

Air Quality Assessment

Westbury Court, 423-435 Lordship Lane

Report Ref: AQ1065

March 2023

DOCUMENT CONTROL & DISCLAIMER

Title:

Westbury Court, 423-435 Lordship Lane:
Air Quality Assessment

Report Ref:

AQ1065

Date Issued:

March 2023

Client Details:

Ivorystone Investments Ltd

115 Craven Park Road
London
N15 6BL

Produced By:

GEM Air Quality Ltd

Union House
111 New Union Street
Coventry
CV1 2NT

Tel: 0800 689 4329

Email: info@gemairquality.co.uk

www.gemairquality.co.uk

Disclaimer:

GEM Air Quality Ltd completed this Report on the basis of a defined programme of work and terms and conditions agreed with the Client. All reasonable skill and care has been used in producing this report, taking into account the project objectives, the agreed scope of work, prevailing site conditions and the degree of manpower and resources allocated to the project.

GEM Air Quality Ltd accepts no responsibility to any parties whatsoever, following the issue of the Report, for any matters arising outside the agreed scope of the work.

This Report is issued in confidence to the Client and **GEM Air Quality Ltd** has no responsibility to any third parties to whom this Report may be circulated, in part or in full, and any such parties rely on the contents of the report solely at their own risk.



CONTENTS

1	INTRODUCTION	1
1.1	Scope.....	1
2	POLLUTANTS & LEGISLATION	2
2.1	Pollutant Overview	2
2.2	Air Quality Strategy	2
2.3	Clean Air Strategy.....	3
2.4	London Local Air Quality Management (LLAQM)	3
2.4.1	London Borough of Haringey	4
3	PLANNING POLICY & GUIDANCE.....	5
3.1	National Planning Policy & Guidance.....	5
3.1.1	National Planning Policy Framework	5
3.1.2	Planning Practice Guidance (PPG).....	5
3.1.3	Land-Use Planning & Development Control	6
3.2	Regional Planning Policy	6
3.2.1	London Environment Strategy	6
3.2.2	The London Plan.....	7
3.2.3	Supplementary Planning Guidance (SPG)	8
4	ASSESSMENT METHODOLOGY.....	10
4.1	Operational Phase (Traffic Emissions)	10
4.1.1	Modelled Scenarios.....	10
4.1.2	ADMS-Roads	10
4.1.3	Emission Factors.....	10
4.1.4	Traffic Data.....	11
4.1.5	Street Canyons	12
4.2	Background Concentrations.....	12
4.3	Surface Roughness	13
4.4	Meteorological Data	13
4.5	Model Output	14
4.5.1	NO _x /NO ₂ Relationship.....	14



4.5.2	Predicted Short Term Concentrations	14
4.5.3	Model Verification	14
4.5.4	Receptor Locations.....	15
4.6	Significance Criteria	17
4.6.1	Operational Phase.....	17
5	AIR QUALITY ASSESSMENT	19
5.1	Impact of Vehicle Emissions.....	19
5.1.1	Introduction	19
5.1.2	Model Verification	19
5.1.3	Model Adjustment	19
5.1.4	Nitrogen Dioxide	21
5.1.5	Particulate Matter.....	22
6	AIR QUALITY NEUTRAL ASSESSMENT	24
6.1	Introduction	24
6.2	Transport Emissions.....	24
6.3	Building Emissions.....	24
7	CONCLUSIONS AND RECOMMENDATIONS	25
7.1	Impact of Vehicle Emissions.....	25
7.2	Air Quality Neutral Assessment	25
7.3	Overall Conclusion	25



LIST OF TABLES

Table 1 – Overview of NO ₂ and PM ₁₀	2
Table 2 – UK Air Quality Objectives for Nitrogen Dioxide and Particulate Matter	3
Table 3 – Annual Average Daily Traffic Flows, Percentage HDV and Speeds for Modelled Roads.....	12
Table 4 – Background NO _x , NO ₂ , PM ₁₀ and PM _{2.5} Concentrations	12
Table 5 – Modelled Verification Locations	14
Table 6 – Modelled Receptor Locations	15
Table 7 – Air Pollution Exposure Criteria (APEC)	17
Table 8 – Comparison of Modelled and Monitored NO ₂ Concentrations (µg/m ³), 2019	19
Table 9 – Monitored NO _x and NO ₂ concentrations, 2019	20
Table 10 – Adjustment of Modelled NO _x Contributions, 2019	20
Table 11 – Predicted NO ₂ Concentrations, Annual Mean (µg/m ³)	21
Table 12 – Predicted PM ₁₀ Concentrations, Annual Mean (µg/m ³).....	22
Table 13 – Predicted PM _{2.5} Concentrations, Annual Mean (µg/m ³)	23

