Air Quality Assessment:
300 Gray's Inn Road, Camden

May 2023

Experts in air quality management & assessment

Document Control

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Executive Summary

The air quality impacts associated with the proposed mixed-use development at 300 Gray's Inn Road, Camden have been assessed. The proposals are to extend, reconfigure and refurbish the existing seven-storey building to increase the commercial (office) floor space and provide seven residential units.

During the construction works, a range of best practice mitigation measures will be implemented to reduce dust emissions and the overall effect will be 'not significant'; appropriate measures have been set out in this report, to be included in the Dust Management Plan for the works.

The proposed development is 'car-free' and will be provided with heat and hot water by an all-electric system. It will not therefore have a significant effect on local air quality.

The suitability of the site for its proposed residential use has been considered and the assessment has demonstrated that future residents will experience acceptable air quality, with pollutant concentrations below the relevant air quality objectives.

Overall, the construction and operational air quality effects of the proposed development are judged to be 'not significant'.

The proposed development has also been shown to meet the London Plan's requirement that new developments are at least 'air quality neutral'.

Contents

Tables

Figures

1 Introduction

1.1 This air quality assessment has been prepared in support of an application at 300 Gray's Inn Road, London, WC1X 8DX for full planning permission for:

"Refurbishment and extension of the building to provide residential flats (Class C3) and commercial, business and service use (Class E) including external alterations for new facades to all elevations, the introduction of terraces, reconfiguration of entrances and servicing arrangements, new hard and soft landscaping, provision of cycle parking and other ancillary works."

1.2 The proposed development will be 'car-free' and will not provide any car parking spaces apart from one on-street blue-badge holder space.

1.3 The proposed development is located adjacent to the junction of Gray's Inn Road and Acton Street within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Camden (LB of Camden) for exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean PM_{10} objectives. It is also within the GLA's King's Cross / Caledonian Road Area air quality Focus Area; this is a location with high levels of human exposure where the annual mean limit value for NO_2 is exceeded. The proposed development will introduce new residential exposure into an area of potentially poor air quality, thus an assessment is required to determine the air quality conditions that future residents will experience. The main air pollutants of concern are related to road traffic emissions, which are NO_2 and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.4 The location and setting of the proposed development are shown in Figure 1, along with the nearby Focus Areas.

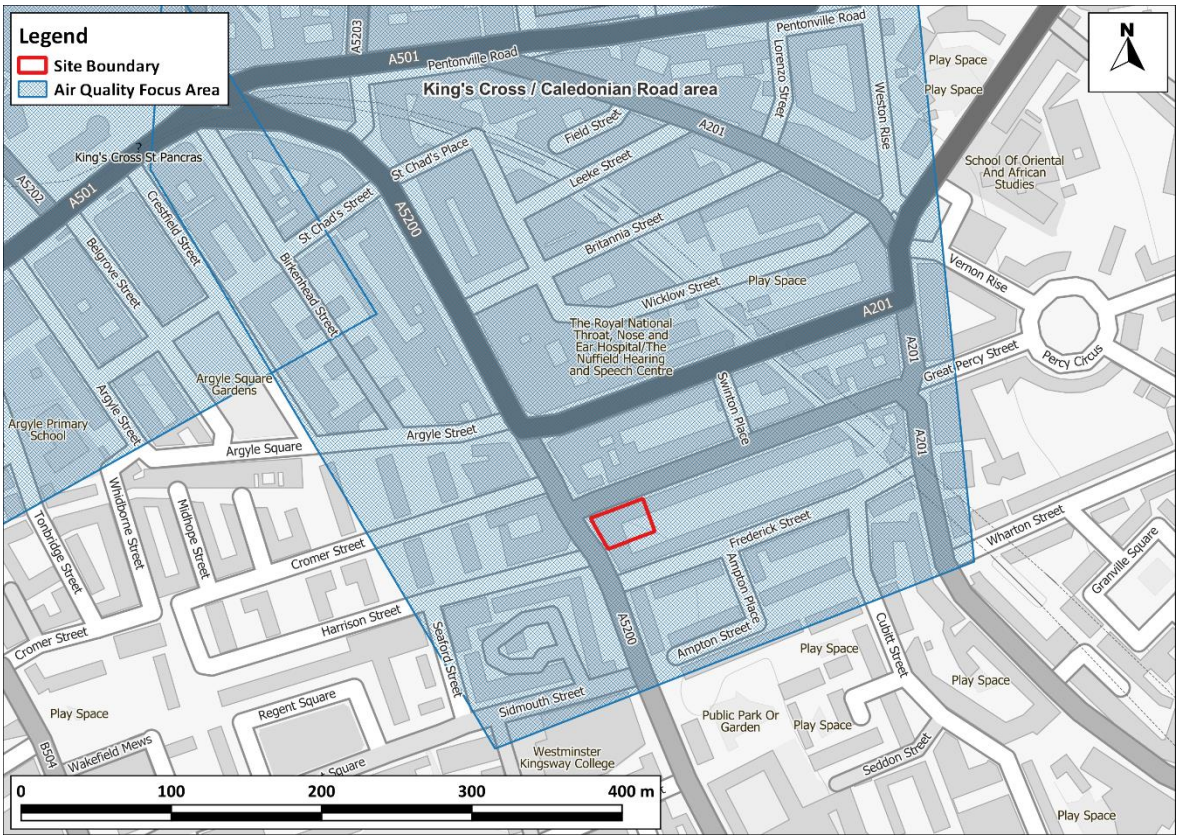

Figure 1: Proposed Development Setting in the Context of Air Quality

1.5 The new homes within the proposed development will be provided with heat and hot water by air source heat pumps (ASHPs) and solar photovoltaics (PV); there will be no centralised energy plant and thus no significant point sources of emissions within the proposed development.

1.6 The Greater London Authority's (GLA's) London Plan (GLA, 2021) requires new developments to be air quality neutral. The air quality neutrality of the proposed development has been assessed following the methodology provided in the latest GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2023).

1.7 The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition (GLA, 2014). The SPG outlines a risk assessment approach for construction dust assessment and helps determine the mitigation measures that will need to be applied. A construction dust assessment has been undertaken and the appropriate mitigation has been set out.

1.8 This report describes existing local air quality conditions in 2022, and the predicted air quality in the 2026, which is the anticipated year of opening. The assessment of construction dust impacts focuses on the anticipated duration of the works.

1.9 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology agreed with the LB of Camden.

2 Policy Context

2.1 All European legislation referred to in this report is written into UK law and remains in place.

Air Quality Strategy

2.2 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an AQMA, and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Air Quality Strategy 2023

2.3 The Air Quality Strategy: Framework for Local Authority Delivery 2023 (Defra, 2023a) sets out the strategic air quality framework for local authorities and other Air Quality Partners in England. It sets out their powers and responsibilities, and actions the government expects them to take. It does not replace other air quality guidance documents relevant to local authorities

Reducing Emissions from Road Transport: Road to Zero Strategy

2.4 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

2.5 The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. The Government has since announced that the phase-out date for the sale of new petrol and diesel cars and vans will be brought forward to 2030 and that all new cars and vans must be fully zero emission at the tailpipe from 2035. If these ambitions are realised then road traffic-related NOx emissions can be expected

to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Environment Act 2021

2.6 The UK's new legal framework for protection of the natural environment, the Environment Act (2021) passed into UK law in November 2021. The Act gives the Government the power to set long-term, legally binding environmental targets. It also establishes an Office for Environmental Protection (OEP), responsible for holding the government to account and ensuring compliance with these targets.

2.7 The Government has recently published a draft Statutory Instrument to set two new targets for future concentrations of $PM_{2.5,}$ but this has not yet been approved by parliament. These targets are described in Paragraph 3.5.

Environmental Improvement Plan 2023

2.8 Defra published its 25 Year Environment Plan in 2018 (Defra, 2018a). The Environment Act (2021) requires Defra to review this Plan at least every five years. The Environmental Improvement Plan 2023 (Defra, 2023b) is the first revision. This outlines the progress made since 2018 and adds detail to the goals defined in the 2018 Plan, including that of achieving clean air.

2.9 The Environmental Improvement Plan 2023 sets out the new air quality targets which have been set for concentrations of $PM_{2.5}$. These targets, which are described in more detail in Paragraph 3.5, include the long-term targets in the Statutory Instrument described in Paragraph 2.7, and interim targets to be achieved by 2028.

2.10 The 2023 Plan outlines the role of local authorities in helping it meet both its targets and existing commitments. It notes that an Air Quality Strategy will be published to provide guidance on how local authorities should assist. The Plan makes clear that this will focus on reducing emissions from sources within a local authority's control, including through traffic management and planning powers. This focus on emissions, as opposed to directly requiring local authorities to assess $PM_{2.5}$ concentrations against the new targets, recognises that $PM_{2.5}$ is a cross-boundary issue; most $PM_{2.5}$ within a local authority's area is not, by and large, emitted within that local authority. The 2023 Plan also outlines the respective roles of industry, agricultural sectors, and the Department for Transport in providing the coordinated action required to meet both its new, and pre-existing targets and commitments.

Planning Policy

National Policies

2.11 The National Planning Policy Framework (NPPF) (2021) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which (Paragraph 8c) is an environmental objective:

"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".

