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**340 Grays Inn Road,**
**London, WC1X 8BG**

# Air Quality Assessment

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# Air Quality Assessment

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# 1 INTRODUCTION

1.1 Entran Limited has been commissioned to undertake an air quality assessment in support of the planning application for a proposed redevelopment of 340 Grays Inn Road, London, WC1X 8BG. The Site location is identified in Figure 1.1.

1.2 The proposals are for the refurbishment and extension of the existing building to provide commercial use at ground and basement level and residential units at first floor level.

1.3 The London Borough of Camden (LBC) declared a Borough-wide Air Quality Management Area (AQMA) in 2002, due to exceedances of the air quality objectives for nitrogen dioxide ($NO_2$) and particulate matter (as $PM_{10}$). Consequently, the Site falls within the designated AQMA.

1.4 This report presents the findings of a detailed air quality assessment of the potential impacts of the Proposed Development on local air quality during construction and the suitability of the site for residential purposes with regards to the exposure of future occupants to elevated pollution concentrations.

1.5 For both the construction and operational phases of the development the type, source and significance of potential impacts are identified and the measures that should be employed to minimise any identified impacts and exposure to elevated pollution are described.

1.6 A glossary of common air quality terminology is provided in **Appendix A.**

**Figure 1.1: Site Layout Plan**

## 2 LEGISLATION AND POLICY

### Air Quality Strategy for England, Scotland, Wales & Northern Ireland

2.1 The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007[1], pursuant to the requirements of Part IV of the Environment Act 2021. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK. The AQS is designed to be an evolving process that is monitored and regularly reviewed.

2.2 The AQS sets standards and objectives for ten main air pollutants to protect health, vegetation and ecosystems. These are benzene ($C_6H_6$), 1,3-butadiene ($C_4H_6$), carbon monoxide (CO), lead (Pb), nitrogen dioxide ($NO_2$), particulate matter ($PM_{10}$, $PM_{2.5}$), sulphur dioxide ($SO_2$), ozone ($O_3$) and polycyclic aromatic hydrocarbons (PAHs).

2.3 The air quality standards are long-term benchmarks for ambient pollutant concentrations which represent negligible or zero risk to health, based on medical and scientific evidence reviewed by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO). These are general concentration limits, above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects.

2.4 The air quality objectives are medium-term policy based targets set by the Government which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.

2.5 For some pollutants there is both a long-term (annual mean) standard and a short-term standard. In the case of $NO_2$, the short-term standard is for a 1-hour averaging period, whereas for $PM_{10}$ it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants (e.g. temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road).

2.6 Of the pollutants included in the AQS, $NO_2$, $PM_{10}$ and $PM_{2.5}$ will be particularly relevant to this project as these are the primary pollutants associated with road traffic.

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – July 2007.

2.7 The current statutory standards and objectives for $NO_2$, $PM_{10}$ and $PM_{2.5}$ are set out in the table presented in **Appendix B.**

**Air Quality (England) Regulations**

2.8 Many of the objectives in the AQS were made statutory in England with the *Air Quality (England) Regulations 2000*[2] and the *Air Quality (England) (Amendment) Regulations 2002* (the Regulations)[3] for the purpose of Local Air Quality Management (LAQM).

2.9 The Air Quality Standards (Amendment) Regulations 2016[4] amend the Air Quality Standards Regulations 2010 to implement the changes made by Directive (EU) 2015/1480 and came into force on the 31th December 2016. These regulations prescribe the 'relevant period' (referred to in Part I2V of the Environment Act 2021) that local authorities must consider in their review of the future quality of air within their area. The regulations also set out the air quality objectives to be achieved by the end of the 'relevant period'. The Air Quality Standards Regulations were further amended by the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[5] in January 2020 with regards to $PM_{2.5}$.

2.10 The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[6] came into force on the 31st January 2023 and adopted into UK law a Target Value for $PM_{2.5}$.

**Local Air Quality Management (LAQM)**

2.11 Part IV of the Environment Act 2021 also requires local authorities to periodically Review and Assess the quality of air within their administrative area. The Reviews have to consider the present and future air quality and whether any air quality objectives prescribed in Regulations are being achieved or are likely to be achieved in the future.

2.12 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate that part an Air Quality Management Area (AQMA).

2.13 For each AQMA, the Local Authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the Authority intends to introduce to deliver improvements in

[2] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

[3] The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043

[4] The Air Quality Standards Regulations 2016 – Statutory Instrument 2016 No. 1184

[5] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 – Statutory Instrument 2020 No 1313

[6] The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 – Statutory Instrument 2023 No 96

local air quality in pursuit of the air quality objectives. Local Authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

2.14 The Department of Environment, Food and Rural Affairs (DEFRA) has published technical guidance for use by local authorities in their Review and Assessment work[7]. This guidance, referred to in this chapter as LAQM.TG(22), has been used where appropriate in the assessment.

**National Planning Policy Framework**

2.15 The National Planning Policy Framework (NPPF)[8] sets out the Government's planning policies for England and how these are expected to be applied. At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the NPPF with the objective of contributing to the achievement of sustainable development.

2.16 The NPPF states that the planning system has three overarching objectives in achieving sustainable development including a requirement to *'to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.'*

2.17 Under Section 15: Conserving and Enhancing the Natural Environment, the NPPF (paragraph 174) requires that *'planning policies and decisions should contribute to and enhance the natural and local environment by …preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible help to improve local environmental conditions such as air and water quality'*

2.18 In dealing specifically with air quality the NPPF (paragraph 186) states that *'planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement.*

[7] Department for Environment, Food and Rural Affairs (DEFRA), (2022): Part IV The Environment Act 2021 Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(22).

[8] Ministry of Housing, Communities and Local Government: *National Planning Policy Framework* (July 2021).

*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'.*

2.19 Paragraph 188 states that *'the focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively.*'

**Planning Practice Guidance**

2.20 Planning Practice Guidance (PPG)[9] was updated in November 2019 and supports the NPPF. Paragraph 001, Reference 32-001-20191101 of the PPG, provides a summary as to why air quality is a consideration for planning:

'*… Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit… The local air quality management (LAQM) regime requires every district and unitary authority to regularly review and assess air quality in their area. These reviews identify whether national objectives have been, or will be, achieved at relevant locations, by an applicable date… If national objectives are not met, or at risk of not being met, the local authority concerned must declare an air quality management area and prepare an air quality action plan… Air quality can also affect biodiversity and may therefore impact on our international obligations under the Habitats Directive… Odour and dust can also be a planning concern, for example, because of the effect on local amenity*.'

2.21 Paragraph 002, Reference 32-002-20191101 of the PPG, concerns the role of Local Plans with regard to air quality;

'*Drawing on the review of air quality carried out for the local air quality management regime, plans may need to consider:*

- *what are the observed trends shown by recent air quality monitoring data and what would happen to these trends in light of proposed development and / or allocations;*

[9] Ministry of Housing, Coummunities & Local Government. (2019). Planning Practice Guidance: Air Quality.

