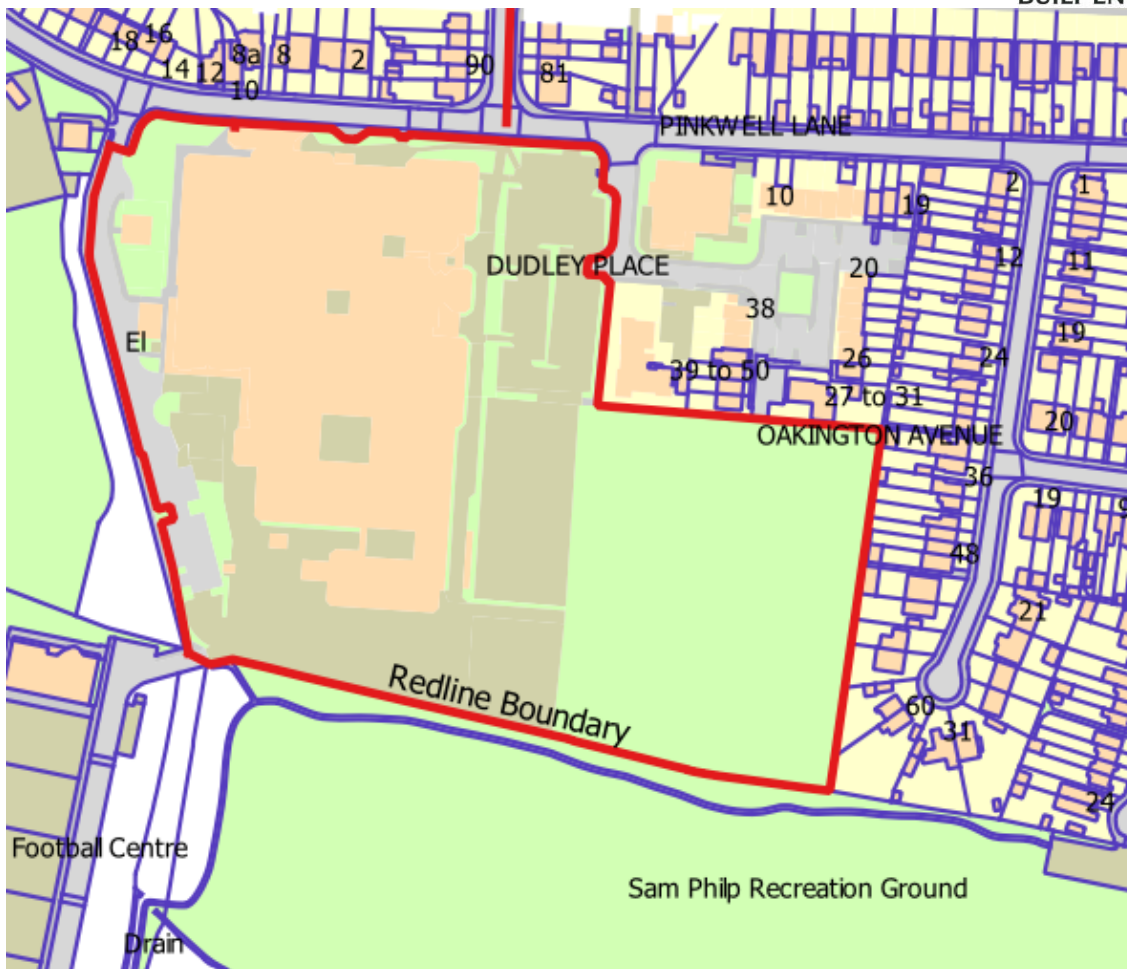
1 Design Manual for Roads and Bridges, Vol 11, Section 3, Part 1 – HA207/07, Highways Agency, May 2007

2 Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance (TG16), Defra, February 2018



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Figure 1 –Site Location Plan



6 Silkwood Business Park, Fryer's Way, Wakefield, WF5 9TJ

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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 (NO₂), fine particulates (PM₁₀), carbon monoxide (CO), 1,3-butadiene and benzene, as well as carbon dioxide (CO₂). This air quality assessment focuses on NO₂ and PM₁₀, as these pollutants are least likely to meet their Air Quality Strategy objectives near roads. Table 1 provides an overview of NO₂ and PM₁₀.

Table 1 – Overview of NO₂ and PM₁₀

Pollutant	Properties	Anthropogenic Sources	Natural Sources	Potential Effects
Particles (PM₁₀)	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
Nitrogen Dioxide (NO₂)	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, Scotland, Wales and Northern Ireland on 17 July 2007³. The Strategy provides an overarching 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 (PM₁₀ 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. Table 2 provides the UK Air Quality Objectives for NO₂ and PM₁₀.

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



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

Pollutant	Objective	Concentration measured as
Nitrogen Dioxide (NO₂)	200µg/m ³ not to be exceeded more than 18 times a year	1 hour mean
	40µg/m ³	Annual mean
Particles (PM₁₀)	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/m³. 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 (NO₂), particulate matter (PM₁₀) and sulphur dioxide (SO₂). All current Air Quality Management Areas (AQMAs) across the UK are declared for one or more of these pollutants, with NO₂ 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 The London Borough of Hillingdon

The Council has declared an Air Quality Management Area (AQMA). The AQMA has been declared for the NO₂ Annual Mean. The AQMA covers the area from the southern local authority boundary to the Chiltern-Marylebone railway line.

There are currently 187 Air Quality Focus areas which have been declared across the 33 London Boroughs. The London Borough of Hillingdon has declared twelve Air Quality Focus and the proposed development is within one of these focus areas.