2.12 To prevent unacceptable risks from air pollution, Paragraph 174 of the NPPF states 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 quality".

2.13 Paragraph 185 states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".

2.14 More specifically on air quality, Paragraph 186 makes clear 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".

2.15 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that:

"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. 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, or where the need for emissions reductions has been identified".

2.16 Regarding plan-making, the PPG states:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

2.17 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan "*identifies measures that will be introduced in pursuit of the objectives and can have implications for planning*". In addition, the PPG makes clear that "*Odour and dust can also be a planning concern, for example, because of the effect on local amenity*".

2.18 Regarding the need for an air quality assessment, the PPG 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".

2.19 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".

2.20 The PPG 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. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented".

London-Specific Policies

2.21 The key London-specific policies are summarised below, with more detail provided, where required, in Appendix A1.

The London Plan

2.22 The London Plan (GLA, 2021) sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The key policy relating to air quality is Policy SI 1 on *Improving air quality*, Part B1 of which sets out three key requirements for developments:

"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".

2.23 The Policy then details how developments should meet these requirements, stating:

"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".

2.24 Part C of the Policy introduces the concept of Air Quality Positive for large-scale development, stating:

"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."

2.25 The proposed development is not large-scale development, thus an Air Quality Positive statement is not required.

2.26 Regarding construction and demolition impacts, Part D of Policy SI 1 of the London Plan states:

"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".

2.27 Part E of Policy SI 1 states the following regarding mitigation and offsetting of emissions:

"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".

2.28 The explanatory text around Policy SI 1 of the London Plan states the following with regard to assessment criteria:

"The Mayor is committed to making air quality in London the best of any major world city, which means not only achieving compliance with legal limits for Nitrogen Dioxide as soon as possible and maintaining compliance where it is already achieved, but also achieving World Health Organisation targets for other pollutants such as Particulate Matter.

The aim of this policy is to ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits. Where limit values are already met, or are predicted to be met at the time of completion, new developments must endeavour to maintain the best ambient air quality compatible with sustainable development principles.

Where this policy refers to 'existing poor air quality' this should be taken to include areas where legal limits for any pollutant, or World Health Organisation targets for Particulate Matter, are already exceeded and areas where current pollution levels are within 5 per cent of these limits"[1].

2.29 The London Plan includes a number of other relevant policies, which are detailed in Appendix A1.

[1] The London Plan was developed based on a World Health Organisation guideline for $PM_{2.5}$ of 10 $\mu g/m^3$ (see Paragraph 2.30).

London Environment Strategy

2.30 The London Environment Strategy was published in May 2018 (GLA, 2018a). The strategy considers air quality in Chapter 4; the Mayor's main objective is to create a *"zero emission London by 2050".* Policy 4.2.1 aims to *"reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport".* The strategy sets a target to achieve, by 2030, the guideline value for $PM_{2.5}$ which was set by the World Health Organisation (WHO) in 2005. An implementation plan for the strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the strategy.

Mayor's Transport Strategy

2.31 The Mayor's Transport Strategy (GLA, 2018b) sets out the Mayor's policies and proposals to reshape transport in London over the next two decades. The Strategy focuses on reducing car dependency and increasing active sustainable travel, with the aim of improving air quality and creating healthier streets. It notes that development proposals should *"be designed so that walking and cycling are the most appealing choices for getting around locally".*

GLA SPG: The Control of Dust and Emissions During Construction and Demolition

2.32 The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014) outlines a risk assessment based approach to considering the potential for dust generation from a construction site, and sets out what mitigation measures should be implemented to minimise the risk of construction dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM's) guidance (IAQM, 2016), and it states that "*the latest version of the IAQM Guidance should be used*".

Air Quality Focus Areas

2.33 The GLA has identified 160 air quality Focus Areas in London. These are locations that not only exceed the annual mean limit value for nitrogen dioxide, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and Transport for London (TfL) will focus actions to improve air quality. The proposed development is located within the King's Cross / Caledonian Road air quality Focus Area.

Local Transport Plan

2.34 LB of Camden's Transport Strategy (LB of Camden, 2019) sets out the Council's vision and objectives for transport in the borough, in order to respond to changing challenges, opportunities and policy contexts, and identifies measures by which the Council will meet its transport goals. The

Strategy contains one relevant objective, to air quality; Objective 5 '*To reduce and mitigate the impact of transport-based emissions…*'. The Objective is supported by the following policies:

"*Policy 5b: Work towards the World Health Organisation (WHO) limits for Particulate Matter and Nitrogen Dioxide by 2030.*

Policy 5c: Use air quality indicators (PM_{10} and NOx emissions levels) as key factors in prioritising locations for LIP-funding through our Area-wide Healthy Streets Projects.

Policy 5h: Where feasible and appropriate, we will monitor the impact of our highways/streetscape schemes using air quality monitoring, including (for example) the use of diffusion tubes to monitor Nitrogen Dioxide levels pre- and post-implementation."

2.35 Other actions within the supporting policies include:

- Continuing to develop a comprehensive network of electric vehicle charging points;
- Incentivising the update of electric vehicles; and
- Establishing the highest standards for the Council's own vehicle fleet.

Local Policies

2.36 The Camden Local Plan was adopted in 2017. The Plan sets out the Council's planning policies, covering the period from 2016-2031, and replaces the Core Strategy and Development Policies planning documents (adopted in 2010).

2.37 Policy A1 on managing the impact of development states that "*The Council will seek to protect the quality of life of occupiers and neighbours*" and will "*seek to ensure that the amenity of communities, occupiers and neighbours is protected […] and require mitigation measures where necessary. Factors that will be considered include odour, fumes and dust"*.

2.38 Policy CC4 on Air Quality states that:

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

2.39 Policy D1 Design, has implications to air quality as well:

"*The Council will seek to secure high quality design in development. The Council will require that development […]*

c. is sustainable in design and construction, incorporating best practice in resource management and climate change mitigation and adaptation;

h. promotes health;

The Council will resist development of poor design that fails to take the opportunities available for improving the character and quality of an area and the way it functions…"

2.40 The plan elaborates that design can impact on air quality and health:

"*The way an area is designed and managed can have a significant impact on people's quality of life, health and wellbeing. Planning has a key role in promoting good physical and mental health by creating streets, spaces and buildings which allow and encourage healthy lifestyles. Architecture and urban design can affect human health through […] air quality [...]. The Council will require applicants to consider how development will contribute to improving health*."

2.41 To support the Camden Local Plan, the Council has published a 'Camden Planning Guidance (CPG)' document relating to air quality, which forms a Supplementary Planning Document (SPD). The CPG states that:

- "*All developments are to protect future occupants from exposure to poor air quality; and*
- *All developments are to limit their impact on local air quality and be at least air quality neutral*."

2.42 The CPG references the previous WHO guideline targets for NO_2, PM_{10} and $PM_{2.5}$ of 40 µg/m^3, 20 µg/m^3 and 10 µg/m^3 respectively which Camden aims to achieve by 2030. The SPD also states that "*For the determination of planning applications and appraisal of Construction Management Plans, consideration must be paid to uncertainty in NO_2 data, therefore 38 µg/m^3 (the 40 µg/m^3 WHO limit less 5%) shall be taken as the limit for this pollutant*".

2.43 The SPD outlines when an air quality assessment should be undertaken and what the assessment should cover. With respect to dispersion modelling, the SPD states that "*Modelling should not predict improvements to future years (future vehicle emissions or future background concentrations)*."

Building Standards

2.44 Part F(1) of Schedule 1 of the Building Regulations 2010 as amended June 2022 (Ministry of Housing, Communities & Local Government, 2022) places a duty on building owners, or those responsible for relevant building work[2], to ensure adequate ventilation is provided to building occupants.

2.45 Approved Document F (HM Government, 2021a), which accompanies the Building Regulations, explains that care should be taken to minimise entry of external air pollutants. Specific steps should be taken to manage ventilation intakes where the building is near to a significant source of emissions, or if local ambient concentrations exceed values set in the Air Quality Standards Regulations 2010 (see Paragraph 3.10, later). These steps include maximising the distance between emission source and air intake, considering likely dispersion patterns, and considering the timing of pollution releases when designing the ventilation system.

2.46 Part S(1) of Schedule 1, and Regulation 44D, of the Building Regulations 2010 (Ministry of Housing, Communities & Local Government, 2022) define a requirement for the provision of infrastructure for charging electric vehicles. Precise requirements are explained further within Approved Document S (HM Government, 2021b) and depend on the overall number of parking spaces provided and the average financial cost of installation.

2.47 Compliance with the Building Regulations is not required for planning approval, but it is assumed that the Regulations will be complied with in the completed building.

Air Quality Action Plans

National Air Quality Plan

2.48 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018b) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ). There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the

[2] Building work is a legal term for work covered by the Building Regulations. With limited exemptions, the Regulations apply to all significant building work, including erecting or extending a building.

vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

2.49 LB of Camden's combined Clean Air Strategy and Clean Air Action Plan (CAAP) (LB of Camden, 2022a) sets out the strategic objectives for improving air quality in the borough between 2019 and 2034 and the actions that will be undertaken between 2023 and 2026 to support the strategic objectives.