- *the impact of point sources of air pollution (pollution that originates from one place);*
- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments, including their implications for vehicle emissions;*
- *ways in which new development could be made appropriate in locations where air quality is or is likely to be a concern, and not give rise to unacceptable risks from pollution. This could, for example, entail identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable; and*
- *opportunities to improve air quality or mitigate impacts, such as through traffic and travel management and green infrastructure provision and enhancement.*'

2.22 Paragraph 006, Reference 32-005-20191101 of the PPG, identifies when air quality could be relevant for a planning decision;

'*Considerations that may be relevant to determining a planning application include whether the development would:*

- *Lead to changes (including any potential reductions) in vehicle-related emissions in the immediate vicinity of the proposed development or further afield. This could be through the provision of electric vehicle charging infrastructure; altering the level of traffic congestion; significantly changing traffic volumes, vehicle speeds or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; could add to turnover in a large car park; or involve construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more;*
- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; biomass boilers or biomass-fuelled Combined Heat and Power plant; centralised boilers or plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area; or extraction systems (including chimneys) which require approval or permits under pollution control legislation;*
- *Expose people to harmful concentrations of air pollutants, including dust. This could be by building new homes, schools, workplaces or other development in places with poor air quality;*
- *Give rise to potentially unacceptable impacts (such as dust) during construction for nearby sensitive locations;*

- *Have a potential adverse effect on biodiversity, especially where it would affect sites designated for their biodiversity value.*

2.23 Paragraph 007, Reference 32-007-20191101 of the PPG, provides guidance on how detailed an assessment needs to be;

'*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.*'

2.24 Paragraph 008, Reference 32-007-20191101 of the PPG, provides guidance on how an impact on air quality can be mitigated;

'*Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact… Examples of mitigation include:*

- *maintaining adequate separation distances between sources of air pollution and receptors;*
- *using green infrastructure, in particular trees, where this can create a barrier or maintain separation between sources of pollution and receptors;*
- *appropriate means of filtration and ventilation;*
- *including infrastructure to promote modes of transport with a low impact on air quality (such as electric vehicle charging points);*
- *controlling dust and emissions from construction, operation and demolition; and*
- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development*.'

**Control of Dust and Particulates associated with Construction**

2.25 Section 79 of the *Environmental Protection Act (1990*) states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

- *'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance', and*
- *'any accumulation or deposit which is prejudicial to health or a nuisance'.*

2.26 Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

2.27 In the context of the Proposed Development, the main potential for nuisance of this nature will arise during the construction phase – potential sources being the clearance, earthworks, construction and landscaping processes.

2.28 There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Whether or not dust deposition constitutes a nuisance is highly dependent upon the existing conditions and the change which has occurred. However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates.

**The London Environmental Strategy (May 2018)**

2.29 The London Environment Strategy was published in 2018. It outlines the current issues facing London with regards to air pollution and sets out actions required. It also recognises the need to go beyond legal limits. It sets out the timescale and the changes needed to achieve tighter targets.

**The London Plan: The Spatial Development Strategy for Greater London (March 2021)**

2.30 Policy SI1 Improving air quality of the London Plan states:

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.

3) masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development.

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:

1) how proposals have considered ways to maximise benefits to local air quality; and

2) 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.

**The Mayor of London's Supplementary Planning Guidance on the Control of Dust and Emissions during Construction and Demolition**

2.31 The Mayor of London's Supplementary Planning Guidance builds on the voluntary guidance published in 2006 by the London Councils to establish best practice in mitigating impacts on air quality during construction and demolition work. The SPG incorporates more detailed guidance and best practice, and seeks to address emissions from Non-Road Mobile

Machinery (NRMM) through the use of a Low Emissions Zone, which was introduced in September 2015.[10].

2.32 The SPG provides a methodology for assessing the potential impact of construction and demolition activities on air quality following the same procedure as set out in the IAQM guidance. It then identifies the relevant controls and mitigation measures that should be put in place to minimise any adverse impacts, which need to be set out, in draft, in an air quality assessment report submitted with the planning application, and then formalised post submission as an Air Quality and Dust Management Plan. Details of site air quality monitoring protocols are provided with varying requirements depending on the size of the site and the potential risk of adverse impacts.

**Camden Local Plan**

2.33 Camden's Local Plan[11] was adopted on 3rd July 2017 and is the basis for planning decisions and future development in the borough. The following policy relevant to air quality and the Proposed Development is contained within this document:

2.34 Policy CC4 Air Quality, which states

*'The* Council *will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.*

*The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.*

*Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.*

[10] The control of dust and emissions from construction and demolition Best Practice Guidance, Greater London Authority and London Council's, November 2006.

[11] London Borough of Camden. (2017). Camden Local Plan.

*Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.'*

**EPUK & IAQM Land Use Planning and Development Control**

2.35 Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) published the Land Use Planning and Development Control Air Quality guidance in January 2017[12] to provide guidance on the assessment of air quality in relation to planning proposals and ensure that air quality is adequately considered within the planning control process.

2.36 The main focus of the guidance is to ensure all developments apply good practice principles to ensure emissions and exposure are kept to a minimum. It also sets out criteria for identifying when a more detailed assessment of operational impacts is required, guidance on undertaking detailed assessments and criteria for assigning the significance of any identified impacts.

2.37 This guidance has been used within this assessment.

**Assessment of Dust from Demolition and Construction**

2.38 The IAQM published guidance in 2014 on the assessment of emissions from demolition and construction activities[13]. The guidance sets out an approach to identifying the risk of impacts occurring at nearby sensitive receptors from dust generated during the construction process and sets out recommended mitigation measures based on the identified risk.

2.39 This guidance has been used within this assessment.

**Air Quality Neutral Planning Support Guidance**

2.40 The Air Quality Neutral Planning Support Guidance[14] provides a methodology for assessing the air quality neutrality of proposed developments in London. This guidance has been used within this assessment.

**London Plan Guidance: Air Quality Neutral**

[12] EPUK & IAQM. Land-use Planning and Development Control: Planning for Air Quality, January 2017

[13] Guidance on the assessment of dust from demolition and construction (version 1.1), IAQM, February 2014.

[14] Air Quality Consultants & Environ (2014). Air Quality Neutral Planning Support Update

2.41 The Mayor of London has issued guidance[15] on the methodology for assessment of the air quality neutrality of proposed developments in London. This guidance has been used within this assessment.

[15] Mayor of London (2023). London Plan Guidance. Air Quality Neutral.

# 3 METHODOLOGY

## Scope of Assessment

3.1 The scope of the assessment has been determined in the following way:

- Review of air quality data for the area surrounding the Site and background pollutant maps;
- Review of the proposals; and
- An assessment of the impact of the Proposed Development in accordance with the Mayor of London's 'air quality neutral' policy.

3.2 Guidance provided by the EPUK & IAQM provides threshold criteria for establishing when significant impacts on local air quality may occur during the operation of a development and when a detailed assessment of potential impacts is required. At locations inside an AQMA, a change in light duty vehicles (LDV) of more than 100 per day and / or a change in heavy duty vehicles (HDV) of more than 25 per day is considered to result in potentially significant impacts on air quality.

3.3 Due to the size of the Proposed Development, it is unlikely that the above thresholds will be exceeded. An assessment of the impact of road vehicles generated by the operation of the Proposed Development has therefore not been included in the assessment. The assessment of the operational phase therefore comprises consideration of exposure of future occupants to pollutant concentrations and the suitability of the Site for its proposed end use.

3.4 During construction of the development there is the potential for impacts to occur as a result of dust and $PM_{10}$ emissions. Guidance provided by the IAQM recommends that an assessment is undertaken where there are human receptors within 350m of the Site boundary or within 50m of the routes used by construction vehicles up to 500m from the site entrance; and where there are dust sensitive ecological receptors within 50m of the Site boundary or within 50m of the routes used by construction vehicles up to 500m from the site entrance. Human receptors are located within 350m of the Site, but there are no dust sensitive ecological habitats in the vicinity of the Site. An assessment of the impacts of the construction of the Proposed Development on human receptors has therefore been included in the assessment. An assessment of the impacts on ecological receptors has not been considered further.