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 19th February 2019, 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 Control⁵.

Paragraph 170 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 181 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 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 processes⁶.

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.

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

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 Strategy⁷ 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 London Plan

In March 2016, the updated London Plan was published by the Greater London Authority⁸. The London Plan provides an overall 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 7.14 relates specifically to improving air quality and states the following:

"The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimize public exposure to pollution".

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

"Development proposals should:

- a minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAS) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3)*
- b promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'*
- c be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAS)).*
- d ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches*

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

⁸ The London Plan. The Spatial Development Strategy for London. Consolidated with Alterations. March 2016



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e where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified”.

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 2014⁹. The guidance seeks to reduce emissions of dust and PM₁₀ 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 2014¹⁰. 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

⁹ The Control of Dust and Emissions during Construction and Demolition SPG. Greater London Authority, July 2014

¹⁰ 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 PM₁₀ concentrations, as a result of dust generating activities on site; and
- An increase in concentrations of 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 PM₁₀ concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of particulate matter in all size fractions.

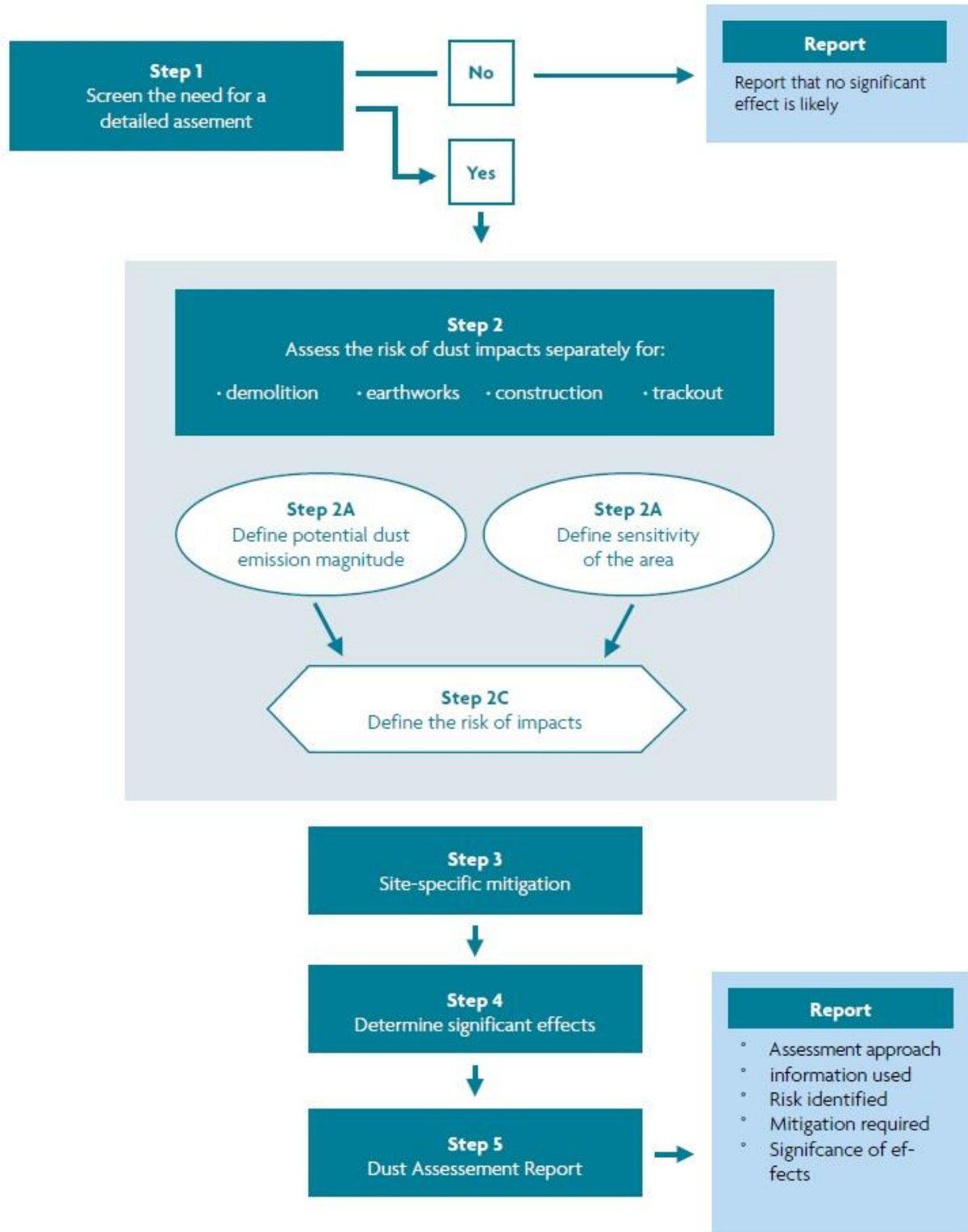
Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed”.

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 2018 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 (2018); 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 will be undertaken using the latest version of the ADMS-Roads model¹¹. 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 9.0) which incorporates updated NO_x emissions factors and vehicle fleet information¹². 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 2017 have been used for all modelled years.

4.2.4 Traffic Data

Baseline flows along the local roads are available from the London Atmospheric Emissions Inventory (LAEI)¹³ and DfT. Baseline (2016) data from the LAEI has been projected to 2018 and 2023. Projection of traffic data has been undertaken using growth factors specific to the local authority, obtained from TEMPro¹⁴. 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 kph has been modelled in order to represent queuing traffic at a junction. This is the approach recommended by the London Local Air.