2.50 One of the Clean Air Strategy's key commitments is "*achieving the most stringent evidence-based air quality targets available, in as short a timeframe as possible. Currently, these are the World Health Organization's (WHO) air quality guidelines, published in 2021*" of 10 µg/m^3 for NO_2 by 2034, 15 µg/m^3 for PM_{10} by 2030 and 5 µg/m^3 for $PM_{2.5}$ by 2034. These are more stringent than those published in the Air Quality CPG, which are based on the previous WHO guidelines and are recommended for use "*for the determination of planning applications and appraisal of Construction Management Plans*" (LB of Camden, 2021).

2.51 The Clean Air Action Plan contains 36 'Clean Air Outcomes' to help improve air quality and protect health in Camden. The Plan sets out seven themes, around which a number of actions have been developed in order to improve local air quality:

- reducing construction emissions;
- reducing building emissions;
- reducing transport emissions;
- supporting communities and schools;
- indirect emissions and lobbying;
- public health and awareness; and,
- indoor air quality and occupational exposure.

3 Assessment Criteria

UK Criteria

3.1 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

3.2 The UK-wide objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 µg/m^3 (Defra, 2022). Therefore, 1-hour nitrogen dioxide concentrations will only be considered if the annual mean concentration is above this level. Measurements have also shown that the 24-hour mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 µg/m^3 (Defra, 2022). The predicted annual mean PM_{10} concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM_{10} objective. Where predicted annual mean concentrations are below 32 µg/m^3 it is unlikely that the 24-hour mean objective will be exceeded.

3.3 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. The GLA explains where these objectives will apply in London (GLA, 2019). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals and care homes etc., the gardens of residential properties, school playgrounds and the grounds of hospitals and care homes. The annual mean objectives do not apply at the "*building facades of offices or other places of work where members of the public do not have regular access*". The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as at hotels. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

3.4 For $PM_{2.5}$, the objective set by Defra for local authorities is to work toward reducing concentrations without setting any specific numerical value. In the absence of a numerical objective, it is convention to assess local air quality impacts against the limit value (see Paragraph 3.10), originally set at 25 µg/m^3 and currently set at 20 µg/m^3.

3.5 Defra has also recently set two new targets, and two new interim targets, for $PM_{2.5}$ concentrations in England. One set of targets focuses on absolute concentrations. The long-term target is to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by the end of 2040, with the interim target being a value of 12 µg/m^3 by the start of 2028[3]. The second set of targets relate to reducing overall population exposure to $PM_{2.5}$. By the end of 2040, overall population exposure to $PM_{2.5}$ should be reduced by 35% compared with 2018 levels, with the interim target being a reduction of 22% by the start of 2028.

3.6 Defra will assess compliance with the population exposure targets by averaging concentrations measured at its own background monitoring stations. This will not consider small changes over time to precisely where people are exposed (such as would relate to exposure introduced by a new development). Furthermore, as explained in Paragraph 2.10, all four new targets provide metrics against which central Government can assess its own progress. While local authorities have an important role delivering the required improvements, the actions required of local authorities, which will be clarified within a future Air Quality Strategy, relate to controlling emissions and not to directly assessing $PM_{2.5}$ concentrations against the targets.

3.7 Development control decisions can most effectively support Defra to achieve all four targets by optimising new developments to reduce their total emissions. The ambient concentrations to which occupants of new developments are exposed will have no effect on the ability to meet these targets. Similarly, where a new development causes an increase in local concentrations, this must be viewed in the context that all four targets relate to concentrations across England as a whole; there will be very few locations where a localised impact could alter the date by which the target is achieved in England.

3.8 The new $PM_{2.5}$ targets have been considered within this assessment principally by working with the developer to ensure that all practical measures will be taken to reduce emissions. However, it is recognised that there is often interest in investigating how local air quality within a development's study area will relate to the new concentration targets.

3.9 As explained in Paragraph 2.30, the GLA has set a target to achieve an annual mean $PM_{2.5}$ concentration of 10 µg/m^3 by 2030. This target was derived from an air quality guideline set by WHO in 2005. In 2021, WHO updated its guidelines, but the London Environment Strategy (GLA, 2018a) considers the 2005 guideline of 10 µg/m^3. While there is no explicit requirement to assess against the GLA target of 10 µg/m^3, it has nevertheless been included within this assessment.

3.10 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air

[3] Meaning that it will be assessed using measurements from 2027. The 2040 target will be assessed using measurements from 2040. National targets are assessed against concentrations expressed to the nearest whole number, for example a concentration of 10.4 µg/m^3 would not exceed the 10 µg/m^3 target.

Quality Standards Regulations (2010)[4]. The limit values for nitrogen dioxide, PM_{10} are the same numerical concentrations as the UK objectives, but achievement of the limit values is a national obligation rather than a local one and concentrations are reported to the nearest whole number. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit values. Central Government does not normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.11 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
NO_2	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
$PM_{2.5}$	Annual Mean	20 µg/m^3 [b]
	Annual Mean	10 µg/m^3 by 2030
	Annual Mean	12 µg/m^3 before 2028 [c]
	Annual Mean	10 µg/m^3 by 2040 [c]

[a] A proxy value of 32 µg/m^3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM_{10} objective are possible (Defra, 2022).

[b] There is no numerical $PM_{2.5}$ objective for local authorities (see Paragraph 3.4). Convention is to assess against the UK limit value which is currently 20 µg/m^3.

[c] Expressed to the nearest whole number. Defra has explained in the 2023 Environmental Improvement Plan (Defra, 2023b) that local authority responsibilities in relation to these targets relate to controlling emissions and not determining concentrations.

Camden Criteria

3.12 The LB of Camden has committed within their Air Quality CPG and CAAP to meeting the WHO guideline limits for NO_2, PM_{10} and $PM_{2.5}$, as discussed in paragraphs 2.42 and 2.49. However, the two documents quote different WHO limits; the CPG refers to the previous WHO limits to be met in 2030 while the CAAP refers to the current WHO limits to be met in 2034.

[4] As amended through The Air Quality Standards (Amendment) Regulations 2016 and The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020.

3.13 The commitment to meet the new WHO guidelines in the CAAP is described within the context of the Council's local air quality management; the CAAP states that "*We will not consider that we have achieved the WHO guideline objectives until every monitoring location at which the pollutants are measured records annual mean concentrations which meet the relevant standards*". The purpose of the CAAP is to help fulfil their requirements under the LAQM regime, rather than development control. The CAAP does not reference the WHO guidelines for planning, nor does the CAAP include any measures with respect to updating the Air Quality CPG to account for the latest WHO guidelines.

3.14 The WHO guidelines outlined in the Air Quality CPG are provided within the context of undertaking an air quality assessment for planning, stating that the WHO guidelines quoted in the CPG are to be used for "*the determination of planning applications and appraisal of Construction Management Plans*". The WHO guidelines in the Air Quality CPG also align with those in the London Environment Strategy (GLA, 2018a).

3.15 The WHO guidelines outlined within the Air Quality CPG, which specifically relates to planning, are presented in Table 2 below and have been considered within this assessment. The use of this criteria for the assessment has been agreed with the LB of Camden (see Paragraph 4.1).

Table 2: Camden Air Quality CPG Criteria for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Guideline target (as an annual mean)
NO_2	38 µg/m^3 [a]
PM_{10}	20 µg/m^3
$PM_{2.5}$	10 µg/m^3

[a] While the WHO guideline is 40 µg/m^3, 38 µg/m^3 has been used in accordance with the Air Quality CPG which states that "*consideration must be paid to uncertainty in NO_2 data, therefore 38µg/m^3 (the 40µg/m^3 WHO limit less 5%) shall be taken as the limit for this pollutant*."

Construction Dust Criteria

3.16 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[5] (2016) has been used (the GLA's SPG (GLA, 2014) recommends that the assessment be based on the latest version of the IAQM guidance). Full details of this approach are provided in Appendix A2.

[5] The IAQM is the professional body for air quality practitioners in the UK.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology agreed with the LB of Camden during pre-application discussions with Dr Kate Wilkins (Air Quality Consultants) in June 2022. The following key points were discussed and agreed:

- the assessment will cover the impacts of emissions from vehicles using the adjacent road network on future residents of the proposed development using dispersion modelling undertaken using ADMS-roads;
- the model will be verified and adjusted based on the results from a short-term diffusion tube monitoring undertaken at 330 Gray's Inn Road (80 m north of the proposed development) in 2019;
- an anticipated year of completion of 2026 will be assessed. In accordance with Camden Council's Air Quality planning guidance, concentrations will also be predicted assuming no improvements in emissions between the baseline and the opening year;
- concentrations of pollutants will be assessed against the air quality objectives, the WHO guideline for $PM_{2.5}$ as set out in the London Plan, and the WHO guideline for PM_{10} as set out in the LB of Camden's Air Quality CPG; and,
- as there will be minimal parking provision and no onsite sources of combustion, a simple qualitative discussion will be undertaken for the air quality neutral assessment.

Study Area

4.2 The study area for the assessment has been identified using professional judgement. It includes the application site itself and roads in the surrounding area which are expected to impact on air quality at the Site. Specifically, the assessment has focussed on Acton Street (A501) and Gray's Inn Road (A5200) from York Way to Heathcote Street, as well as Swinton Street (A201), King's Cross Road (A201), from Pentonville Road to Wharton Street, Argyle Street and Argyle Square. The study area is shown in Figure 2.