LIST OF FIGURES

Figure 1 – Wind Speed and Direction Data, London City Airport (2019).....	13
Figure 2 – Modelled Receptor Locations	16
Figure 3 – Assessing the Significance of Air Quality Impacts of a Development Proposal	18



1 INTRODUCTION

1.1 Scope

GEM Air Quality Ltd has been commissioned to undertake a detailed air quality assessment based on the potential impacts of a proposed mixed-use development located at Westbury Court, 423-435 Lordship Lane in Haringey, London.

The pollutants modelled as part of this assessment are nitrogen oxides (NO_x) and particulate matter (PM₁₀ and PM_{2.5}).

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 London Local Air Quality Management (LLAQM) Technical Guidance (TG19)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 air quality neutral assessment has also been undertaken relating to the proposed building and transport emissions.

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

² London Local Air Quality Management (LLAQM), Technical Guidance, October 2019 (TG19)



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 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 (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 (Amendment) Regulations 2016, which came into force on 31st December 2016. 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



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

Pollutant	Objective	Concentration measured as	Obligation
Particles (PM₁₀)	50µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	All local authorities
	50µg/m ³ not to be exceeded more than 7 times a year	24 hour mean	Scotland only
	40µg/m ³	Annual mean	All local authorities
	10µg/m ³	Annual mean	Scotland only
Particles (PM_{2.5})	20µg/m ³ ^(a)	Annual Mean	England only (encouraged in Wales)
	10µg/m ³	Annual Mean	Scotland only
Nitrogen Dioxide (NO₂)	200µg/m ³ not to be exceeded more than 18 times a year	1 hour mean	All local authorities
	40µg/m ³	Annual mean	All local authorities
(a) The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 is an amendment to the existing regulations and reduces the threshold for PM _{2.5} from 25 µg/m ³ to 20 µg/m ³ .			

2.3 Clean Air Strategy

The Clean Air Strategy⁴ was published in January 2019 and sets out the comprehensive action that is required from across all parts of government and society to tackle all sources of air pollution. New legislation will create a stronger and more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanisms.

2.4 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. In Greater London, AQMAs are declared for NO₂ and PM₁₀ in equal proportions. 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.

⁴ Clean Air Strategy 2019, Department for Environment, Food and Rural Affairs, January 2019



2.4.1 London Borough of Haringey

The Council has declared an Air Quality Management Area (AQMA). The AQMA covers the entire Borough and has been declared for NO₂ and PM₁₀ from road transport. As such, the proposed development lies within this AQMA.



3 PLANNING POLICY & GUIDANCE

3.1 National Planning Policy & Guidance

3.1.1 National Planning Policy Framework

On a national level, air quality can be a material consideration in planning decisions. The updated National Planning Policy Framework (NPPF) for England, released in 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.

Paragraph 105 within the NPPF states that the *“The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making”*.

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 Practice Guidance (PPG)

The NPPF is supported by the national Planning Practice Guidance (PPG), which includes guiding principles on how planning can take account of the impacts of new development on air quality (updated November 2019). The PPG states that *“Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values”* and *“It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit”*. The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans *“identify measures that will be introduced in pursuit of the objectives”*. The PPG makes clear that *“Odour and dust can also be a planning concern, for example, because of the effect on local amenity”*.



The PPG also states that *“Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity”*.

The PPG sets out the information that may be required in an air quality assessment, making clear that *“Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific”*. It also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that *“Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact”*.

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 processes⁵.

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

3.2 Regional Planning Policy

3.2.1 London Environment Strategy

The Mayor’s London Environment Strategy⁶, published in May 2018, contains a comprehensive list of measures to improve air quality. The aim is *“for London to have the best air quality of any major world city by 2050, going beyond legal requirements to protect human health and minimise inequalities”*.

The strategy includes setting new targets for PM_{2.5} with the aim of meeting World Health Organization (WHO) guidelines by 2030, the establishment of zero emission zones from 2020, the introduction of an air quality positive development, the phasing out the use of fossil fuels

⁵ 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 2018

⁶ London Environment Strategy. Mayor of London. May 2018



to heat, cool and maintain London's buildings and the introduction of a low emission zone for non-road mobile machinery (NRMM).