¹¹ Model Version: 4.1.1.0. Interface Version 4.1.1 (18/01/2018)

¹² https://laqm.defra.gov.uk/documents/EFT2019_v9.0.xlsb

¹³ <https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2016>

¹⁴ TEMPro (Trip End Model Presentation Program) version 7.2. Department for Transport



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

Link Name	Baseline AADT 2017	Future Baseline AADT 2022	Future Baseline + Development AADT 2022	HDV (%)	Speed (kph)
Dawley Road	13,971	14,671	14,791	7.4%	48
Shepiston Lane	15,516	16,293	16,345	5.2%	48
Stockley Road	58,524	61,965	61,965	5.1%	80
Mildred Avenue	3,117	3,273	3,273	7.8%	48
Redmead Road	1,268	1,332	1,332	0.7%	48
M4	150,899	158,459	158,459	4.7%	96

4.3 Background Concentrations

Background NO_x, NO₂ and PM₁₀ concentrations have been obtained from Defra15. These 1 km x 1 km grid resolution maps are derived from a base year of 2017 (for NO_x, NO₂, PM₁₀ and PM_{2.5} only), which are then projected to future years up to 2030. Background concentrations of NO₂, PM₁₀ and PM_{2.5} derived from Defra are provided in Table 4.

Table 4 – Background NO_x, NO₂, PM₁₀ and PM_{2.5} Concentrations

Location	Pollutant	X	Y	2018
Proposed Development	NO ₂	508500	178500	32.6
	NO _x			53.5
	PM ₁₀			17.7
	PM _{2.5}			12.1

In order to undertake a worst-case assessment, 2018 background concentrations have been assumed for all modelled scenarios.

4.4 Surface Roughness

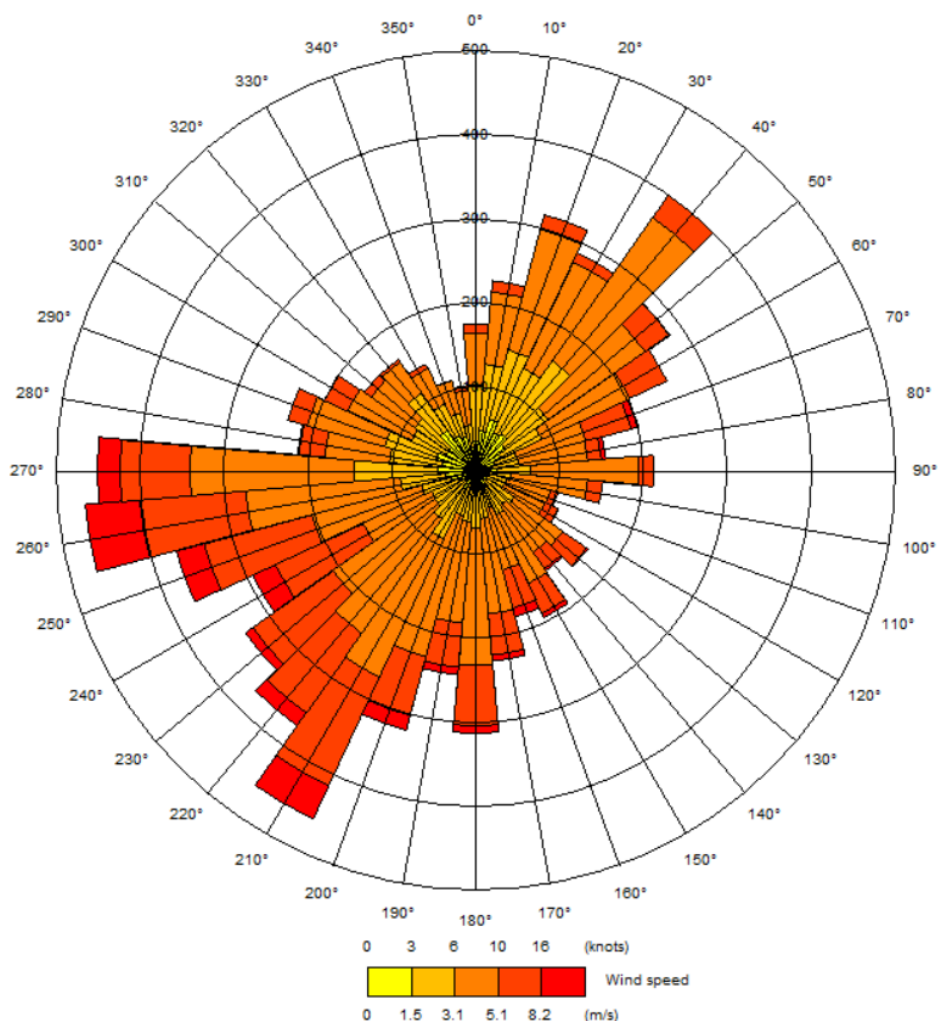
A surface roughness of 0.5 metre has been used in the model. This value is provided by ADMS-Roads as a typical roughness length for open suburbia. This value has been used across the modelled domain.

4.5 Meteorological Data

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

15 <https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2017>

Figure 3 – Wind Speed and Direction Data, London Heathrow Airport (2018)



4.6 Model Output

4.6.1 NO_x/NO₂ Relationship

Following recent evidence that shows the proportion of primary NO₂ in vehicle exhaust has increased¹⁶. As such, a new NO_x to NO₂ calculator has been devised¹⁷. This new calculator has been used to determine NO₂ concentrations for this assessment, based on predicted NO_x concentrations using ADMS-Roads. Converted NO₂ 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_x concentrations are adjusted before conversion to NO₂.