3.5 Since the proposed development will contain less than 10 residential dwellings and the commercial floor space is less than 1,000m$^2$, an Air Quality Neutral Assessment is not required and has been scoped out of this assessment.

3.6 Details of the assessment methodology and the specific issues considered are provided below.

**Construction Phase Methodology**

3.7 To assess the potential impacts associated with dust and $PM_{10}$ releases during the demolition and construction phase and to determine any necessary mitigation measures, an assessment based on the latest guidance from the IAQM has been undertaken.

3.8 This approach divides construction activities into the following four categories:

- demolition;
- earthworks;
- construction; and
- trackout (the transport of dust and dirt from the construction site onto the public road network).

3.9 The assessment methodology then considers three separate dust effects:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in exposure to $PM_{10}$.

3.10 The assessment of the risk of dust effects is determined by:

- the scale and nature of the works, which determine the risk of dust arising; and
- the proximity of sensitive receptors.

3.11 Risks are described in terms of there being a low, medium or high risk of dust effects for each of the four separate potential activities. This assessment is based on both IAQM criteria and professional judgement.

3.12 Mitigation measures are identified where necessary and significance of dust effects determined following such mitigation. The significance of the dust effects is based on

professional judgement, taking into account the sensitivity of the surrounding area and the existing air quality.

Dust Emission Magnitude

3.13 The magnitude of the dust impacts for each source is classified as Small, Medium or Large depending on the scale of the proposed works. Table 3.1 summarises the IAQM criteria that may be used to determine the magnitude of the dust emission. These criteria are used in combination with site specific information and professional judgement.

**Table 3.1: Dust Emission Magnitude Criteria**

| Source | Large | Medium | Small |
|---|---|---|---|
| **Demolition** | • Total building volume >50,000m$^3$<br>• Potentially dusty material (e.g. concrete)<br>• Onsite crushing and screening<br>• Demolition activities >20m above ground level. | • Total building volume 20,000 - 50,000m$^3$<br>• Potentially dusty material<br>• Demolition activities 10 - 20m above ground level. | • Total building volume <20,000m$^3$<br>• Construction material with low potential for dust release<br>• Demolition activities <10m above ground level<br>• Demolition during wetter months |
| **Earthworks** | • Total site area >10,000m$^2$<br>• Potentially dusty soil type (e.g. clay)<br>• >10 heavy earth moving vehicles active at any one time<br>• Formation of bunds >8m in height<br>• Total material moved >100,000 tonnes | • Total site area 2,500 - 10,000m$^2$<br>• Moderately dusty soil type (e.g. silt)<br>• 5 - 10 heavy earth moving vehicles active at any one time<br>• Formation of bunds 4 - 8m in height<br>• Total material moved 20,000 - 100,000 tonnes | • Total site area <2,500m$^2$<br>• Soil type with large grain size (e.g. sand)<br>• <5 heavy earth moving vehicles active at any one time<br>• Formation of bunds <4m in height<br>• Total material moved <20,000 tonnes<br>• Earthworks during wetter months |
| **Construction** | • Total building volume >100,000m$^3$<br>• On site concrete batching<br>• Sandblasting | • Total building volume 25,000 - 100,000m$^3$<br>• Potentially dusty construction material (e.g. concrete)<br>• On site concrete batching | • Total building volume <25,000m$^3$<br>• Material with low potential for dust release (e.g. metal cladding or timber) |
| **Trackout** | • >50 HGV movements in any one day (a)<br>• Potentially dusty surface material (e.g. high clay content)<br>• Unpaved road length >100m | • 10 - 50 HGV movements in any one day (a)<br>• Moderately dusty surface material (e.g. silt)<br>• Unpaved road length 50 - 100m | • <10 HGV movements in any one day (a)<br>• Surface material with low potential for dust release<br>• Unpaved road length <50m |
| (a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes. | | | |

Receptor Sensitivity

3.14 Factors defining the sensitivity of a receptor are presented in Table 3.2.

**Table 3.2: Factors Defining the Sensitivity of a Receptor**

| Sensitivity | Human (health) | Human (dust soiling) | Ecological |
|---|---|---|---|
| **High** | • Locations where members of the public are exposed over a time period relevant to the air quality objectives for $PM_{10}$ (a)<br>• Examples include residential dwellings, hospitals, schools and residential care homes. | • Regular exposure<br>• High level of amenity expected.<br>• Appearance, aesthetics or value of the property would be affected by dust soiling.<br>• Examples include residential dwellings, museums, medium and long-term car parks and car showrooms. | • Nationally or Internationally designated site with dust sensitive features (b)<br>• Locations with vascular species (c) |
| **Medium** | • Locations where workers are exposed over a time period relevant to the air quality objectives for $PM_{10}$ (a)<br>• Examples include office and shop workers (d) | • Short-term exposure<br>• Moderate level of amenity expected<br>• Possible diminished appearance or aesthetics of property due to dust soiling<br>• Examples include parks and places of work | • Nationally designated site with dust sensitive features (b)<br>• Nationally designated site with a particularly important plant species where dust sensitivity is unknown |
| **Low** | • Transient human exposure<br>• Examples include public footpaths, playing fields, parks and shopping streets | • Transient exposure<br>• Enjoyment of amenity not expected.<br>• Appearance and aesthetics of property unaffected<br>• Examples include playing fields, farmland (e), footpaths, short-term car parks and roads | • Locally designated site with dust sensitive features (b) |

(a) In the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

(b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).

(c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

(d) Does not include workers exposure to $PM_{10}$ as protection is covered by Health and Safety at Work legislation.

(e) Except commercially sensitive horticulture.

3.15 The sensitivity of a receptor will also depend on a number of additional factors including any history of dust generating activities in the area, likely cumulative dust impacts from nearby construction sites, any pre-existing screening such as trees or buildings and the likely duration of the impacts. In addition, the influence of the prevailing wind direction and local topography may be of relevance when determining the sensitivity of a receptor.

Area Sensitivity

3.16 The sensitivity of the *area* to dust soiling and health impacts is dependent on the number of receptors within each sensitivity class and their distance from the source. In addition, human health impacts are dependent on the existing $PM_{10}$ concentrations in the area. Tables 3.3 and 3.4 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively.