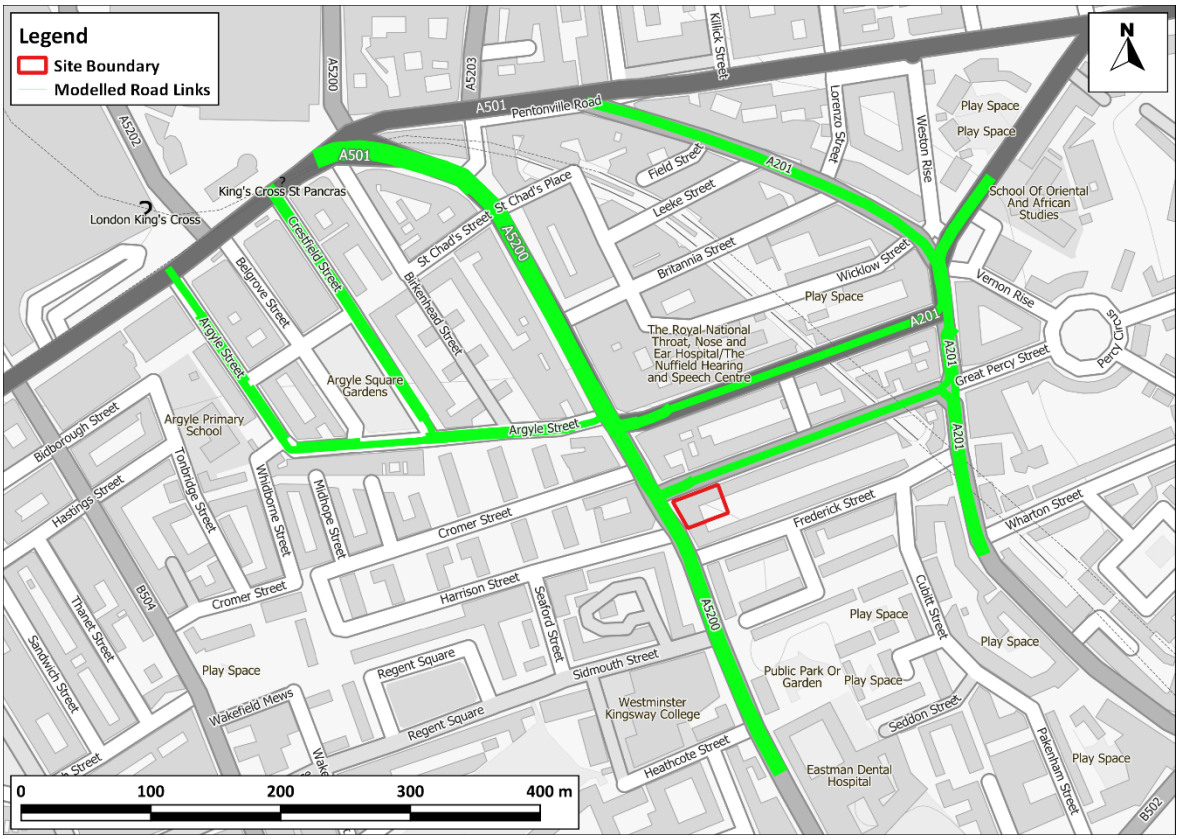

Figure 2: Study Area

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4.3 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles within 500 m of the site. The specific areas considered are detailed in Section 6.

Receptors

4.4 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at a number of locations within the residential section of the proposed development. Receptors have been identified to represent relevant exposure, including worst-case locations (the façades of the residential properties fronting Acton Street).

4.5 Six receptor locations at multiple heights have been identified within the new development, which represent exposure to existing sources at each floor level with residential use (there is no ground-floor residential use). These locations are described in Table 3 and shown in Figure 3. In addition, concentrations have been modelled at the diffusion tube monitoring sites from the 330 Gray's Inn Road monitoring survey undertaken for planning application 2020/5593/P (AQC, 2020a) in order to verify the model outputs (see Appendix A5 for verification method).

Table 3: Description of Receptor Locations

Receptor	Description	X coordinate	Y coordinate	Heights Modelled (m) [a]
1	Residential - 1st, 2nd, 3rd floor	530607.8	182710.4	5, 8, 11
2	Residential - 1st, 2nd, 3rd floor	530621.4	182715.5	5, 8, 11
3	Residential - 4th floor	530608.4	182708.6	14
4	Residential - 4th floor	530622.1	182713.8	14
5	Residential - 1st, 2nd, 3rd floor	530612.9	182696.1	5, 8, 11
6	Residential - 4th floor	530611.7	182699.7	14

[a] Based on the plans provided, heights of 5 m, 8 m, 11 m and 14 m have been used to represent first, second, third and fourth-floor level exposure.

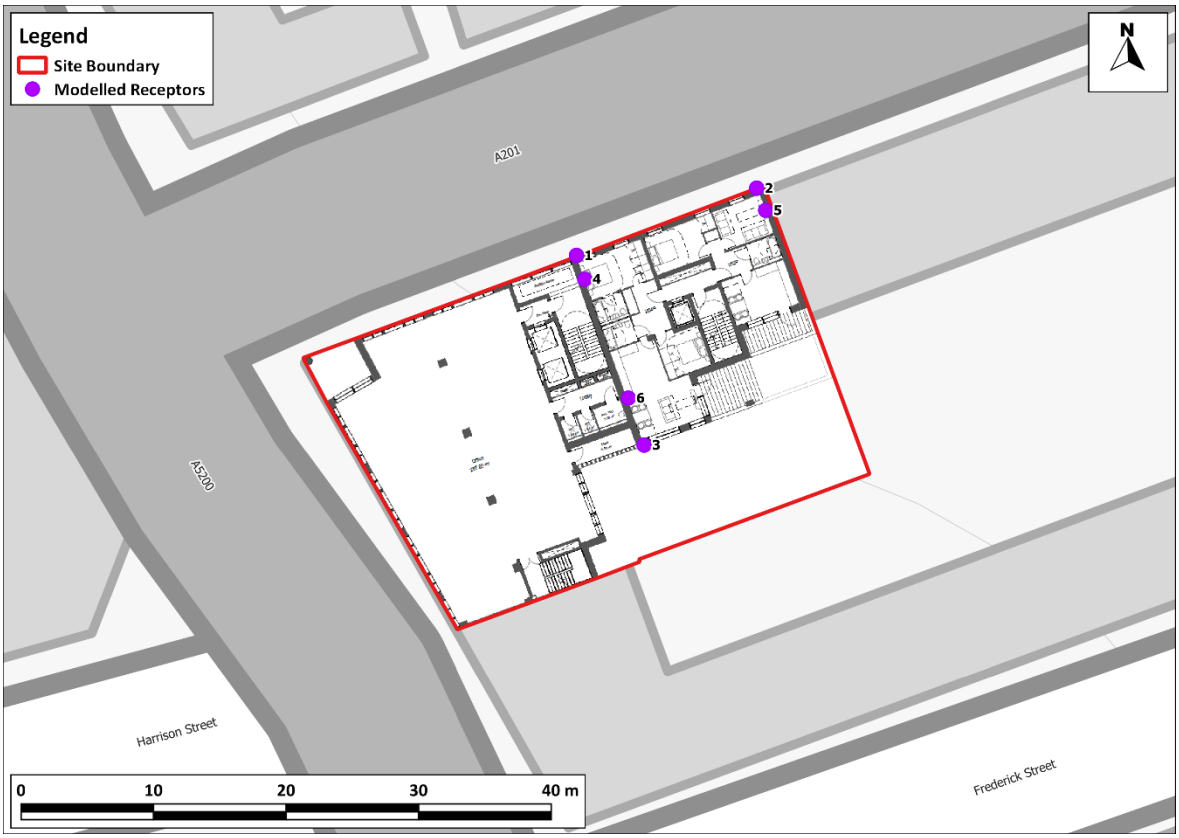

Figure 3: Receptor Locations

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4.6 The construction dust risk assessment approach does not require specific receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. These receptor counts are provided in Section 6.

Existing Conditions

4.7 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2023c);
- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained from a site specific air quality survey conducted for the nearby 330 Gray's Inn Road development (AQC, 2020a), detailed in Section 5. The results of monitoring carried out by the local authority have also been included in order to provide context for the assessment;
- background concentrations for 2022 have been defined using the 2022 concentrations monitored at the background automatic monitor at London Bloomsbury (BL0)[6] for NO_2 and PM_{10} and the 2022 concentration monitored at Euston Road (CD9)[7] for $PM_{2.5}$;
- background concentrations for 2026 have estimated based on the 2022 monitoring data from BL0 and CD9 by applying a ratio based on the relationship between the 2022 and 2026 concentrations in Defra's 2018-based background maps (Defra, 2023d); and
- whether or not there are any exceedances of the annual mean limit value for NO_2 in the study area has been identified using the maps of roadside concentrations published by Defra (2020) (2023e), as well as from any nearby Automatic Urban and Rural Network (AURN) monitoring sites (which operate to the required data quality standards). These are the maps used by the Government, together with the AURN results, to identify and report exceedances of the limit value. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2023e), which are available for the years 2009 to 2019, show no exceedances of the limit values anywhere in the UK in 2019.