¹⁶ Trends in Primary Nitrogen Dioxide in the UK, Air Quality Expert Group, 2007

¹⁷ http://laqm.defra.gov.uk/documents/no2tonox9_ja-forweb_june2016.xls

4.6.2 Predicted Short Term Concentrations

As discussed in the introduction, it has not been possible to model the short-term impacts of NO₂ and PM₁₀. Research undertaken in 2003¹⁸ has indicated that the hourly NO₂ objective is unlikely to be exceeded at a roadside location where the annual mean NO₂ concentration is less than 60 µg/m³.

For PM₁₀, 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 and most representative monitoring sites to the proposed development.

Table 5 – Modelled Verification Locations

Site ID	X	Y	Height (m)
HD31	506926	178614	1.5
HD51	506335	180263	1.5
HD55	509918	179015	1.5
HD203	509683	179486	1.5
HD204	506108	180493	1.5
HD205	506503	179510	1.5
HD207	507580	179812	1.5
HD214	509499	178370	1.5
HD402	509328	179603	1.5

4.6.4 Receptor Locations

In order to assess the potential impact of the proposed development, the locations of the openable windows at the school and the perimeter of the sports hall 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, 5 and 6.

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

Air Quality Assessment ID	X	Y	Height (m)
R1	508697	178694	1.5 and 4.5
R2	508717	178692	1.5 and 4.5
R3	508745	178690	1.5 and 4.5
R4	508771	178687	1.5 and 4.5

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

R5	508803	178684	1.5 and 4.5
R6	508805	178671	1.5 and 4.5
R7	508797	178648	1.5 and 4.5
R8	508774	178650	1.5 and 4.5
R9	508755	178652	1.5 and 4.5
R10	508723	178654	1.5 and 4.5
R11	508697	178657	1.5 and 4.5
R12	508693	178675	1.5 and 4.5
R13	508745	178642	1.5
R14	508769	178618	1.5
R15	508757	178607	1.5
R16	508733	178609	1.5
R17	508725	178619	1.5
R18	508729	178636	1.5

Figure 4 – Modelled ground floor school receptor locations





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Figure 5 – Modelled first floor school receptor locations

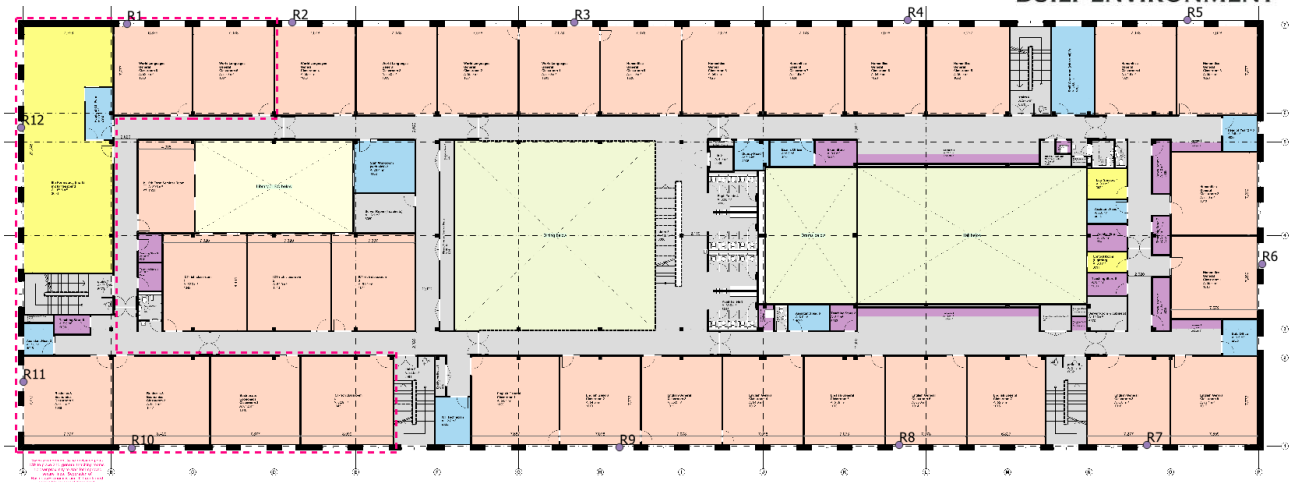


Figure 6 – Modelled sports hall receptor locations



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

1.2.1.