**Table 3.3: Sensitivity of the Area to Dust Soiling Effects on People and Property**

| Receptor Sensitivity | Number of Receptors | Distance from the source (a) | | | |
|---|---|---|---|---|---|
| | | <20m | <50m | <100m | <350m |
| **High** | **>100** | High | High | Medium | Low |
| | **10-100** | High | Medium | Low | Low |
| | **1-10** | Medium | Low | Low | Low |
| **Medium** | **>1** | Medium | Low | Low | Low |
| **Low** | **>1** | Low | Low | Low | Low |

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

**Table 3.4: Sensitivity of the Area to Human Health Impacts**

| Receptor Sensitivity | Annual Mean $PM_{10}$ ($\mu g/m^3$) | Number of Receptors | Distance from the source (a) | | | | |
|---|---|---|---|---|---|---|---|
| | | | <20m | <50m | <100m | <200m | <350m |
| High | > 32 | > 100 | High | High | High | Medium | Low |
| | | 10 - 100 | High | High | Medium | Low | Low |
| | | 1 - 10 | High | Medium | Low | Low | Low |
| | 28 - 32 | > 100 | High | High | Medium | Low | Low |
| | | 10 - 100 | High | Medium | Low | Low | Low |
| | | 1 - 10 | High | Medium | Low | Low | Low |
| | 24 - 28 | > 100 | High | Medium | Low | Low | Low |
| | | 10 - 100 | High | Medium | Low | Low | Low |
| | | 1 - 10 | Medium | Low | Low | Low | Low |
| | < 24 | > 100 | Medium | Low | Low | Low | Low |
| | | 10 - 100 | Low | Low | Low | Low | Low |
| | | 1 - 10 | Low | Low | Low | Low | Low |
| Medium | >32 | > 10 | High | Medium | Low | Low | Low |
| | | 1 - 10 | Medium | Low | Low | Low | Low |
| | 28-32 | > 10 | Medium | Low | Low | Low | Low |
| | | 1 - 10 | Low | Low | Low | Low | Low |
| | <28 | - | Low | Low | Low | Low | Low |
| Low | - | >1 | Low | Low | Low | Low | Low |

(a) For trackout, the distance is measured from the side of roads used by construction traffic. Beyond 50m, the impact is negligible.

3.17 For each dust emission source (demolition, construction, earthworks and trackout), the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts.

Risk of Dust Impacts

3.18 The risk of dust impacts prior to mitigation for each emission source is presented in Tables 3.5, 3.6 and 3.7.

**Table 3.5: Risk of Dust Impacts – Demolition**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| **High** | High Risk | Medium Risk | Medium Risk |
| **Medium** | High Risk | Medium Risk | Low Risk |
| **Low** | Medium Risk | Low Risk | Negligible |

**Table 3.6: Risk of Dust Impacts – Earthworks and Construction**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| **High** | High Risk | Medium Risk | Medium Risk |
| **Medium** | Medium Risk | Medium Risk | Low Risk |
| **Low** | Medium Risk | Low Risk | Negligible |

**Table 3.7: Risk of Dust Impacts - Trackout**

| Sensitivity of Area | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| **High** | High Risk | Medium Risk | Low Risk |
| **Medium** | Medium Risk | Low Risk | Negligible |
| **Low** | Low Risk | Low Risk | Negligible |

Mitigation and Significance

3.19 The IAQM guidance provides a range of mitigation measures which are dependent on the level of dust risk attributed to the site. Site specific mitigation measures are also included where appropriate.

3.20 The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity following the application of appropriate mitigation measures. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effects will normally be negligible.

**Construction Traffic**

3.21 Construction traffic will contribute to existing traffic levels on the surrounding road network. The greatest potential for impacts on air quality from traffic associated with this phase of the Proposed Development will be in the areas immediately adjacent to the principal means of access for construction traffic.

3.22 Based on the size of the Proposed Development, construction related traffic flows are not predicted to be significant in terms of total emissions or construction duration.

**Operational Phase Methodology**

3.23 As discussed in the scoping section, the impact of the traffic associated with the operation of the Proposed Development is considered to be negligible and therefore the assessment of operational phase considers only the likely exposure of future residents to pollutant levels and the suitability of the Site for its proposed end use.

3.24 The prediction of local air quality has been undertaken using the ADMS Roads dispersion model (Version 5.0.1.3). This is a commercially available dispersion model and has been widely validated for this type of assessment and used extensively in the Air Quality Review and Assessment process.

3.25 The model uses detailed information regarding traffic flows on the local road network and local meteorological conditions to predict pollution concentrations at specific locations selected by the user. Meteorological data from London City Airport Meteorological Station for 2020 has been used for the assessment.

3.26 The model has been used to predict road specific concentrations of oxides of nitrogen ($NO_x$) and Particulate Matter ($PM_{10}$ and $PM_{2.5}$) at selected receptors. The predicted

concentrations of $NO_x$ have been converted to $NO_2$ using the $NO_x$ to $NO_2$ calculator available on the Defra air quality website[16].

3.27 Traffic data for road links adjacent to the Site has been sourced from Department for Transport traffic counts[17]. A summary of the traffic data used in the assessment can be found in **Appendix C**. The data includes details of annual average daily traffic flows (AADT), vehicle speeds and percentage HGV for the assessment years considered. Low traffic speeds have been assigned to appropriate road links to account for congestion and queuing vehicles.

3.28 The emission factors released by Defra in November 2021, provided in the emissions factor toolkit EFT2021 v11.0 have been used to predict traffic related emissions in 2022 (for verification purposes) and 2024.

3.29 To predict local air quality, traffic emissions predicted by the model must be added to local background concentrations. Background concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ have been taken from the 2018 Defra background maps (issued August 2020). The maps provide an estimate of background concentrations between 2018 and 2030. The data used for the modelling assessment are set out in Table 4.5.

3.30 Background concentrations for 2022 have been used to predict concentrations. This is considered to represent a worst-case prediction of future concentrations.

3.31 To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process aims to minimise modelling uncertainty and systematic error by correcting the modelled results by an adjustment factor to gain greater confidence in the final results. This process was undertaken using the methodology outlined in Chapter 7, Section 4 of LAQM.TG(22).

3.32 Local roadside monitoring data was not available for concentrations of $PM_{10}$ and $PM_{2.5}$, the modelled pollutant road-contributions for $PM_{10}$ and $PM_{2.5}$ were therefore adjusted using the verification factor obtained for $NO_x$ as recommended in the guidance provided in LAQM.TG(22).

3.33 A verification factor of 1.82 was determined which indicates that the model is under-predicting in this area. This factor was applied to the modelled road-$NO_x$ concentrations prior to

[16] http://uk-air.defra.gov.uk

[17] https://roadtraffic.dft.gov.uk/manualcountpoints/

conversion to annual mean $NO_2$ concentrations using the $NO_x$ to $NO_2$ calculator. Further details of the determination of the verification factor are provided in **Appendix D**.

3.34 A quantitative assessment of air quality at the Proposed Development has been completed against the Air Quality Strategy objectives set out in **Appendix B** for $NO_2$, $PM_{10}$ and $PM_{2.5}$.

Sensitive Receptors

3.35 LAQM.TG(22) describes in detail typical locations where consideration should be given to pollutants defined in the Regulations. Generally, the guidance suggests that all locations '*where members of the public are regularly present*' should be considered. At such locations, members of the public will be exposed to pollution over the time that they are present, and the most suitable averaging period of the pollutant needs to be used for assessment purposes.