6 The 2022 monitoring results from BL0 have been used as they are judged to be the most representative of actual background conditions in the study area in 2022. The Defra background are judged to be overly pessimistic being projected from a 2018 base year.

7 Due to poor data capture for 2022 at the BL0 monitor for $PM_{2.5}$. Data from the CD9 roadside monitor has been used to represent background $PM_{2.5}$ concentrations used within the assessment, which is worst case.

Construction Impacts

4.8 The construction dust assessment considers the potential for impacts within 350 m of the site boundary, or within 50 m of roads used by construction vehicles. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014), which is based on that provided by IAQM (2016). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix A2 explains the approach in more detail.

Road Traffic Impacts

Modelling Methodology

4.9 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v11.0) (Defra, 2023d). Details of the model inputs and the model verification are provided in Appendix A5.

Assessment Scenarios

4.10 Nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations have been predicted for the proposed year of opening of the proposed development (2026).

4.11 In accordance with LB of Camden's Air Quality planning guidance (LB of Camden, 2021), concentrations have also been predicted for the proposed opening year assuming no improvements in emissions from the baseline scenario (i.e. using 2022 emission factors and background concentrations with 2026 traffic data). As discussed in Paragraphs 4.15 to 4.17 below, this is a highly conservative assumption.

Uncertainty

4.12 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

4.13 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A5). Because the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2022) concentrations.

4.14 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions. Historic versions of Defra's EFT tended to over-state emissions reductions into the future. However, analyses of the most recent versions of Defra's EFT carried out by AQC (2020b) (2020c) suggest that, on balance, these versions are unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by the current EFT, especially against a base year of 2016 or later. Using EFT v11.0 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2022.

4.15 In spite of the large body of evidence described above indicating that the EFT vehicle projection factors are robust and LB of Camden monitoring data indicating the concentrations have continually reduced in the borough since 2015 (presented in Table 4 and Table 6), the Air Quality CPG requests that concentrations are predicted assuming no improvements in vehicle emissions. The results from this scenario are considered highly conservative; the background concentrations and baseline concentrations are actually expected to be closer to those described for 2026 in Section 5 of this report. Appendix A6 discusses uncertainties regarding the future fleet mix in London and the scale of the reduction in NOx emissions that can be expected with the adoption of these changes. The LB of Camden approach of disregarding expected future improvements in air quality will more than offset any other uncertainties in the assumptions.

4.16 Forecasts of future-year concentrations are usually based on measurements made during a recent year. They then take account of projected changes over time to factors such as the composition of the vehicle fleet and the uptake of other new technologies, as well as population increases etc. In early 2020, activity in the UK was disrupted by the Covid-19 pandemic. As a result, concentrations of traffic-related air pollutants fell appreciably (Defra Air Quality Expert Group, 2020). 2020 and 2021 are thus likely to present as an atypically low pollution year for roadside pollutant concentrations. The pandemic may cause long-lasting changes to travel activity patterns, and it is reasonable to assume that 2022 represents a return to more typical activity levels.

4.17 Changes were made to the LEZ and the Ultra Low Emission Zone (ULEZ) in 2021, and the ULEZ is to be expanded further in 2023. The changes are described in detail in Appendix A1, and can be expected to significantly reduce NOx emissions in London; however, they are not reflected in Defra's latest EFT and thus have not been considered in this assessment. The assessment presented in this report is, therefore, very much worst-case in this regard, and it is expected that background

concentrations, and the impacts of the proposed development, will be lower than described in Section 7 of this report (and even lower than those presented for 2022 where it is assumed there is no improvement in air quality from pre-LEZ and ULEZ). Appendix A6 discusses uncertainties regarding the future fleet mix in London and the scale of the reduction in NOx emissions that can be expected with the adoption of these changes.

4.18 This assessment has also considered the GLA target for $PM_{2.5}$ and the WHO guideline limit values as outlined in the Air Quality CPG.

Assumptions

4.19 It is necessary to make a number of assumptions when carrying out an air quality assessment; in order to account for some of the uncertainty in the approach, as described above, assumptions made have generally sought to reflect a realistic worst-case scenario. Key assumptions made in carrying out this assessment include that the Battersea Heliport meteorological monitoring station appropriately represents conditions in the study area (this is discussed further in Appendix A5) and that the proposed development is located within street canyons (this is discussed further in Appendix A5). The 2022 no reduction in emissions scenario is based on 2026 traffic data and 2022 emissions.

Assessment of Significance

Construction Dust Significance

4.20 Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. This is the latest version of the guidance upon which the assessment methodology set out in the GLA guidance (GLA, 2014) is based (the GLA guidance advises that the latest version of the IAQM guidance should always be used). The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

4.21 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach developed jointly by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM)[8] (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement; the experience of the consultants preparing the report is set out in Appendix A4. Full details of the EPUK/IAQM approach are provided in Appendix A3.

[8] The IAQM is the professional body for air quality practitioners in the UK.

'Air Quality Neutral'

4.22 The GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2023) sets out guidance on how an 'air quality neutral' assessment should be undertaken. It also provides a methodology for calculating an offsetting payment if a development is not 'air quality neutral' and it is not possible to identify or agree appropriate and adequate mitigation.

5 Baseline Conditions

Relevant Features

5.1 The proposed development is near Kings Cross Station, in Camden, within 150 m of the boundary with London Borough of Islington (LB of Islington). The residential units within the application site are bounded by Acton Street and other buildings surrounding the proposed development while the offices are bounded by Acton Street, Gray's Inn Road and Frederick Street. It currently consists of residential properties and a Bupa Health Centre. There are existing residential properties, offices and retail buildings in the immediate vicinity.

5.2 The proposed development is located within the Camden borough-wide AQMA and the King's Cross/Caledonian Road air quality Focus Area, as highlighted in Figure 1.

Industrial Sources

5.3 No significant industrial sources have been identified that are likely to affect the proposed development, in terms of air quality.

Air Quality Monitoring

Local Authority Monitoring

5.4 LB of Camden operates five automatic monitoring stations within its area, the closest of which are the London Bloomsbury and Euston Road sites, situated 650 m and 880 m away, respectively. The Council also operates a number of NO_2 monitoring sites using diffusion tubes prepared and analysed by Gradko International (using the 50% TEA in acetone method). These include two deployed on Euston Road, within 650 m of the Site, and a number at background locations.

5.5 The Site also lies in close proximity to the LB of Islington. LB of Islington operates three diffusion tube monitoring sites within 700 m of the Site, including two background locations and the Roseberry Avenue roadside site.

5.6 Annual mean results for the years 2015 to 2022[9] are summarised in Table 4, while results relating to the 1-hour mean objective are summarised in Table 5 (data for 2022 is only available for the automatic monitoring sites). The monitoring locations are shown in Figure 4. The monitoring data have been taken from LB of Camden's 2021 Air Quality Annual Status Report (LB of Camden, 2022b), LB of Islington's 2021 Air Quality Annual Status Report (LB of Islington, 2022) and the Air Quality England website (Air Quality England, 2023).

[9] While 2020 and 2021 results have been presented in this Section for completeness, they are not relied upon in any way as they will not be representative of 'typical' air quality conditions due to the considerable impact of the Covid-19 pandemic on traffic volumes and thus pollutant concentrations

Table 4: Summary of Annual Mean NO_2 Monitoring (2015-2022) (µg/m³) [a]

Site No.	Site Type	Location	2015	2016	2017	2018	2019	2020	2021	2022
LB of Camden – Automatic Sites										
BL0	Urban Background	London Bloomsbury	**48**	**42**	38	36	32	28	27	24
CD9	Roadside	Euston Road	**90**	**88**	**83**	**82**	**70**	**43**	**48**	**44**
LB of Camden – Diffusion Tubes										
CA10	Urban Background	Tavistock Gardens	**45**	40	**46**	35	34	27	22[b]	-
CA27	Roadside	Euston Road LAQN colocation	-	-	-	-	**65**	**47**	**47** [b]	**-**
CA28	Urban Background	St. George's Gardens East	-	-	-	-	28	22	17	-
CA29	Roadside	Endsleigh Gardens	-	-	-	-	**49**	35	35 [b]	-
CA4A (new)	Kerbside	Euston Road	-	-	-	-	**71**	**54**	**57** [b]	**-**
CA6	Urban Background	St. George's Gardens (prev. 'Wakefield Gardens')	36	31	34	27	25	- [c]	- [c]	- [c]
LB of Islington – Diffusion Tubes										
BIS005/02	Roadside	Roseberry Avenue	**62**	**62**	**54**	**51**	**44**	31	30	-
BIS005/04	Urban Background	Percy Circus	**45**	**46**	40	35	32	23	22	-
BIS005/05	Urban Background	Myddleton Square	39	38	39	35	28	21	20	-
Objective			**40**							

[a] Exceedances of the objectives are shown in bold.

[b] Data capture less than 75%.