4.7.2 Operational Phase

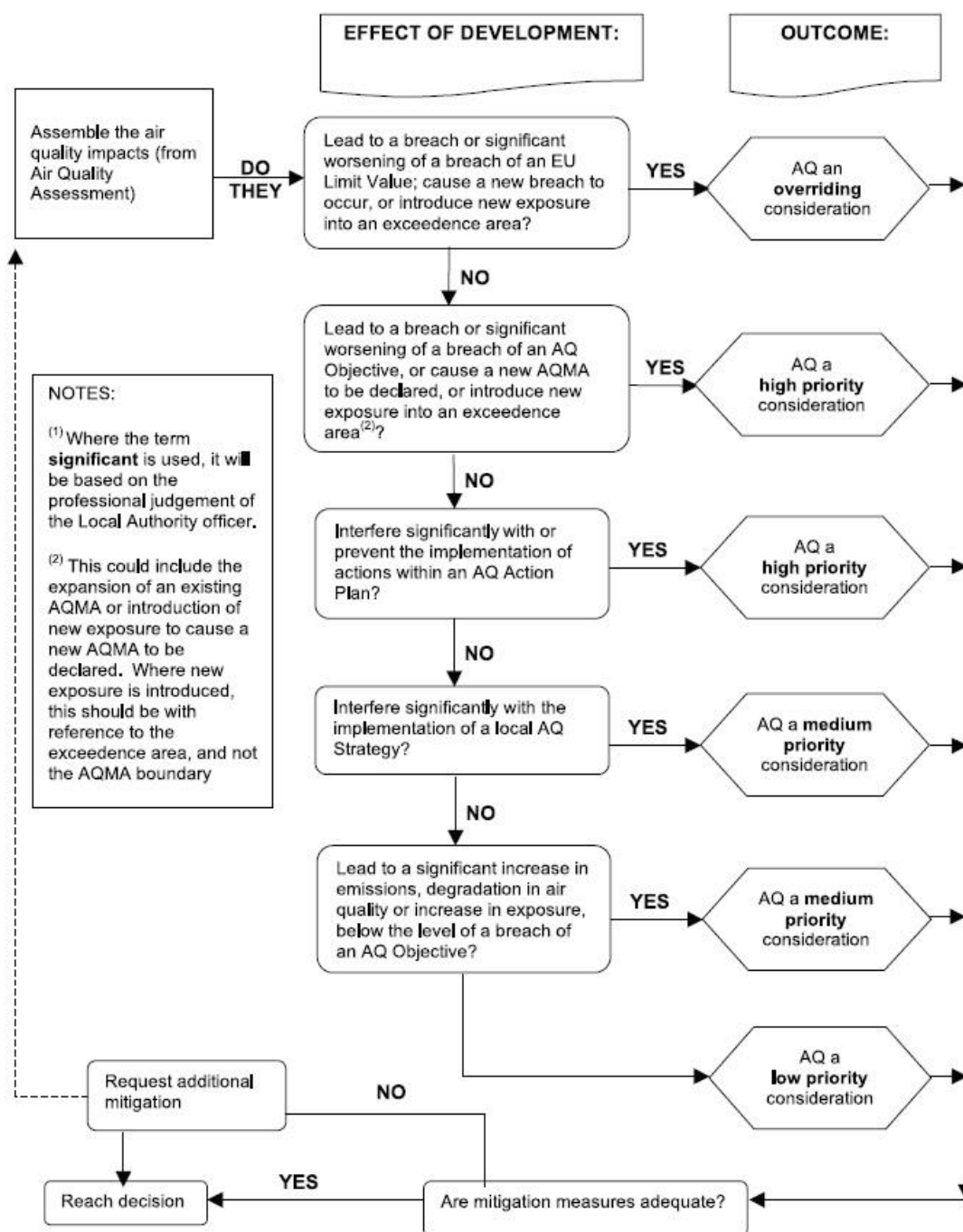
The guidance released by Environmental Protection UK (EPUK) provides steps for a Local Authority to follow in order to assess the significance of air quality impacts of a development proposal. This procedure, shown in Figure 7, will be applied to the modelled results.

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

5.1.1 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 = Large;
- Construction = Small; and
- Track out = Small.

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	High	High	High	High
Human Health	Medium	Medium	Medium	Medium

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 Risk	High Risk	Medium Risk	Low Risk
Human Health	Medium Risk	Medium Risk	Medium Risk	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.

5.1.2 Impact of Vehicle Emissions

5.1.3 Model Verification

Using the guidance provided within the London Local Air Quality Management Technical Guidance TG(16), 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_x/NO₂ and PM₁₀ concentrations.

Table 12 – Comparison of Modelled and Monitored NO₂ and PM₁₀ Concentrations (µg/m³)

Verification Location	Modelled Concentration	Monitored Concentration	Difference [(modelled - monitored)/monitored] x100
HD31	44.3	42.0	5.4%
HD51	28.0	30.6	-8.4%
HD55	31.7	37.7	-15.9%
HD203	31.3	38.5	-18.7%
HD204	29.7	35.0	-15.1%
HD205	29.2	36.6	-20.2%
HD207	30.7	37.1	-17.3%
HD214	43.9	42.0	4.5%
HD402	30.2	31.7	-4.7%

As described in the Technical Guidance (LLAQM.TG16), in order to provide more confidence in the model predictions and the decisions based on these, the majority of results should be within $\pm 25\%$ (ideally $\pm 10\%$) 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.

5.1.4 Model Adjustment

In order to undertake model adjustment, it is first necessary to derive the monitored and modelled road contributions of NO_x (excluding background). The modelled road contribution NO_x is taken directly from the ADMS-Roads output before it has been converted to NO₂ using the NO_x to NO₂ calculator described in Section 4.6.1. The NO_x to NO₂ calculator can also be used to derive



monitored road contributions of NO_x from NO₂ diffusion tube results. A summary of these calculations is provided in Table 13.

Table 13 – Monitored NO_x and NO₂ concentrations

Verification Location	Monitored Total NO ₂	Defra Background NO ₂	Monitored road contribution NO ₂ (total – background)	Monitored road contribution NO _x (total – background)	Modelled road contribution NO _x (excludes background)	Ratio of monitored road contribution NO _x / modelled road contribution NO _x
HD31	42.0	30.7	11.3	25.4	31.00	0.82
HD51	30.6	27.1	3.5	7.4	2.04	3.65
HD55	37.7	28.8	8.9	19.4	6.08	3.19
HD203	38.5	28.8	9.7	21.3	5.19	4.10
HD204	35.0	27.1	7.9	17.1	5.53	3.09
HD205	36.6	24.7	11.9	25.8	9.33	2.77
HD207	37.1	28.1	9.0	19.5	5.33	3.67
HD214	42.0	32.2	9.8	21.9	26.47	0.83
HD402	31.7	28.8	2.9	6.1	2.92	2.08

Once the monitored and modelled road contributions of NO_x (excluding background) have been derived the contributions of NO_x are compared and a ratio derived. In this case it is 1.098 and is used to adjust the modelled road contribution of NO_x. This is shown in Table 14.