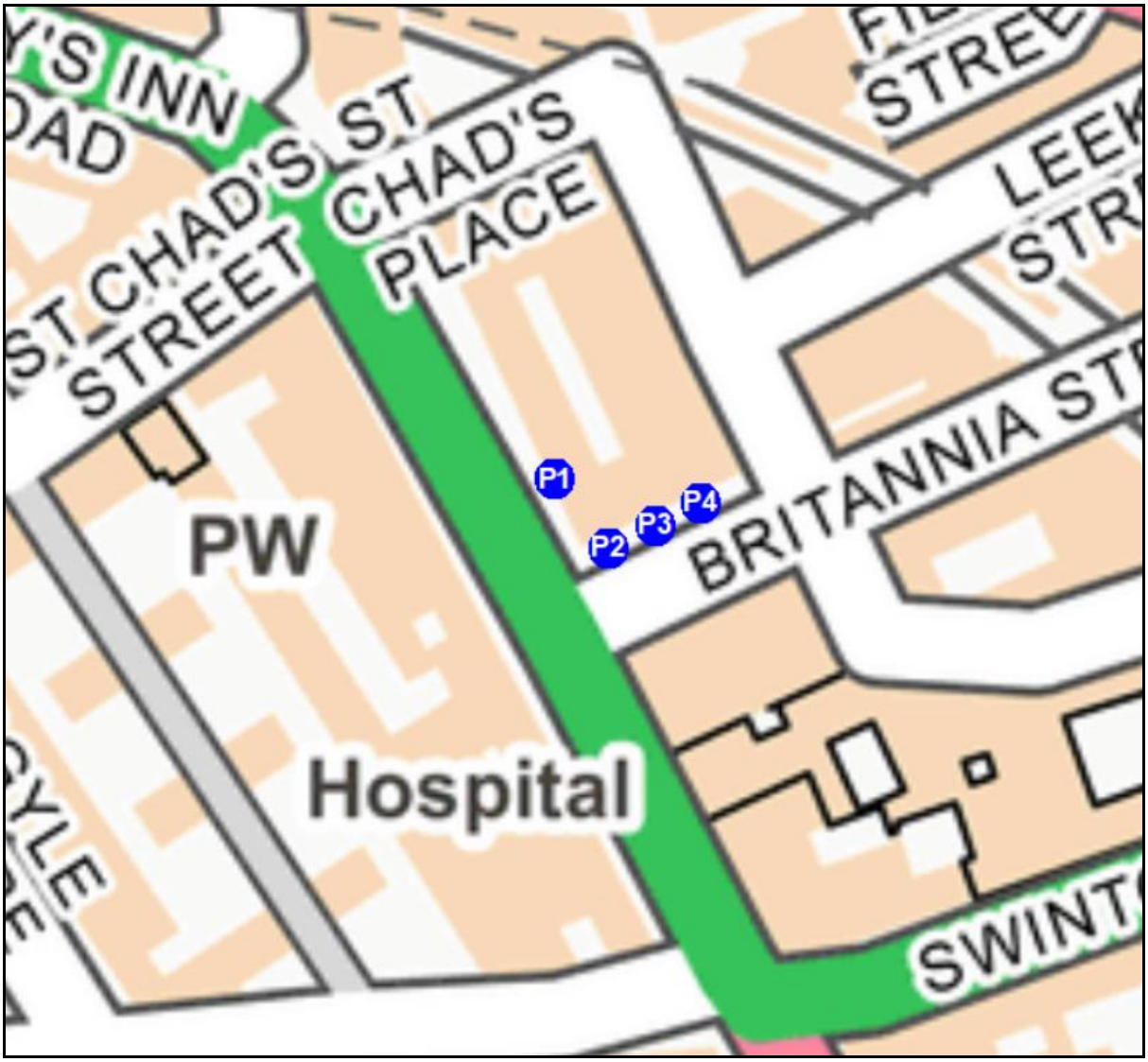
3.36 For instance, on a footpath, where exposure will be transient (for the duration of passage along that path) comparison with short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. For private dwellings, however; where exposure may be for longer periods, comparison with long-term (such as 24-hour mean or annual mean) standards may be most appropriate. In general terms, concentrations associated with long-term standards are lower than short-term standards owing to the chronic health effects associated with exposure to low level pollution for longer periods of time.

3.37 The modelling assessment predicted concentrations at four locations at the facades of the Proposed Development and are presented in Table 3.8 below and illustrated in Figure 3.1.

**Table 3.8 Location of Sensitive Receptors**

| ID | Receptor | Type | Easting | Northing |
|---|---|---|---|---|
| P1 | Façade of the Proposed Development (Grays Inn Road) | Proposed | 530499.5 | 182872.8 |
| P2 | Façade of the Proposed Development (Grays Inn Road/Britannia Street) | Proposed | 530510.7 | 182858.2 |
| P3 | Façade of the Proposed Development (Britannia Street) | Proposed | 530520.6 | 182863.0 |
| P4 | Façade of the Proposed Development (Britannia Street) | Proposed | 530530.2 | 182867.9 |

**Figure 3.1: Location of Receptors Considered within ADMS Model**



## 4 BASELINE CONDITIONS

### London Borough of Camden Review and Assessment of Air Quality

4.1 LBC has carried out detailed assessments of air quality and as a result has declared the whole borough an AQMA due to exceedances of the $NO_2$ and $PM_{10}$ objectives. The Proposed Development therefore falls within an AQMA.

### Automatic Local Monitoring Data

4.2 There are four automatic air quality monitoring sites within the borough. $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations are measured and are summarised in Tables 4.1 4.2, and 4.3.

**Table 4.1: $NO_2$ Concentrations measured at the LBC Automatic Monitors (µg/m$^3$)**

| Monitoring Site | Statistic | Year | | | | |
|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 |
| London Bloomsbury (Urban Background) | Annual Mean | 36 | 32 | 28 | 27 | 26 |
| | Number of 1-Hour means > 200 µg/m$^3$ | 0 | 0 | 0 | 0 | 0 |
| Swiss Cottage (Kerbside) | Annual Mean | 54 | 43 | 33 | 41 | 37 |
| | Number of 1-Hour means > 200 µg/m$^3$ | 2 | 1 | 0 | 1 | 0 |
| Euston Road (Roadside) | Annual Mean | 82 | 70 | 43 | 48 | 45 |
| | Number of 1-Hour means > 200 µg/m$^3$ | 18 | 7 | 0 | 1 | 1 |
| Data obtained from LBC Air Quality Annual Status Report 2020 and Air Quality England | | | | | | |

4.3 Annual mean $NO_2$ concentrations recorded have been above the 40 µg/m$^3$ objective level at some roadside and kerbside locations in the years of monitoring presented. Annual mean $NO_2$ concentrations recorded at the urban background monitor have been below the objective in the years of monitoring presented.

4.4 Exceedences of the hourly objective have been recorded at roadside and kerbside locations in the borough. The objective allows for 18 exceedences of the 200 µg/m$^3$ limit in any given year, therefore the objective has been met in the years of monitoring presented.

4.5 A large drop in annual mean $NO_2$ concentrations was observed between 2019 and 2020. This is considered likely to be due to the travel restrictions associated with the COVID-19 pandemic.

**Table 4.2: $PM_{10}$ Concentrations measured at the LBC Automatic Monitors (µg/m³)**

| Monitoring Site | Statistic | Year | | | | |
|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 |
| London Bloomsbury (Urban Background) | Annual Mean | 17 | 18 | 16 | 16 | 17 |
| | Number of 24-hour means > 50 µg/m³ | 1 | 9 | 4 | 0 | 4 |
| Swiss Cottage (Kerbside) | Annual Mean | 21 | 19 | 16 | 17 | 19 |
| | Number of 24-hour means > 50 µg/m³ | 4 | 8 | 3 | 0 | 0 |
| Euston Road (Roadside) | Annual Mean | 21 | 22 | 18 | 19 | 21 |
| | Number of 24-hour means > 50 µg/m³ | 2 | 8 | 2 | 2 | 6 |
| Coopers Lane (Urban Background/Industrial) | Annual Mean | 15 | 15 | 13 | 14 | 15 |
| | Number of 24-hour means > 50 µg/m³ | 1 | 5 | 1 | 0 | 5 |
| Data obtained from LBC Air Quality Annual Status Report 2020 and Air Quality England | | | | | | |

4.6 Annual mean $PM_{10}$ concentrations recorded have been consistently well below the 40 µg/m³ objective since 2018.

4.7 Exceedences of the 24-hour objective have been recorded at the monitoring stations during the five years of the monitoring presented, however the objective allows for 35 exceedences of the 50 µg/m³ limit in any given year. Therefore, the objective was met in all five monitoring years.