[c] This monitor was retired in 2020

Table 5: Number of Hours With NO_2 Concentrations Above 200 µg/m³

Site No.	Site Type	Location	2015	2016	2017	2018	2019	2020	2021	2022
BL0	Urban Background	London Bloomsbury	0	0	0	0	0	0	0	0
CD9	Roadside	Euston Road	**54**	**39**	**25**	18	7	0	1	2
Objective			**18**							

[a] Exceedances of the objectives are shown in bold.

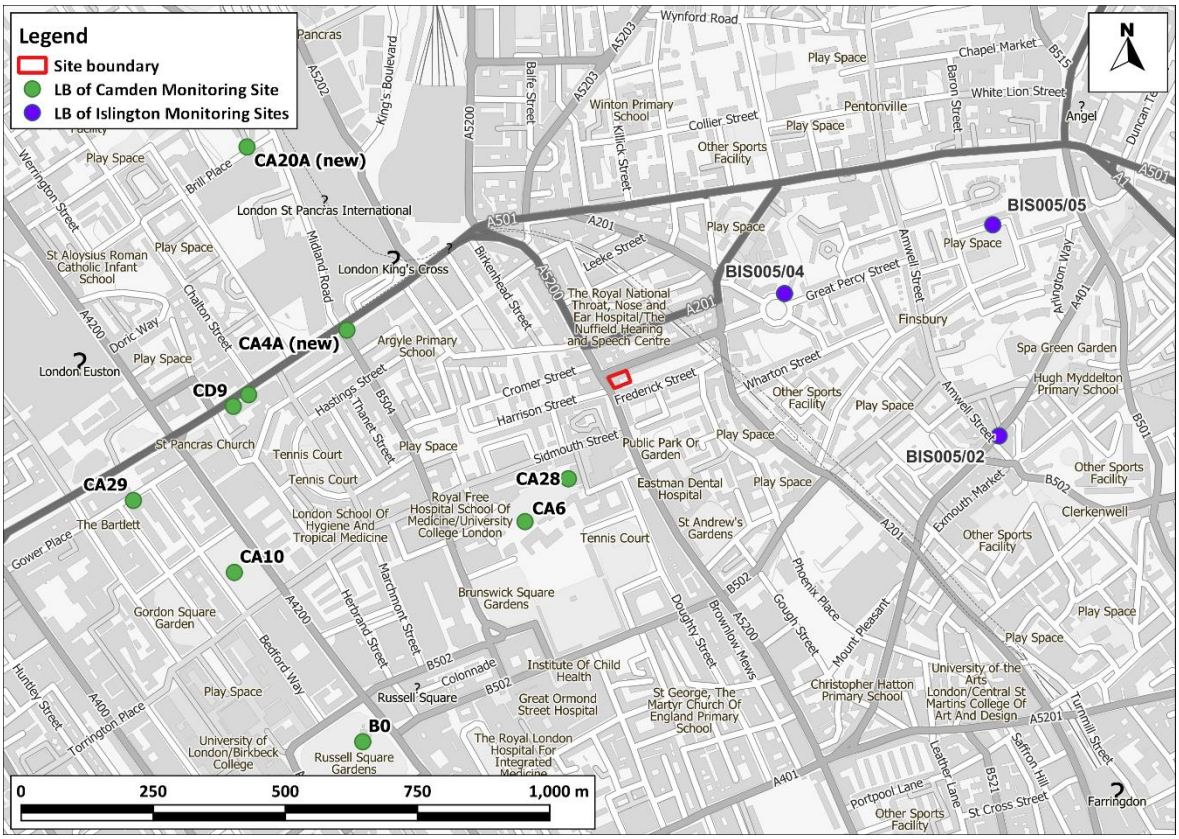

Figure 4: Local Authority Monitoring Locations

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5.7 There have been consistent exceedances of the annual mean NO_2 objective at roadside and kerbside monitors since 2015. However, concentrations at all background sites in the study area have been below the objective since 2018. No exceedances of the hourly NO_2 objective have been measured since 2015 at the urban background automatic monitor (BL0), while at the roadside automatic monitor (CD9), hourly NO_2 concentrations have been below the objective since 2019.

5.8 Data in Table 4 and Table 5 indicate a strong downward trend in concentrations over time at roadside and urban background monitoring sites, demonstrating a sustained improvement in air quality within the Borough in recent years.

5.9 The London Bloomsbury and Euston Road automatic monitoring stations also measure PM_{10} and $PM_{2.5}$ concentrations. Annual mean results for the years 2015 to 2022 are summarised in Table 6, while results relating to the daily mean objective are summarised in Table 7. The results demonstrate that PM_{10} and $PM_{2.5}$ concentrations have been below the respective objectives since 2015. However, mean $PM_{2.5}$ concentrations were above the GLA target.

Table 6: Summary of Annual Mean PM_{10} and $PM_{2.5}$ Monitoring (2015-2022) (µg/m³)

Site No.	Site Type	Location	2015	2016	2017	2018	2019	2020	2021	2022
PM_{10}										
BL0	Urban Background	London Bloomsbury	22	20	19	17	18	16	16	17
CD9	Roadside	Euston Road	28	24	20	21	22	18	19	21
Objective			**40**							
$PM_{2.5}$										
BL0	Urban Background	London Bloomsbury	11	12	13	10	11	9	9[b]	8[b]
CD9	Roadside	Euston Road	17	17	14	15	14	10	9	11
Objective/GLA target			**20/10 [a]**							

[a] The 20 µg/m³ $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m³ is the GLA target for annual mean $PM_{2.5}$; again, there is no requirement for local authorities to meet this.

[b] Data capture less than 75%

Table 7: Number of Days With PM_{10} Concentrations Above 50 µg/m³

Site No.	Site Type	Location	2015	2016	2017	2018	2019	2020	2021	2022
BL0	Urban Background	London Bloomsbury	6	9	6	1	9	4	0	5
CD9	Roadside	Euston Road	5	10	3	2	8	2	2	6
Objective			**35**							

Site Specific Monitoring Survey

5.10 None of the above monitoring sites are considered representative of air quality conditions at the Site. Therefore, the results from a nearby site specific monitoring survey that was conducted to accompany the planning application for the development at 330 Gray's Inn Road (application number 2020/5593/P) have been considered.

5.11 A nitrogen dioxide monitoring survey was undertaken using diffusion tubes deployed at seven locations in the vicinity of 330 Gray's Inn Road (80 m north of the proposed development) (AQC, 2020a). The locations of the seven monitoring sites are described in Table 8 and shown in Figure 5.

5.12 The diffusion tube survey was designed in accordance with the Diffusion Tubes for Ambient NO_2 Monitoring Practical Guidance (AEA Energy & Environment, 2008) published on Defra's air quality website. Diffusion tubes were supplied and analysed by Gradko International Ltd (using the 50% TEA in acetone preparation method).

5.13 Six months of monitoring was carried out between 3rd July 2019 to 8th January 2020 and the results from the monitoring survey were annualised to 2019 (AQC, 2020a) and corrected for systematic diffusion tube bias using a Defra's national diffusion tube bias adjustment factor spreadsheet (Defra, 2023f). The 2019 annual means have subsequently been annualised to a 2022 calendar year in accordance with the method outlined in guidance from Defra (Defra, 2022).

5.14 Full details of the annualisation procedure applied are presented in Appendix A7.

Table 8: Diffusion Tube Monitoring Locations and Annual Mean NO_2 Concentrations [a]

Site No.	Location	2022 Annual Mean NO_2 ($\mu g/m^3$)
GR1	1st floor office window on Gray's Inn Road	34.3
GR2 [b]	Lampost on Gray's Inn Road	36.7
GR4 [b]	1st floor office window on Swinton Street	36.4
GR5 [b]	Lamppost on Swinton Street	38.2
GR6 [b]	Roof of Building on Wicklow Street	25.7
GR7 [b]	Wicklow Street	28.1
Objective		**40**

[a] Results for monitoring site GR3 have not been presented due to low data capture.

[b] Triplicate diffusion tubes.

5.15 The results show that at both ground and first-floor locations on Gray's Inn Road, Wicklow Street and Swinton Street, concentrations were below the air quality objectives in 2022.