3.2.2 The London Plan

The most recent London Plan was published in March 2021. Policy SI1 relates specifically to air quality and states the following:

"A - Development Plans, through relevant strategic, site-specific and area based policies, should seek opportunities to identify and deliver further improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality.

B - To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:

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 should demonstrate that design measures have been used to minimise exposure*

C - Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be



improved across the area of the proposal as part of an Air Quality Positive approach. To achieve this a statement should be submitted demonstrating:

- a. How proposals have considered ways to maximise benefits to local air quality, and*
- b. What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.*

D - In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

E - Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development”.

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 2014⁷. 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.

⁷ The Control of Dust and Emissions during Construction and Demolition SPG. Greater London Authority, July 2014



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 2014⁸. 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.

⁸ Sustainable Design and Construction SPG. Greater London Authority, July 2014



4 ASSESSMENT METHODOLOGY

4.1 Operational Phase (Traffic Emissions)

4.1.1 Modelled Scenarios

Two scenarios have been modelled as part of this assessment. These are as follows:

- **Scenario 1 (2019)** – existing levels of air quality / model verification; and
- **Scenario 2 (2027)** – future impact of traffic emissions on the proposed development i.e. introduction of new exposure.

Air quality monitoring data recorded throughout 2020 and 2021 is not considered suitable for model verification due to the impact of the Covid-19 pandemic on local traffic movements. As such, Scenario 1 has utilised a baseline year of 2019 to reflect the most recent, pre-pandemic air quality monitoring data available from the Council.

A future year has been chosen (2027) representing when the development will be completed and operational. This will provide an assessment of the future impact of traffic emissions on the proposed development once completed and fully occupied.

4.1.2 ADMS-Roads

Modelling the impact of traffic emissions on the proposed development will be undertaken using the latest version of the ADMS-Roads model⁹. 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.

4.1.3 Emission Factors

Defra and the Devolved Administrations have provided an updated Emission Factors Toolkit (Version 11.0) which incorporates updated NO_x emissions factors and vehicle fleet information¹⁰. These emission factors have been integrated into the latest ADMS-Roads modelling software.

The Institute for Air Quality Management (IAQM) released a position statement in July 2018 relating to uncertainties in vehicle NO_x emissions within air quality assessments. It states the following:

⁹ Model Version: 5.0.1.3. Interface Version 5.0.1.7065 (31/01/2022)

¹⁰ https://iaqm.defra.gov.uk/wp-content/uploads/2021/11/EFT2021_v11.0.xlsb



“It has been known since around 2011 that nitrogen oxides (NO_x) emissions from diesel vehicles have not declined as expected despite the introduction of increasingly more stringent European Union (EU) emission limits since the early 1990s. This, together with an increase in numbers of diesel cars and the use of emission control devices that increase the proportion of the nitrogen dioxide (NO₂) in the exhaust NO_x, has resulted in annual mean concentrations of NO₂ remaining high, particularly at roadside locations”.

However, the IAQM position statement has now been withdrawn and the following statement has been published by the IAQM:

“There is a growing body of evidence to suggest that the latest COPERT vehicle emission factors, which feed into the EFT (v9 and onwards), reflect the real-world NO_x emissions more accurately.

It is judged that an exclusively vehicle emissions-based sensitivity test is no longer necessary.

On this basis, the EFT may be used for future year modelling with greater confidence when considering the per vehicle emission, provided that the assessment is verified against measurements made in the year 2016 or later”.

On this basis, Scenario 2 has also been modelled with vehicle emission factors for 2027 derived from the latest Emission Factors Toolkit.

4.1.4 Traffic Data

Baseline flows along the local road are available from the London Atmospheric Emissions Inventory (LAEI)¹¹. Baseline data has been projected to 2027. Projection of traffic data has been undertaken using growth factors specific to the London Borough of Haringey, obtained from TEMPro¹². The projected flow rates are provided in Table 3. It is assumed that the percentage HDV and speed will remain unchanged in future years.

Modelled speeds have also been provided in Table 3. These are based on the LAEI data. However, where a link approaches a junction a speed of 20 kph has been modelled (or the speed provided in Table 3, whichever is lower) to represent queuing traffic at a junction.