Figure 8 – Linear Regression of Modelled and Monitored NO₂

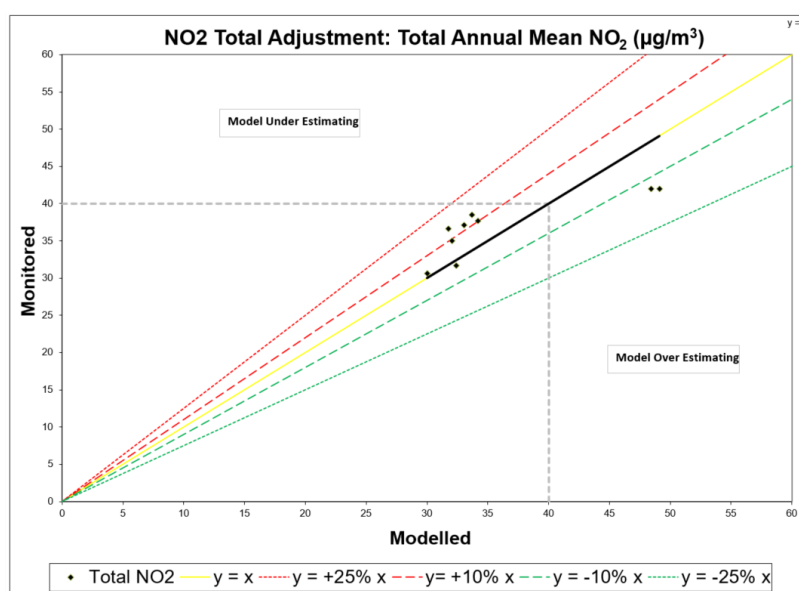


Table 14 – Adjustment of Modelled NOx Contributions

Verification Location	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
HD31	1.098	34.0	45.5	42.0	8.3%
HD51	1.098	2.2	28.1	30.6	-8.1%
HD55	1.098	6.7	32.0	37.7	-15.2%
HD203	1.098	5.7	31.5	38.5	-18.1%
HD204	1.098	6.1	30.0	35.0	-14.4%
HD205	1.098	10.2	29.6	36.6	-19.0%
HD207	1.098	5.8	30.9	37.1	-16.7%
HD214	1.098	29.1	45.0	42.0	7.0%
HD402	1.098	3.2	30.4	31.7	-4.3%

Following adjustment of the modelled NOx concentrations by a factor of 1.098 the total NO₂ concentration at the model verification location has been calculated using the method described in Section 4.6.1. The revised NO₂ concentration, shown in Table 14, indicates a more acceptable model performance when compared against the monitored NO₂ concentrations. As such, an adjustment factor of 1.098 has been applied to all modelled NOx concentrations across the model domain before conversion to NO₂.

5.1.5 Nitrogen Dioxide

Predicted annual mean concentrations for NO₂ at the proposed development in 2018 and 2023 are provided in Table 15 with the change and significance criteria in table 16. As mentioned in Section 4.6.1, NO₂ concentrations have been calculated from the predicted NO_x concentrations using the latest NO_x-NO₂ conversion spreadsheet available from the Air Quality Archive.

Table 15 – Comparison of Predicted Annual Mean NO₂ Concentrations (µg/m³)

Receptor ID	Baseline (2018)	Future Baseline (2023)	% relative to AQO	AQO breach
Ground Floor Receptors				
R1	34.0	34.1	85.2	No
R2	34.0	34.1	85.2	No
R3	34.0	34.1	85.2	No
R4	34.0	34.1	85.3	No
R5	34.0	34.1	85.3	No
R6	34.1	34.2	85.6	No
R7	34.3	34.4	86.1	No
R8	34.3	34.4	86.1	No
R9	34.3	34.4	86.0	No
R10	34.3	34.4	86.0	No
R11	34.3	34.4	86.0	No
R12	34.1	34.3	85.6	No
R13	34.4	34.5	86.3	No
R14	34.6	34.8	86.9	No
R15	34.8	34.9	87.4	No
R16	34.8	35.0	87.4	No
R17	34.7	34.8	87.1	No
R18	34.5	34.6	86.5	No
First Floor Receptors				
R1	33.9	34.1	85.2	No
R2	33.9	34.1	85.1	No
R3	33.9	34.1	85.1	No
R4	33.9	34.1	85.2	No
R5	34.0	34.1	85.2	No
R6	34.1	34.2	85.4	No
R7	34.2	34.4	86.0	No
R8	34.2	34.4	85.9	No
R9	34.2	34.4	85.9	No
R10	34.2	34.4	85.9	No
R11	34.2	34.4	85.9	No
R12	34.1	34.2	85.5	No
R13	34.3	34.5	86.2	No
R14	34.6	34.7	86.8	No
R15	34.7	34.9	87.2	No
R16	34.7	34.9	87.2	No

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R17	34.6	34.8	86.9	No
R18	34.4	34.6	86.4	No
Objective	40			

The ADMS predictions for annual mean NO₂ concentrations in 2018 and 2023 indicate that the annual mean objective (40 µg/m³) would be achieved at the sensitive modelled receptor locations.