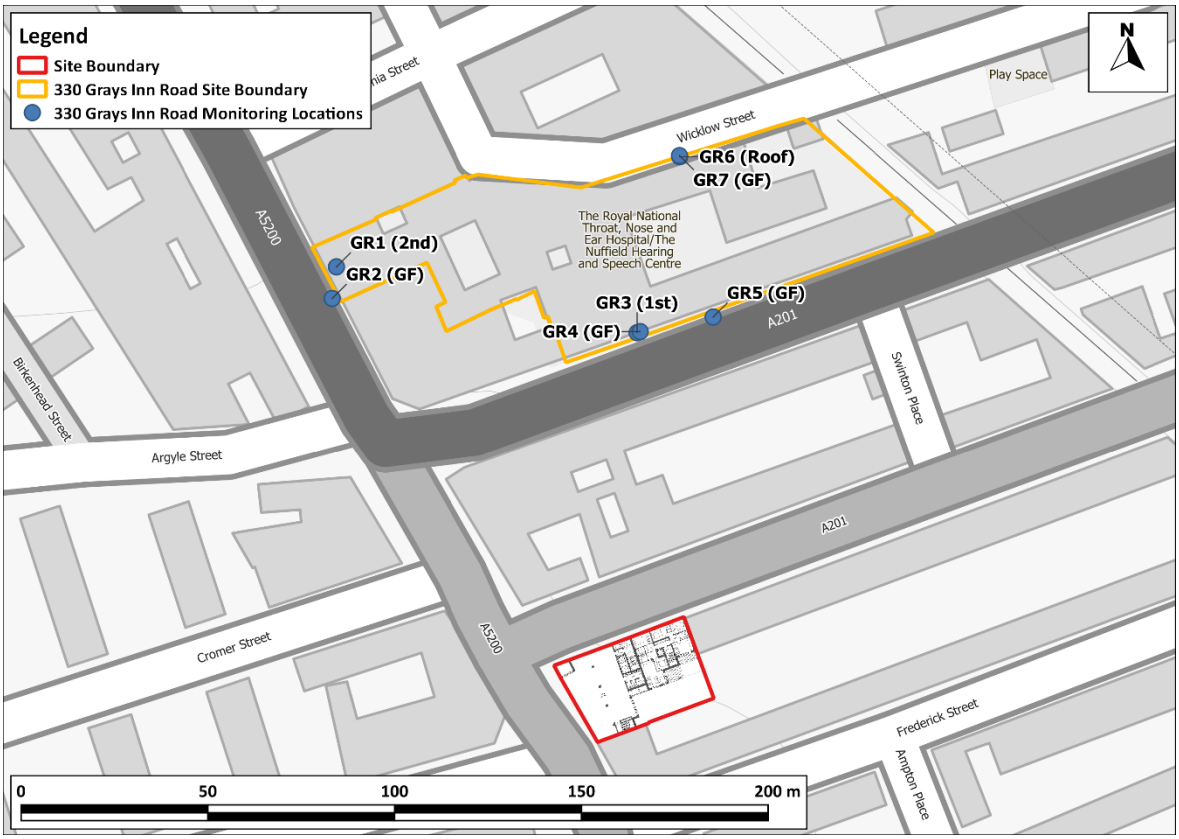

Figure 5: Site Specific Monitoring Survey Locations

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Exceedances of Limit Value

5.16 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedances of the annual mean nitrogen dioxide limit value (Defra, 2023c). Furthermore, Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2023g), which are used to identify and report exceedances of the limit value, identify exceedances of this limit value in 2019 along many roads in London, including Gray's Inn Road, adjacent to the proposed development. The Greater London Urban Area has thus been reported as exceeding the limit value for annual mean nitrogen dioxide concentrations. Defra's predicted concentrations for 2026 (Defra, 2020) also do not identify any exceedances adjacent to the application site. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

5.17 Defra's Air Quality Plan requires the GLA to prepare an action plan that will *"deliver compliance in the shortest time possible"*, and the 2015 Plan assumed that a CAZ was required. The GLA has

already implemented an LEZ and a ULEZ, thus the authority has effectively already implemented the required CAZ. These have been implemented as part of a package of measures including 12 Low Emission Bus Zones, Low Emission Neighbourhoods, the phasing out of diesel buses and taxis and other measures within the Mayor's Transport Strategy.

Background Concentrations

5.18 Estimated background concentrations at the proposed development are set out in Table 9 and are well below the respective objectives.

Table 9: Estimated Annual Mean Background Pollutant Concentrations in 2022 and 2026 (µg/m^3)

Year	NO_2 [a]	PM_{10} [a]	$PM_{2.5}$ [b]
2022	24.0	17.0	11.0
2026	22.5	16.4	10.6
Objective / GLA target	**40**	**40**	**20/10 [c]**

[a] Defra background for NO_2 and PM_{10} for 2022 based on 2022 monitoring results at BL0 (London Bloomsbury automatic monitor). 2026 values have been adjusted based on the Defra background maps – see paragraph 4.7 for details.

[b] Defra background for $PM_{2.5}$ for 2022 based on 2022 monitoring results at CD9 (Euston Road automatic monitor). 2026 values have been adjusted based on the Defra background maps – see paragraph 4.7 for details.

[c] The 20 µg/m^3 $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m^3 is the GLA target for annual mean $PM_{2.5}$; again, there is no requirement for local authorities to meet this.

6 Construction Phase Impact Assessment

Construction Traffic

6.1 Vehicles will approach the site via the A5011 Westbound and follow the one-way system to Acton Street. When departing, vehicles will leave via Gray's Inn Road and the A501 westbound. It is anticipated that on most days, less than 10 heavy vehicles will access the site, thus the additional heavy vehicle movements on local roads will be well below the 25 AADT screening criterion recommended by EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). It is, therefore, not considered necessary to assess the impacts of traffic emissions during the construction phase and it can be concluded that the proposed development will not have a significant impact on local roadside air quality as a result of construction traffic emissions.

On-Site Exhaust Emissions

6.2 The IAQM guidance (IAQM, 2016) states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

6.3 The proposed development is relatively small, thus the number of NRMM able to operate at any one time will be limited. The proposed development is also located in an opportunity area and all NRMM operating within this area need to meet stage IV emissions standards. With these standards in place, it is judged that there no risk of significant effects at existing receptors as a result of on-site machinery emissions.

Construction Dust and Particulate Matter Emissions

6.4 The construction works will give rise to a risk of dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A2), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

6.5 The concrete superstructure of the existing development will be retained and therefore there will be minimal demolition activities; the main demolition activities are associated with the removal of the plant room on the top floor of the existing building at 300 Gray's Inn Road (which has an approximate

volume of 1,000 m^3). The existing brick facades of the building will also be removed during the construction phase. On-site crushing/screening of concrete and masonry is likely to be required before removal of the material; such crushing plant may require a valid Environmental Permitting Regulations permit. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for demolition is considered to be *medium.*

Earthworks

6.6 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2023), as set out in Table 10. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 10: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Argillaceous
European Soil Bureau Description	Prequaternary Marine/Estuarine Sand and Silt
Soil Group	Medium to Light (Silty) to Heavy
Soil Texture	Clayey Loam [a] to Silty Loam

[a] a loam is composed mostly of sand and silt.

6.7 The site is less than 1,000 m^2 with only a small proportion of the site subject to earthworks, involving excavation and landscaping. The earthworks will last around four months and dust will arise mainly from the handling of dusty materials (such as dry soil). Only one heavy earth-moving vehicle will be active at any one time. Based on the example definitions set out in Table A2.1 in AppendixA2, the dust emission class for earthworks is considered to be *small*.

Construction

6.8 Construction will primarily involve the addition of two floors to the existing structure, with a total building volume of less than 5,000 m^3, in addition to replacing the building façade. Dust will arise from piling, the handling and storage of dusty materials and from the cutting of concrete. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for construction is considered to be *small*.

Trackout

6.9 For the majority of the construction phase, the average number of heavy vehicles accessing the site, which may track out dust and dirt, will be less than 10 per day. However, on any given day there could be a maximum of between 10-50 outward heavy vehicle movements. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for trackout is considered to be *medium*.

6.10 Table 11 summarises the dust emission magnitude for the proposed development.

Table 11: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Medium
Earthworks	Small
Construction	Small
Trackout	Medium

Sensitivity of the Area

6.11 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

6.12 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling and human health effects, while places of work are 'medium' sensitivity receptors (Table A2.2 in Appendix A2). There are more than 10 residential properties within 20 m of the site (see Figure 6).