¹¹ LAEI (2019), Greater London Authority

¹² 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	AADT 2019	AADT 2027	HDV (%)	Speed (kph)
A109 Lordship Lane	24,664	25,897	9.3%	17
A1080 Westbury Avenue	7,810	8,201	9.5%	34
B155 Downhills Way Northbound	8,346	8,763	2.9%	21
B155 Downhills Way Southbound	10,416	10,937	4.7%	31
A1080 The Roundway Northbound	12,330	12,947	7.7%	32
A1080 The Roundway Southbound	15,218	15,979	7.4%	18

4.1.5 Street Canyons

A street canyon may be defined as a relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road. Street canyons may result in elevated pollutant concentrations from road traffic emissions due to a reduced likelihood of the pollutants becoming dispersed in the atmosphere. Street canyons have not been modelled as part of this assessment.

4.2 Background Concentrations

Background NO_x, NO₂ and PM₁₀ concentrations have been obtained from Defra¹³. These 1 km x 1 km grid resolution maps are derived from a base year of 2018 (for NO_x, NO₂, PM₁₀ and PM_{2.5} only), which are then projected to the relevant baseline year (2019 and 2027). Background concentrations of NO_x, 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

Pollutant	X	Y	2019	2027
NO₂	532500	190500	23.4	17.7
NO_x			34.7	24.9
PM₁₀			19.3	17.8
PM_{2.5}			12.9	11.9

¹³ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018>



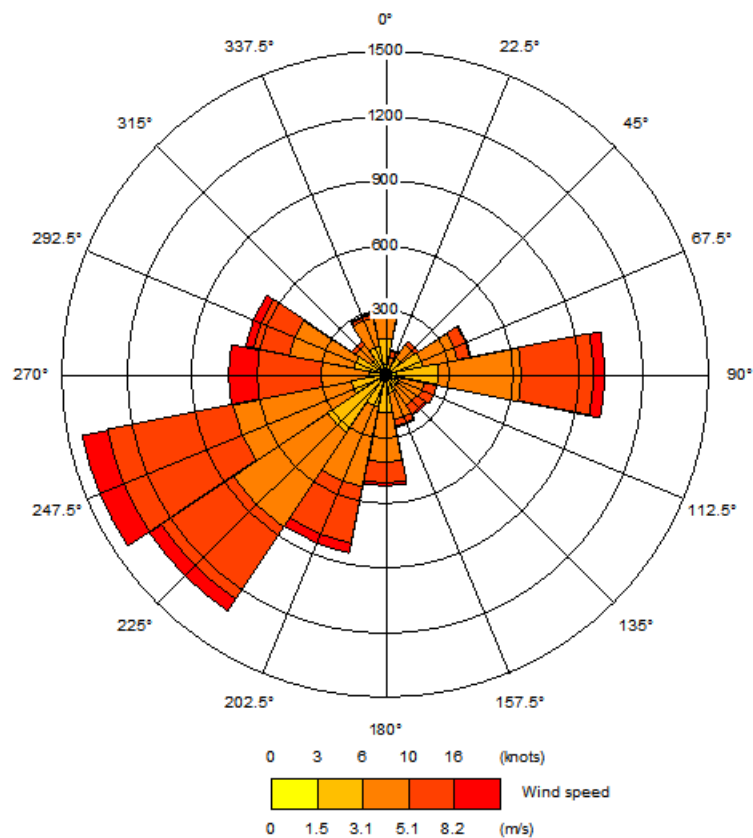
4.3 Surface Roughness

A surface roughness of 1.5 metre 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.

4.4 Meteorological Data

Hourly sequential meteorological data from the London City Airport meteorological station has been used. Wind speed and direction data from the London City Airport meteorological station has been plotted as a wind rose in Figure 1.

Figure 1 – Wind Speed and Direction Data, London City Airport (2019)



4.5 Model Output

4.5.1 NO_x/NO₂ Relationship

The most NO_x to NO₂ calculator¹⁴ 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 against local monitoring data to verify the model output. If the model performance is considered unacceptable then the NO_x concentrations are adjusted before conversion to NO₂.

4.5.2 Predicted Short Term Concentrations

As discussed in the introduction, it has not been possible to model the short-term impacts of NO₂ and PM₁₀. Research¹⁵ 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. A concentration of 60 µg/m³ has therefore been used to screen the likelihood of exceedance of the hourly mean NO₂ objective.

For PM₁₀, a relationship between the annual mean and the number of 24-hour mean exceedences has been devised and is as follows:

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

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

4.5.3 Model Verification

Monitored NO₂ concentrations from the site listed in Table 5 has been used for the purposes of model verification. This is the closest kerbside or roadside monitoring site to the proposed development.