4.8 Based on the data recorded at these sites, $PM_{10}$ concentrations are expected to meet the annual mean and 24-hour objectives at the Proposed Development.

**Table 4.3: $PM_{2.5}$ Concentrations measured at the LBC Automatic Monitors (µg/m$^3$)**

| Monitoring Site | Statistic | Year | | | | |
|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 |
| London Bloomsbury (Urban Background) | Annual Mean | 10 | 11 | 9 | 11 | 8 |
| Swiss Cottage (Kerbside) | Annual Mean | 11 | 11 | 10 | 10 | 10 |
| Euston Road (Roadside) | Annual Mean | 15 | 14 | 11 | 11 | 12 |
| Data obtained from LBC Air Quality Annual Status Report 2020 and Air Quality England | | | | | | |

4.9 Annual mean $PM_{2.5}$ concentrations recorded have been consistently well below the 20 µg/m$^3$ objective since 2018.

4.10 Based on the data recorded at these sites, $PM_{2.5}$ concentrations are expected to meet the annual mean objective at the Proposed Development.

**Non-Automatic Local Monitoring Data**

4.11 $NO_2$ is measured at a large number of locations within the borough using passive diffusion tubes. Bias corrected data from the monitoring sites in the vicinity of the Site are provided in Table 4.4 below.

**Table 4.4: $NO_2$ Concentrations recorded at the nearest Diffusion Tube Monitors**

| Monitoring Site | Type | Distance to Kerb | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|
| CA4A – Euston Road | Kerbside | 0.5 | 82.71 | 84.95 | 69.16 | - | - |
| CA10 – Tavistock Gardens | Urban Background | 25 | 39.68 | 46.17 | 35.35 | 33.13 | 26.15 |
| CA20A – Brill Place | Roadside | 0.5 | - | - | - | 43.13 | 42.85 |
| CA27 – Euston Road LAQN colocation | Roadside | 0.5 | - | - | - | 63.81 | 45.46 |
| CA28 – St. George's Garden East | Urban Background | 29 | - | - | - | 27.67 | 21.93 |
| CA29 – Endsleigh Gardens | Roadside | 0.5 | - | - | - | 48.34 | 34.48 |
| Data obtained from LBC Air Quality Annual Status Report 2020 | | | | | | | |

4.12 At all but one of the diffusion tube sites in the vicinity of the Site, the AQS objective for annual mean $NO_2$ concentrations has been exceeded over the five-year period.

4.13 Large decreases in annual mean $NO_2$ concentrations were measured in 2020 when compared to the concentrations measured in 2019. It is considered that this is likely to be due to the travel restrictions associated with the COVID-19 pandemic.

4.14 Diffusion tubes cannot monitor short-term NO2 concentrations, however, as previously discussed, research has concluded that exceedances of the 1-hour mean objective are generally unlikely to occur where annual mean concentrations do not exceed 60 µg/m$^3$. Annual mean $NO_2$ concentrations were above the 60 µg/m$^3$ at two sites (CA4A and CA27), therefore it is expected that the 1-hour objective was not met at these locations.

**Defra Background Maps**

4.15 Additional information on background concentrations in the vicinity of the Proposed Development have been obtained from the Defra background pollutant maps. The pollutant concentrations from the grid square representing the assessment area (i.e. 530500, 182500) has been extracted from the maps which include the Proposed Development and road links included in the modelling assessment.

4.16 An additional $NO_2$ background concentration has been obtained for the grid square representing the monitoring site used in the verification of the modelling.

4.17 The 2018 Defra background maps, which provide estimated background concentrations between 2018 and 2030, have been used to obtain concentrations for 2022. The data is set out in Table 4.5.

**Table 4.5: Estimated Annual Mean Background Concentrations from Defra Maps (µg/m$^3$)**

| Pollutant | 530500, 182500 | 529500, 182500 |
|---|---|---|
| **$NO_2$** | 35.5 | 35.4 |
| **$PM_{10}$** | 19.3 | - |
| **$PM_{2.5}$** | 12.2 | - |

4.18 The data presented in Table 4.5 shows that estimated annual mean background concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ are below the relevant annual mean objectives (40 and 20 µg/m$^3$) respectively in the vicinity of the Site.

## 5 ASSESSMENT OF IMPACT

### Construction Phase

5.1 The Proposed Development will occupy part of the existing building on Site. No buildings require demolition at the Site. An assessment of dust effects associated with demolition has not therefore been included within this assessment.

5.2 The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the Site boundary. A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 5.1.

**Table 5.1: Sensitivity of Receptors and the Local Area to Dust and $PM_{10}$ Impacts**

| Receptor | Distance from Site Boundary (m) | Approx. Number of Receptors | Sensitivity to Health Impacts (a) | | Sensitivity to Dust Soiling Impacts | |
|---|---|---|---|---|---|---|
| | | | Receptor | Area | Receptor | Area |
| Residential Properties | <20 m | 10-100 | High | Low | High | High |
| **Overall Sensitivity of the Area** | | | **Low** | | **High** | |
| (a) Estimated background $PM_{10}$ concentration is 19.3 µg/$m^3$. | | | | | | |

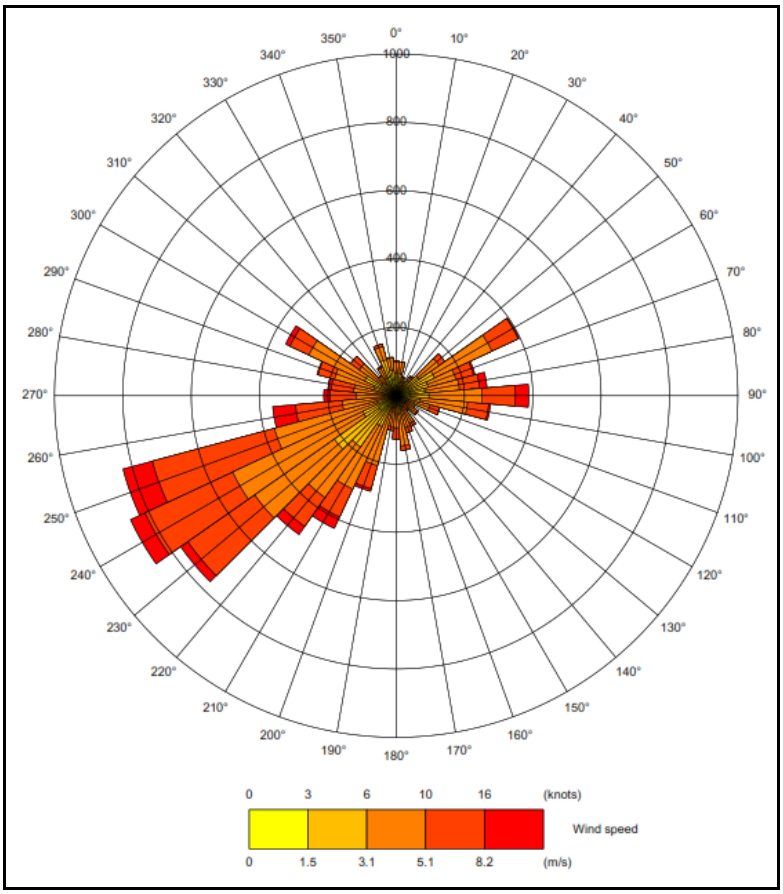
5.3 The route of the construction traffic is assumed to be Grays Inn Road. As the Site is small, the sensitivity of the area to impacts arising from track-out is considered within a distance of 50m from the Site entrance. There are several highly sensitive receptors along the roads within this distance, therefore the sensitivity of the area to impacts from trackout is considered to be high.