Nitrogen dioxide also has an hourly objective of 200 µg/m³ 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 NO₂ concentrations was very weak. Nonetheless, research undertaken in 2003¹⁹ has indicated that the hourly NO₂ objective is unlikely to be exceeded at a roadside location where the annual mean NO₂ concentration is less than 60 µg/m³. Given that predicted NO₂ concentration in 2018 and 2023 are below 60 µg/m³ at the modelled receptor locations, the likelihood of the short-term objective for NO₂ being exceeded is low.

5.1.6 Significance of additional modelled receptors

Sensitive air quality receptors along roads which meet the traffic criteria in the IAQM planning guidance. The predicted changes in traffic movements resulting from the proposed development trigger the criteria within the IAQM planning guidance. The results and impact descriptors are provided in table 16 and 17.

Table 16 – Comparison of Predicted Annual Mean NO₂ Concentrations at additional modelled receptor locations

Receptor ID	Baseline (2018)	Future Baseline (2023)	Future Baseline + Development (2023)	% relative to AQO
R1	36.2	36.4	36.4	91.0
R2	36.1	36.2	36.3	90.7
R3	36.1	36.3	36.4	90.9
R4	32.7	32.8	32.9	82.2
R5	33.3	33.5	33.5	83.8

Table 17 – Impact at additional modelled receptor locations

Receptor ID	Absolute Change	% Change in concentration relative to AQO	Impact Descriptor
R1	0.0	0.0	Negligible
R2	0.0	0.0	Negligible
R3	0.0	0.1	Negligible
R4	0.0	0.0	Negligible

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

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R5	0.0	0.1	Negligible
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The predicted impact of the additional traffic movements on nearby sensitive receptors has been demonstrated to be negligible and is not causing new exceedances of the AQO.

5.1.7 Particulate Matter

Predicted annual mean concentrations for PM₁₀ in 2018 and 2023 are provided in Table 13 with the change and significance criteria in table 18.

Table 18 – Comparison of Predicted Annual Mean PM₁₀ Concentrations (µg/m³)

Receptor ID	Baseline (2018)	Future Baseline (2023)	% relative to AQO	AQO breach
Ground Floor Receptors				
R1	18.1	18.1	45.2	No
R2	18.1	18.1	45.2	No
R3	18.1	18.1	45.2	No
R4	18.1	18.1	45.2	No
R5	18.1	18.1	45.2	No
R6	18.1	18.1	45.2	No
R7	18.1	18.1	45.3	No
R8	18.1	18.1	45.3	No
R9	18.1	18.1	45.3	No
R10	18.1	18.1	45.3	No
R11	18.1	18.1	45.3	No
R12	18.1	18.1	45.2	No
R13	18.1	18.1	45.3	No
R14	18.1	18.2	45.4	No
R15	18.2	18.2	45.5	No
R16	18.2	18.2	45.5	No
R17	18.2	18.2	45.4	No
R18	18.1	18.1	45.4	No
First Floor Receptors				
R1	18.1	18.1	45.2	No
R2	18.1	18.1	45.2	No
R3	18.1	18.1	45.2	No
R4	18.1	18.1	45.2	No
R5	18.1	18.1	45.2	No
R6	18.1	18.1	45.2	No
R7	18.1	18.1	45.3	No
R8	18.1	18.1	45.3	No
R9	18.1	18.1	45.3	No
R10	18.1	18.1	45.3	No
R11	18.1	18.1	45.3	No
R12	18.1	18.1	45.2	No
R13	18.1	18.1	45.3	No

R14	18.1	18.2	45.4	No
R15	18.2	18.2	45.5	No
R16	18.2	18.2	45.5	No
R17	18.1	18.2	45.4	No
R18	18.1	18.1	45.3	No
Objective	40			

The ADMS predictions for annual mean PM₁₀ concentrations in 2018 and 2023 indicate that the annual mean objective (40 µg/m³) would be achieved at all the modelled receptor locations. In addition, the maximum number of days when PM₁₀ concentrations are more than 50 µg/m³ is 2, less than the 35 exceedances allowed in the regulations.

5.1.8 Significance of additional modelled receptors

Sensitive air quality receptors along roads which meet the traffic criteria in the IAQM planning guidance. The predicted changes in traffic movements resulting from the proposed development trigger the criteria within the IAQM planning guidance. The results and impact descriptors are provided in table 19 and 20.

Table 19 – Comparison of Predicted Annual Mean PM₁₀ Concentrations at additional modelled receptor locations

Receptor ID	Baseline (2018)	Future Baseline (2023)	Future Baseline + Development (2023)	% relative to AQO
R1	18.7	18.7	18.7	46.7
R2	18.7	18.7	18.7	46.7
R3	18.7	18.7	18.7	46.8
R4	17.5	17.6	17.6	43.9
R5	17.7	17.7	17.7	44.3

Table 20 – Impact at additional modelled receptor locations

Receptor ID	Absolute Change	% Change in concentration relative to AQO	Impact Descriptor
R1	0.0	0.0	Negligible
R2	0.0	0.0	Negligible
R3	0.0	0.0	Negligible
R4	0.0	0.0	Negligible
R5	0.0	0.0	Negligible

The predicted impact of the additional traffic movements on nearby sensitive receptors has been demonstrated to be negligible and is not causing new exceedances of the AQO.