Table 5 – Modelled Verification Locations

Monitoring ID	Location	X	Y	Height (m)
HR24	Westbury Medical Centre	532155	190517	2.0

¹⁴ https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v8.1.xlsm

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



4.5.4 Receptor Locations

To assess the potential impact of the traffic emissions from the local road network, several receptors have been identified representing the different facades of the proposed development. The location of these receptors, together with their height above ground level is provided in Table 6 and represented in Figure 2.

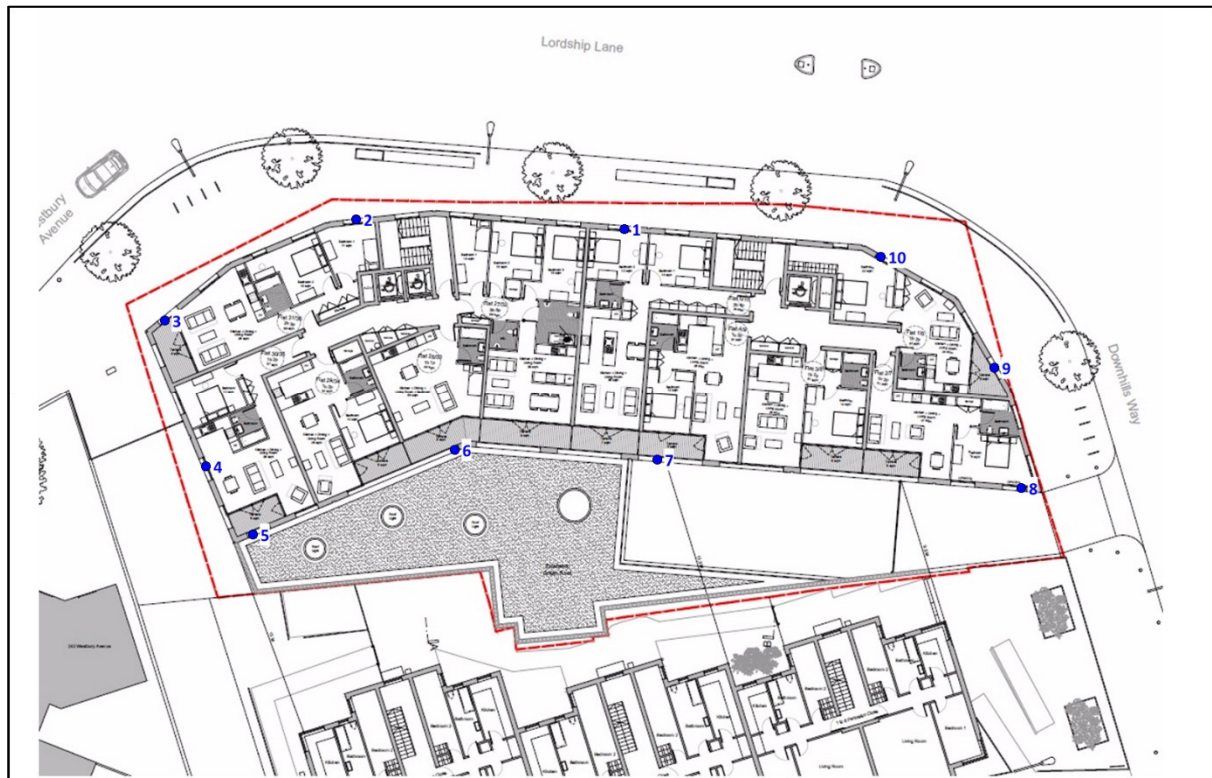
Predicted concentrations on the fifth floor and above have not been modelled as predicted concentrations will be lower than presented on the lower floors. The ground has not been modelled as it does not represent relevant exposure.

Table 6 – Modelled Receptor Locations

AQA ID	X	Y	Height (m)	Description
1	532232	190498	4.5, 7.5, 10.5 & 13.5	Proposed Receptors: First to Fourth Floor
2	532226	190509		
3	532220	190512		
4	532205	190513		
5	532192	190514		
6	532176	190508		
7	532177	190502		
8	532180	190495		
9	532198	190499		
10	532219	190497		



Figure 2 – Modelled Receptor Locations



4.6 Significance Criteria

4.6.1 Operational Phase

The significance of emissions will be determined by comparing the predicted results to the Air Pollution Exposure Criteria (APEC) detailed in the *Air Quality and Planning Guidance* written by the London Air Pollution Planning and the Local Environment (APPLE) working group¹⁶. The Air Pollution Exposure Criteria is considered appropriate to describe the significance of the impacts predicted, together with an indication as to the level of mitigation required in order for the development to be approved. The APEC table is provided below.