5.4 The precise behaviour of the dust, its residence time in the atmosphere, and the distance it may travel before being deposited will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

5.5 A wind rose from London City Airport is provided below in Figure 5.1, which shows that the prevailing wind is from the southwest, therefore receptors to the northeast are the most likely

to experience dust impacts from the Site. Residential receptors are located to the northeast of the Site.

**Figure 5.1: Wind Rose for London City Airport Meteorological Station (2020)**




Dust Emission Magnitude

5.6 Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling of the Site and landscaping. The area of the Site is less than 2,500m$^2$. During earthworks there is likely to be less than five heavy duty vehicles at work on Site at any given time. The magnitude of the dust emission for the earthworks phase is therefore considered to be *small*.

5.7 Dust emissions during construction will depend on the scale of the works, method of construction, construction materials and duration of build. The proposed construction works will comprise refurbishment works and a new extension. Based on the size of the Proposed Development, the dust emission magnitude is considered to be *small*.

5.8 Factors influencing the degree of trackout and associated magnitude of effect include vehicle size, vehicle speed, vehicle numbers, geology and duration. Construction traffic will access the Site via Grays Inn Road. The number of HGV movements (leaving the Site) is likely to be less than 10 per day, therefore dust emission magnitude due to trackout is considered to be *small.*

Dust Risk Effects

5.9 A summary of the potential risk of dust impacts, based on the high sensitivity of the area to dust soiling impacts and low sensitivity to human health impacts, is presented in Table 5.2.

5.10 The risk of dust impacts has been assessed as low, prior to mitigation.

**Table 5.2: Risk of Dust Impacts Prior to Mitigation**

| Source | Impact Magnitude | Human Health Risk | Dust Soiling Risk |
|---|---|---|---|
| Earthworks | Small | Negligible | Low |
| Construction | Small | Negligible | Low |
| Trackout | Small | Negligible | Low |

**Operational Phase**

5.11 Annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations predicted at the Site are set out in Table 5.3. The concentrations include the 2022 background pollutant concentrations indicated in Table 4.5.

**Table 5.3: Predicted Annual Mean Pollutant Concentrations at Proposed Receptors (µg/m$^3$)**

| Level | Receptor Number | Annual Mean $NO_2$ Concentration | Annual Mean $PM_{10}$ Concentration | Annual Mean $PM_{2.5}$ Concentration |
|---|---|---|---|---|
| Ground Floor (commercial) | P1 | 38.5 | 20.1 | 12.7 |
| | P2 | 38.1 | 20.0 | 12.7 |
| | P3 | 37.2 | 19.8 | 12.5 |
| | P4 | 36.8 | 19.7 | 12.5 |
| First Floor (residential) | P1 | 37.5 | 19.9 | 12.6 |
| | P2 | 37.3 | 19.8 | 12.6 |
| | P3 | 36.9 | 19.7 | 12.5 |

| Level | Receptor Number | Annual Mean $NO_2$ Concentration | Annual Mean $PM_{10}$ Concentration | Annual Mean $PM_{2.5}$ Concentration |
|---|---|---|---|---|
| | P4 | 36.6 | 19.6 | 12.4 |

5.12 The predicted annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations are below the respective 40µg/m$^3$, 40µg/m$^3$ and 20µg/m$^3$ objective levels at the proposed receptor locations. Pollutant concentrations at the façade of the Proposed Development will decrease with height as a result of increased dispersion and dilution with separation distance from road traffic sources.

5.13 Research has concluded[18] that exceedences of the 1-hour mean objective are unlikely to occur where annual mean concentrations are below 60 µg/m$^3$. The predicted concentrations at the Proposed Development are well within this level, therefore it is considered unlikely that an exceedence of the short-term objective will occur.

5.14 LAQM.TG(22) provides a relationship between predicted annual mean concentrations and the likely number of exceedances of the short-term (24-hour mean) $PM_{10}$ objective of 50µg/m$^3$ (N), where:

$$N = -18.5 + 0.00145 \times annual\ mean^3 + (206/annual\ mean).$$

5.15 The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32µg/m$^3$.

5.16 The number of predicted exceedances at all receptors is less than 4 days. Therefore, the risk of an exceedence of the short-term air quality objective for $PM_{10}$ at the Proposed Development is considered to be *negligible*.

[18] D Laxen and B Marner (July 2003), Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites.

## MITIGATION

Construction Phase

5.17 The control of dust emissions from construction site activities relies upon management provision and mitigation techniques to reduce emissions of dust and limit dispersion. Where dust emission controls have been used effectively, construction operations have been successfully undertaken without impacts to nearby properties.

5.18 Overall the Site is considered to be a low risk of dust impacts, and a negligible risk to human health from particulate matter concentrations at nearby receptors during the construction phase. Appropriate mitigation measures for the Site have been identified following the IAQM guidance and based on the risk effects presented in Table 5.2. It is recommended that the 'highly recommended' measures set out in **Appendix E** are adhered to during the construction phase.

5.19 In addition to the 'recommended' measures, the IAQM guidance also sets out a number of 'desirable' measures which should also be considered. These are also set out in **Appendix E**.

5.20 Following implementation of the 'highly recommended' measures outlined in the IAQM guidance and reproduced in **Appendix E**, the impact of emissions during construction of the Proposed Development would be negligible.

Operational Phase

5.21 The detailed dispersion modelling indicates that the concentrations of relevant pollutants ($NO_2$, $PM_{10}$ and $PM_{2.5}$) across the Site will meet the relevant air quality objectives. No mitigation during operation of the Site is therefore considered necessary.

## 6 CONCLUSIONS

6.1 An air quality impact assessment has been carried out to assess both construction and operational impacts of the Proposed Development.

6.2 An assessment of the potential impacts during the construction phase has been carried out. This has shown that during this phase of the Proposed Development releases of dust and $PM_{10}$ are likely to occur during site activities. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and $PM_{10}$ releases may be effectively mitigated and the resultant impacts are considered to be negligible.

6.3 There is no significant traffic associated with the Proposed Development, therefore the impact of traffic has been considered with respect to the suitability of the Site for its proposed use.

6.4 ADMS Roads dispersion modelling has been carried out to assess the suitability of the Site for its proposed end use with regards to local air quality. The results indicate that predicted concentrations of relevant pollutants ($NO_2$, $PM_{10}$ and $PM_{2.5}$) concentrations are below the relevant objectives within the Proposed Development.

6.5 Future occupants of the Proposed Development would not be exposed to pollutant concentrations above the relevant objective levels. The impact of the Proposed Development with regards new exposure to air quality is therefore considered to be negligible.

6.6 Based on the above information, it is considered that air quality does not pose a constraint to redevelopment of the Site as proposed.