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6 AIR QUALITY NEUTRAL ASSESSMENT

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 Order²⁰, 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)²¹ and the Air Quality Neutral Planning Support Update²². 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.

Building Emissions

The Building Emissions Benchmark (BEBs) for the land use category applicable to hotels is provided in Table 21. Emissions of PM₁₀ have not been considered as oil and/or solid fuel are not proposed to be used at the development.

Table 21 – Building Emissions Benchmarks (BEBs)

Land Use Class	NOx (g/m ² /annum)
D1 (c-h)	31

Using the method described within the Air Quality Neutral Planning Support Update, the site specific benchmarked emissions have been calculated using the emission rate in Table 21. These are summarised in Table 22. The total building NOx emissions have then been calculated and are summarised in Table 23.

²⁰ Town and Country Planning (Development Management Procedure)(England) Order, March 2015

²¹ Sustainable Design and Construction Supplementary Planning Guidance (SPG), Mayor of London, April 2014

²² Air Quality Neutral Planning Support Update: GLA 80371, April 2014

Table 22 – Calculation of Benchmarked NOx Emissions Using Building Emissions Benchmarks for Each Land Use Category

Land Use	GFA (m ²)	Building Emissions Benchmarks (g/m ² /annum)	Benchmarked Emissions (kg/annum)
D1 (c-h)	11,700	31	362.7
Total Benchmarked Building NOx Emission			362.7 kg/annum

Table 23 – Calculation of Total Building NOx Emissions

Land Use	Boiler Gas Usage (kWh/annum)	Emission Factors (kg/kWh)	Total Building Emissions (kg/annum)
D1 (c-h)	850,000	0.00004	34.0
Total Building NOx Emission			34.0 kg/annum

Based on the comparison between the total building emissions and Building Emissions Benchmarks (see Table 24) the proposed development does meet the air quality neutral requirements and therefore, no mitigation is required.

Table 24 – Comparison of Total Building NOx Emissions and Building Emissions Benchmarks

Land Use	Total Benchmarked Emissions (kg/annum)	Total Building Emissions (kg/annum)	Difference (kg/annum)
D1 (c-h)	362.7	34.0	-328.7
Total			-328.7

Transport Emissions

As per the Air Quality Neutral Planning Update, there is no defined Transport Emissions Benchmark (TEB) for the land use category applicable to the proposed development. As such, the benchmark for the nearest comparable category, office B1, 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 25.



Table 25 – Transport Emissions Benchmarks (NO_x and PM₁₀)

NO _x				
Land Use	Floor Area	Transport Emission Benchmark (g/dwelling/annum)	Transport Emissions (g/annum)	Transport Emissions (kg/annum)
B1	11,700	68.5	801,450	801.5
Total Benchmarked Transport NO_x Emission			801,450	801.5
PM ₁₀				
Land Use	Floor Area	Transport Emission Benchmark (g/dwelling/annum)	Transport Emissions (g/annum)	Transport Emissions (kg/annum)
B1	11,700	11.8	138,060	138.1
Total Benchmarked Transport PM₁₀ Emission			138,060	138.1

The proposed development will generate 172 daily vehicle movements (62,780 per annum) from the proposed hotel use. As such, the total trip emissions for NO_x and PM₁₀ have been calculated in Table 26.

Table 26 – Total Transport Emissions (NO_x and PM₁₀)

Land Use	Total Trips Per Annum	Total Distance (veh-km/annum)	Total Transport Emissions (g/annum)	Total Transport Emissions (kg/annum)
NO _x				
B1	62,780	678,024	239,342	239.3
Total Transport NO_x Emission			239,342	239.3
PM ₁₀				
B1	62,780	678,024	41,088	41.1
Total Transport PM₁₀ Emission			41,088	41.1

Based on the comparison between the total transport emissions and Transport Emissions Benchmarks (see Table 27) the proposed development does meet the air quality neutral requirements and therefore mitigation is not required.

Table 27 – Comparison of Total Transport Emissions and Transport Emissions Benchmarks

Pollutant	Total Benchmarked Transport Emissions (kg/annum)	Total Transport Emissions (kg/annum)	Difference (kg/annum)
NO _x	801.5	239.3	-562.1
PM ₁₀	138.1	41.1	-97.0

7 CONCLUSIONS AND RECOMMENDATIONS

1.3. 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 PM₁₀ are negligible mitigation measures have been listed in Table 28 and are applicable for a medium to 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 28 – Mitigation of Construction Activities

Construction Activity	Mitigation Measures
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site Display the head or regional office contact information.
Site Management	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 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 Where possible, commence baseline monitoring at least three months before phase begins
Operating Vehicle/Machinery and Sustainable Travel	Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance. 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). 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
Waste Management	Reuse and recycle waste to reduce dust from waste materials Avoid bonfires and burning of waste materials.

7.1 Impact of Air Quality Neutral Assessment

The Air Quality Neutral Building Assessment and the Air Quality Neutral Transport Assessment for the proposed development demonstrated that it is below the benchmark. As such, the development is considered air quality neutral and therefore no further mitigation is required.

7.2 Impact of Vehicle Emissions

As shown in tables 15 to 20 the proposed development is below the Air Quality Objective. Furthermore it is not predicted that the change in concentrations at nearby sensitive receptors will be significant. As such the proposal can be determined to be a low priority in terms of air quality.

8 Appendix A – Additional modelled receptor locations

Air Quality Assessment ID	X	Y	Height (m)
R1	509097	178791	1.5
R2	509108	178886	1.5
R3	509075	178946	1.5
R4	509080	179099	1.5
R5	509032	179186	1.5