Table 7 – Air Pollution Exposure Criteria (APEC)

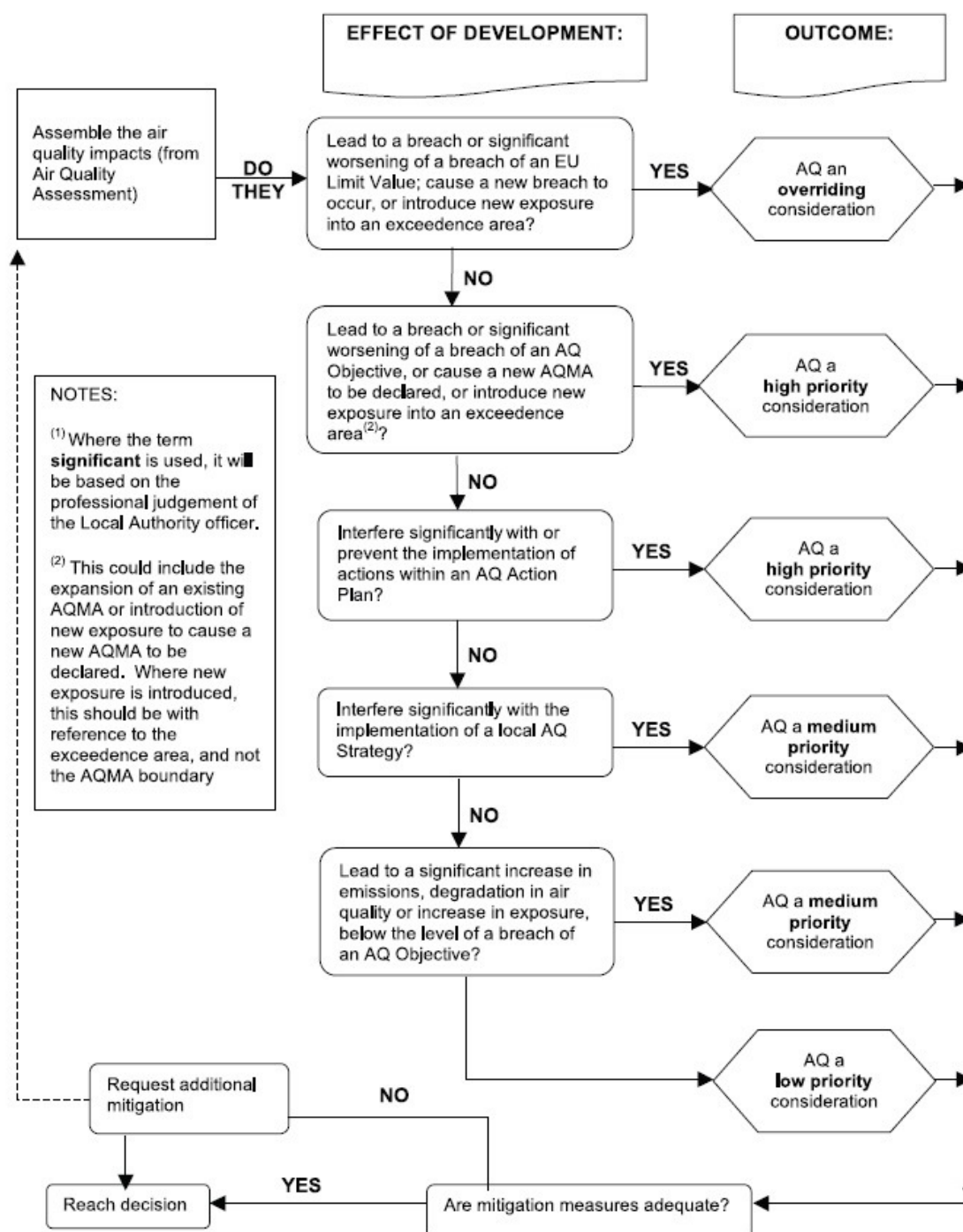
APEC Category	NO ₂	PM ₁₀	Recommendations
A	>5% below national annual mean objective	>5% below national annual mean objective >1-day less than national 24-hour objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
B	Between 5% below or above national annual mean objective	Between 5% above or below national annual mean objective Between 1-day above or below national 24-hour objective	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered
C	>5% above national annual mean objective	>5% above national annual mean objective >1-day more than national 24-hour objective	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated

Furthermore, the guidance released by Environmental Protection UK also provides steps for a Local Authority to follow to assess the significance of air quality impacts of a development proposal. This procedure, shown in Figure 3, has also been applied to the modelled results.