## APPENDIX A - AIR QUALITY TERMINOLOGY

| Term | Definition |
|---|---|
| **Accuracy** | A measure of how well a set of data fits the true value. |
| **Air quality objective** | Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specific timescale (see also air quality standard). |
| **Air quality standard** | The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective). |
| **Ambient air** | Outdoor air in the troposphere, excluding workplace air. |
| **Annual mean** | The average (mean) of the concentrations measured for each pollutant for one year. Usually this is for a calendar year, but some species are reported for the period April to March, known as a pollution year. This period avoids splitting winter season between 2 years, which is useful for pollutants that have higher concentrations during the winter months. |
| **AQMA** | Air Quality Management Area. |
| **DEFRA** | Department for Environment, Food and Rural Affairs. |
| **Exceedence** | A period of time where the concentrations of a pollutant is greater than, or equal to, the appropriate air quality standard. |
| **Fugitive emissions** | Emissions arising from the passage of vehicles that do not arise from the exhaust system. |
| **LAQM** | Local Air Quality Management. |
| **NO** | Nitrogen monoxide, a.k.a. nitric oxide. |
| **$NO_2$** | Nitrogen dioxide. |
| **$NO_x$** | Nitrogen oxides. |
| **$O_3$** | Ozone. |
| **Percentile** | The percentage of results below a given value. |
| **$PM_{10}$** | Particulate matter with an aerodynamic diameter of less than 10 micrometres. |
| **ppb parts per billion** | The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppb means that for every billion ($10^9$) units of air, there is one unit of pollutant present. |
| **ppm parts per million** | The concentration of a pollutant in the air in terms of volume ratio. A concentration of 1 ppm means that for every million ($10^6$) units of air, there is one unit of pollutant present. |
| **Ratification (Monitoring)** | Involves a critical review of all information relating to a data set, in order to amend or reject the data. When the data have been ratified they represent the final data to be used (see also validation). |
| **µg/m³ micrograms per cubic metre** | A measure of concentration in terms of mass per unit volume. A concentration of 1µg/m³ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant. |
| **UKAS** | United Kingdom Accreditation Service. |
| **Uncertainty** | A measure, associated with the result of a measurement, which characterizes the range of values within which the true value is expected to lie. Uncertainty is usually expressed as the range within which the true value is expected to lie with a 95% probability, where standard statistical and other procedures have been used to evaluate this figure. Uncertainty is more clearly defined than the closely related parameter 'accuracy', and has replaced it on recent European legislation. |
| **USA** | Updating and Screening Assessment. |
| **Validation (modelling)** | Refers to the general comparison of modelled results against |

| Term | Definition |
|---|---|
| | monitoring data carried out by model developers. |
| **Validation (monitoring)** | Screening monitoring data by visual examination to check for spurious and unusual measurements (see also ratification). |
| **Verification (modelling)** | Comparison of modelled results versus any local monitoring data at relevant locations. |

## APPENDIX B - AIR QUALITY STANDARDS AND OBJECTIVES

**Table B1: Air Quality Standards and Objectives**

| Pollutant | Objective Level ($\mu g/m^3$) | Averaging Period | No. of Permitted Exceedances | Notes |
|---|---|---|---|---|
| $NO_2$ | 200 (a) | 1-Hour | 18 per annum (99.8$^{th}$ percentile) | |
| | 40 (a) | Annual | - | |
| $PM_{10}$ | 50 (a) | 24-Hour | 35 per annum (90.4$^{th}$ percentile) | |
| | 40 (a) | Annual | - | |
| $PM_{2.5}$ | 20 (b) | Annual | | |
| | 12 (b) | Annual | | Interim Target to be achieved by end Jan 2028 |
| | 10 (c) | Annual | | Target Level to be achieved by end Dec 2040 |

(a) Air Quality Standards Regulations (2016) and amendments

(b) Environmental Improvement Plan 2023

(c) The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

## APPENDIX C - SUMMARY OF TRAFFIC DATA

**Table C1: Traffic data utilised for the air quality assessment (AADT)**

| Road Link | DfT Traffic Count ID | AADT (2022) | HGV (%) (a) | Average Speed (kph) |
|---|---|---|---|---|
| Grays Inn Road (b) | 37825 | 20,679 | 7.2 | 20 |
| Euston Road | 56815 | 37,308 | 7.9 | 20 |

(a) Including buses and coaches

(b) 2024 flows assumed same as 2022 flows

## APPENDIX D – VERIFICATION AND ADJUSTMENT OF MODELLED CONCENTRATIONS

Most nitrogen dioxide ($NO_2$) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS model has followed the methodology presented in LAQM.TG(22).

The model has been run to predict annual mean road-$NO_x$ concentrations at one nearby monitoring site.

The model output of road-NOx (i.e. the component of total $NO_x$ coming from road traffic) has been compared to the 'measured' road-$NO_x$ (Table D1). The 'measured' road $NO_x$ has been calculated from the measured $NO_2$ concentrations by using the Defra $NO_x$ to $NO_2$ calculator available on the UK-AIR website.

**Table D1: Comparison of Modelled and Monitored NOx concentrations**

| Monitoring Location | Total Monitored $NO_2$ | Background $NO_2$ | Monitored Road NOx | Modelled Road NOx | Ratio |
|---|---|---|---|---|---|
| CD9 | 45 | 35.4 | 22.3 | 12.2 | 1.82 |

The results in Table D1 indicate that the ADMS model under-predicted the road $NO_x$ concentration at the selected monitoring site. An adjustment factor was therefore determined as the ratio between the measured road-$NO_x$ contribution and the modelled road-$NO_x$ contribution (1.82). This factor has then been applied to the modelled road-$NO_x$ concentration for each location to provide an adjusted modelled road-$NO_x$ concentration.

The annual mean road-$NO_2$ concentration was determined using the Defra $NO_x$:$NO_2$ spread sheet calculation tool and added to the background $NO_2$ concentration to produce a total adjusted $NO_2$ concentration.

Particulate Matter ($PM_{10}$ and $PM_{2.5}$)

There was insufficient roadside monitoring data available against which the modelling could be verified. Consequently, the verification factor determined above for adjusting the road-$NO_x$ contribution has been applied to the predicted road-$PM_{10}$ and road-$PM_{2.5}$ contributions, consistent with guidance provided in LAQM.TG(22).

## APPENDIX E – CONSTRUCTION MITIGATION MEASURES

The following measures are detailed in the IAQM guidance as being 'highly recommended' for sites of the level of risk identified for the Site. It is therefore recommended that these measures are adhered to during the construction works.

- display the name and contact details of the person accountable for air quality and dust issues on the site boundary (i.e. the environment manager/engineer or site manager);
- display the head or regional office contact information on the site boundary;
- record all dust and air quality complaints, identify cause, take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on- or off- site and the action taken to resolve the situation in the log book;
- carry out regular site inspections to monitor compliance with the DMP, record inspection results and make inspection log available to LBC when asked;
- increase frequency of site inspection by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged periods of dry or windy conditions;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary as necessary that are at least as high as any stockpiles;
- avoid site runoff of water or mud;
- Ensure all on-road vehicles comply with the requirements of the London Low Emissions Zone and the London NRMM standards, where applicable;
- 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 practicable;
- 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 site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- use enclosed chutes and 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;

- avoid bonfires and burning of waste materials;

The guidance also details a number of measures which are considered to be 'desirable'. It is recommended that these measures should also be considered.

- develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.
- undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of the site boundary, with cleaning to be provided if necessary;
- 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;
- cover, seed or fence stockpiles to prevent wind whipping;
- ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods;
- avoid scabbling (roughening or concrete surfaces);
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.