¹⁶ Air Quality and Planning Guidance, written by the London Air Pollution Planning and the Local Environment (APPLE) working group, January 2007



Figure 3 – Assessing the Significance of Air Quality Impacts of a Development Proposal



5 AIR QUALITY ASSESSMENT

5.1 Impact of Vehicle Emissions

5.1.1 Introduction

The following sections summarise the modelled concentrations associated with existing and future road traffic emissions, as defined by the modelled scenarios summarised in Section 4.2.1.

5.1.2 Model Verification

Using the guidance provided within the London Local Air Quality Management Technical Guidance (TG19), the modelled output has been verified against the monitoring data obtained from the sites listed in Table 5. The following tables provide a summary of the model verification process for NO_x/NO₂ concentrations.

Table 8 – Comparison of Modelled and Monitored NO₂ Concentrations (µg/m³), 2019

Verification Location	Modelled Concentration	Monitored Concentration	Difference [(modelled - monitored)/monitored] x100
HR24	28.2	34.1	-17.3%

As described in the Technical Guidance (TG19), 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. To improve the confidence in modelled NO₂ concentrations across the modelled domain the model output has been adjusted. This is described further in the next section.

5.1.3 Model Adjustment

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 9.



Table 9 – Monitored NO_x and NO₂ concentrations, 2019

Site ID	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
HR24	34.1	23.4	10.7	23.0	10.0	2.31

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 the average ratio is 2.31 and this factor has been used to adjust the modelled road contribution of NO_x. This is shown in Table 10.

Table 10 – Adjustment of Modelled NO_x Contributions, 2019

Site ID	Adjustment factor for modelled road contribution	Adjusted modelled road contribution NO _x	Modelled total NO ₂ (based on empirical NO _x /NO ₂ relationship)	Monitored total NO ₂	% Difference [(modelled – monitored) / monitored] x 100
HR24	2.31	23.1	34.1	34.1	0.0%

Following adjustment of the modelled NO_x concentrations by a factor of 2.31 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 10, indicates a more acceptable model performance when compared against the monitored NO₂ concentrations. As such, an adjustment factor of 2.31 has been applied to all modelled NO_x concentrations across the model domain before conversion to NO₂.



5.1.4 Nitrogen Dioxide

Predicted annual mean concentrations for NO₂ in 2019 and 2027 are provided in Table 11. 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 11 – Predicted NO₂ Concentrations, Annual Mean (µg/m³)

Receptor ID	2019				2027			
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
1	31.0	28.6	26.8	25.6	21.2	20.0	19.2	18.7
2	32.7	29.4	27.1	25.7	21.9	20.4	19.3	18.7
3	33.1	29.6	27.2	25.7	22.1	20.5	19.4	18.7
4	32.7	29.4	27.2	25.8	21.9	20.4	19.4	18.8
5	32.7	29.4	27.2	25.8	21.9	20.4	19.4	18.8
6	31.7	28.9	26.9	25.7	21.4	20.1	19.2	18.7
7	30.5	28.5	26.8	25.7	20.8	19.9	19.2	18.7
8	29.4	28.0	26.7	25.6	20.3	19.7	19.1	18.7
9	29.7	28.2	26.8	25.7	20.5	19.8	19.2	18.7
10	29.9	28.3	26.8	25.7	20.6	19.9	19.2	18.7
Objective	40.0							

The ADMS predictions for annual mean NO₂ concentrations in 2019 and 2027 indicate that the annual mean objective (40 µg/m³) would be achieved at all modelled receptors.

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 2003¹⁷ 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 concentrations in 2019 and 2027 are below 60 µg/m³ at all modelled receptors the likelihood of the short-term objective for NO₂ being exceeded is considered low.

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



5.1.5 Particulate Matter

Predicted annual mean concentrations for PM₁₀ in 2019 and 2027 are provided in Table 12.

Table 12 – Predicted PM₁₀ Concentrations, Annual Mean (µg/m³)

Receptor ID	2019				2027			
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
1	19.8	19.6	19.5	19.4	18.2	18.1	18.0	17.9
2	19.9	19.7	19.5	19.4	18.3	18.1	18.0	17.9
3	19.9	19.7	19.5	19.4	18.4	18.2	18.0	17.9
4	19.9	19.7	19.5	19.4	18.3	18.1	18.0	17.9
5	19.9	19.7	19.5	19.4	18.3	18.1	18.0	17.9
6	19.8	19.6	19.5	19.4	18.3	18.1	18.0	17.9
7	19.7	19.6	19.5	19.4	18.2	18.1	18.0	17.9
8	19.7	19.6	19.5	19.4	18.1	18.1	18.0	17.9
9	19.7	19.6	19.5	19.4	18.2	18.1	18.0	17.9
10	19.7	19.6	19.5	19.4	18.2	18.1	18.0	17.9
Objective	40.0							

The ADMS predictions for annual mean PM₁₀ concentrations in 2019 and 2027 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 exceedences allowed in the regulations.

Predicted annual mean concentrations for PM_{2.5} in 2019 and 2027 are provided in Table 13. The ADMS predictions for annual mean PM_{2.5} concentrations in 2019 and 2027 indicate that the annual mean objective (20 µg/m³) would be achieved at all the modelled receptor locations.



Table 13 – Predicted PM_{2.5} Concentrations, Annual Mean (µg/m³)

Receptor ID	2019				2027			
	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th
1	13.2	13.1	13.0	13.0	12.2	12.1	12.0	12.0
2	13.3	13.1	13.0	13.0	12.2	12.1	12.0	12.0
3	13.3	13.1	13.0	13.0	12.2	12.1	12.0	12.0
4	13.3	13.1	13.0	13.0	12.2	12.1	12.0	12.0
5	13.3	13.1	13.0	13.0	12.2	12.1	12.0	12.0
6	13.2	13.1	13.0	13.0	12.2	12.1	12.0	12.0
7	13.2	13.1	13.0	13.0	12.1	12.1	12.0	12.0
8	13.1	13.1	13.0	13.0	12.1	12.0	12.0	12.0
9	13.1	13.1	13.0	13.0	12.1	12.1	12.0	12.0
10	13.2	13.1	13.0	13.0	12.1	12.1	12.0	12.0
Objective	20.0							



6 AIR QUALITY NEUTRAL ASSESSMENT

6.1 Introduction

The air quality neutral assessment has followed the methodology outlined in the draft Air Quality Neutral guidance¹⁸. Within these documents, benchmarks have been provided in relation to building and transport emissions, together with a methodology for calculating the building and transport related emissions for a particular development.

Transport emissions from the retail element have been excluded from the air quality neutral calculations as the proposed floor area (433m²) does not meet the criteria for such an assessment (<1,000m² commercial floor space).

6.2 Transport Emissions

As outlined in the Air Quality Neutral guidance a major development can be considered air quality neutral in relation to the transport emissions if they meet the definition of “car free”¹⁹. The proposed development meets this definition as there are only five disabled parking spaces proposed. As such, the proposed development is considered air quality neutral in relation to the transport emissions.

6.3 Building Emissions

All heating and hot water will be provided using Air Source Heat Pumps (ASHP). As such, the air quality neutral assessment for building emissions has not been undertaken as no gas will be utilised on site.

¹⁸ London Plan Guidance: Air Quality Neutral. GLA, November 2021

¹⁹ Developments that are defined as “car-free” may include provision for disabled persons parking. The standards for disabled persons parking are outlined in the London Plan parking policies (T6 and T6.1 to T6.5) and supporting text.



7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Impact of Vehicle Emissions

The predicted concentrations of NO₂, PM₁₀ and PM_{2.5} in all modelled years are below the relevant objectives applicable to the type of use. Predicted concentrations at all the modelled receptors fall within APEC Category A, which states that there are “no air quality grounds for refusal, however, mitigation of any emissions should be considered”. Overall, using the flow chart presented in Figure 3, air quality is a low priority consideration at the modelled locations in each of the modelled years.

Based on the results and discussion above there is no need to consider building mitigation.

7.2 Air Quality Neutral Assessment

The air quality neutral assessment has concluded that the proposed development will meet building and transport emission benchmarks. As such, no mitigation measures are required to reduce these emissions.

7.3 Overall Conclusion

Based on the outcome of this assessment the current proposals are considered acceptable in terms of the potential air quality impacts across the development.