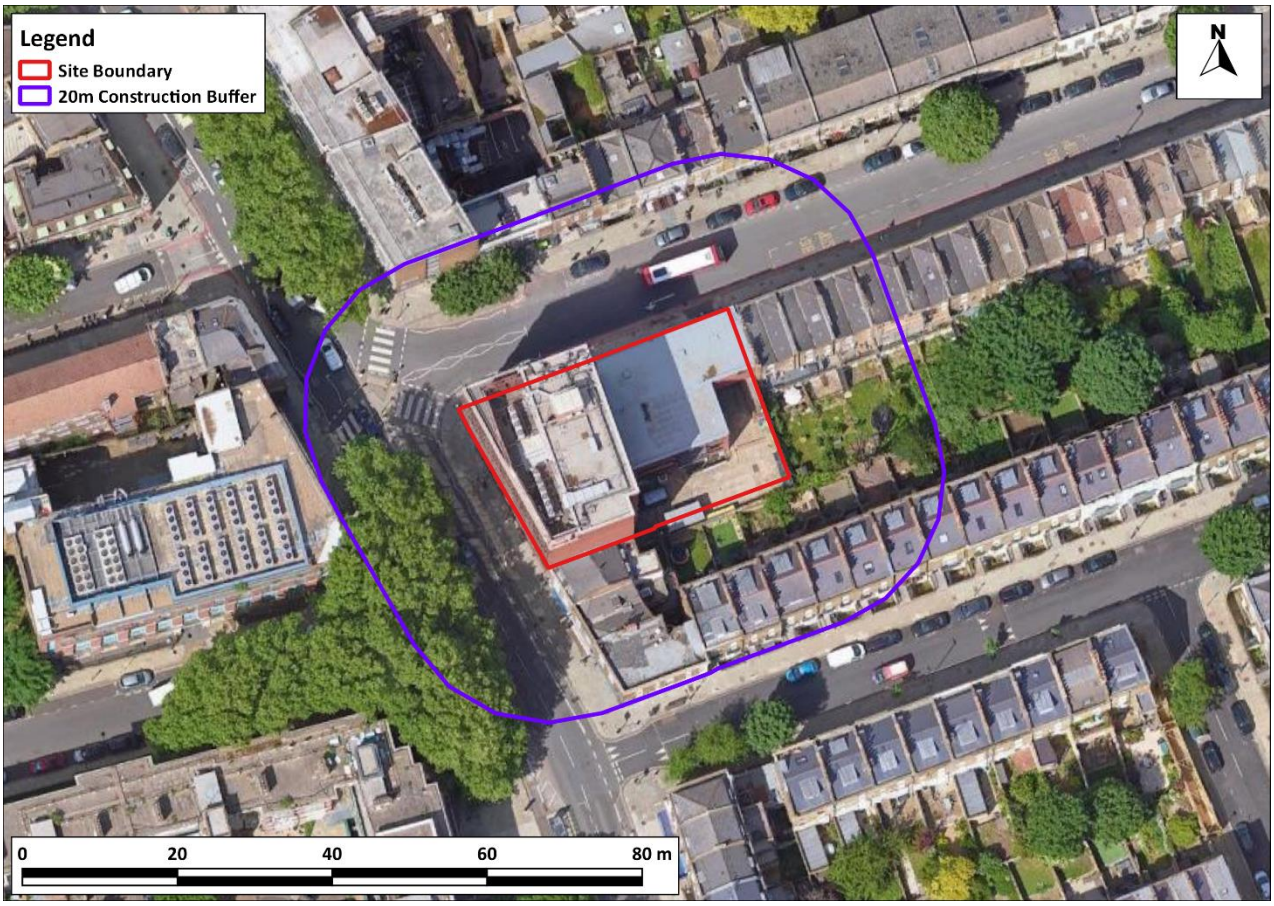

Figure 6: 20 m Distance Bands around Site Boundary

Imagery ©2023 Bluesky, CNES/Airbus, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023

6.13 Table 11 shows that the dust emission magnitude for trackout is *medium* and Table A2.3 in Appendix A2 thus explains that there is a risk of material being tracked 200 m from the site exit. There are more than 10 residential properties within 20 m of the roads along which material could be tracked (see Figure 7).

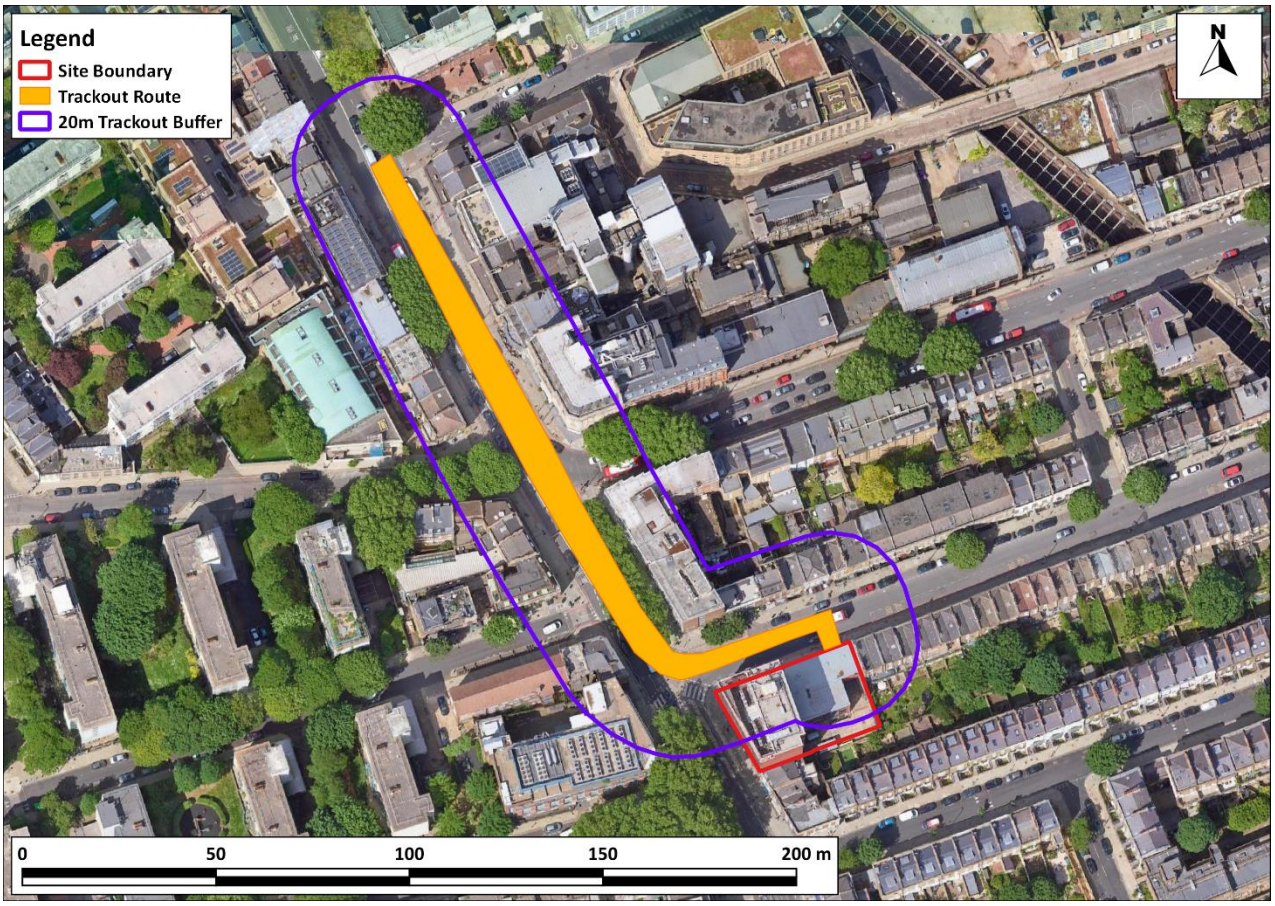

Figure 7: 20 m Distance Bands around Roads Used by Construction Traffic Within 200 m of the Site Exit

Imagery ©2023 Bluesky, CNES/Airbus, Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023

Sensitivity of the Area to Effects from Dust Soiling

6.14 Using the information set out in Paragraph 6.12 and Figure 6 alongside the matrix set out in Table A2.3 in Appendix A2, the area surrounding the onsite works is of 'high' sensitivity to dust soiling. Using the information set out in Paragraph 6.13 and Figure 7 alongside the same matrix, the area is also of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

6.15 The matrix in Table A2.4 in Appendix A2 requires information on the baseline annual mean PM_{10} concentration in the area. The properties nearest the site are located at roadside locations on Gray's Inn Road, Acton Street and Frederick Street. The 2022 measured annual mean PM_{10} concentration at the roadside automatic monitoring site on Euston Road from Table 6 (21 µg/m^3) has therefore been assumed as the concentration at these receptors as a worst-case. Using the information set out in Paragraphs 6.12 and Figure 6 alongside the matrix in Table A2.4 in Appendix A2, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set

out in Paragraph 6.13 and Figure 7 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is also of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

6.16 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

6.17 Table 12 summarises the sensitivity of the area around the proposed construction works.

Table 12: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Low Sensitivity	Low Sensitivity

Risk and Significance

6.18 The dust emission magnitudes in Table 11 have been combined with the sensitivities of the area in Table 12 using the matrix in Table A2.6 in Appendix A2, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 13. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 9 (step 3 of the assessment procedure).

Table 13: Summary of Risk of Impacts Without Mitigation

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

6.19 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016).

7 Operational Phase Impact Assessment

UK Objectives

7.1 Predicted air quality conditions for future residents of the proposed development, taking account of emissions from the adjacent road network, are set out in Table 14 (see Table 3 and Figure 3 for receptor locations). The results show that at all locations NO_2 concentrations are below the annual mean objective (40 µg/m^3), even when applying the conservative assumption of no improvement in emissions or background concentrations in the future. Concentrations are also below the respective objectives for PM_{10} and $PM_{2.5}$.

7.2 Air quality for future residents of the development will thus be acceptable in all locations. Therefore, mitigation measures to minimise exposure for residents to high concentrations of air pollutants are not required.

Table 14: Predicted Annual Mean Concentrations of NO_2, PM_{10} and $PM_{2.5}$ for New Receptors in the Proposed Development (µg/m^3)

Receptor	Height	2026			2022 (assuming no future reduction in concentrations)		
		NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
1	1st floor	27.7	17.7	11.3	31.4	18.3	11.8
2	1st floor	27.5	17.6	11.3	31.1	18.3	11.7
1	2nd floor	26.9	17.5	11.2	30.4	18.1	11.7
2	2nd floor	26.8	17.5	11.2	30.2	18.1	11.6
1	3rd floor	24.5	16.9	10.9	26.9	17.5	11.3
2	3rd floor	24.7	16.9	10.9	27.1	17.5	11.3
3	4th floor	23.5	16.6	10.8	25.5	17.2	11.1
4	4th floor	23.6	16.7	10.8	25.6	17.3	11.2
5	1st floor	23.8	16.7	10.8	25.9	17.3	11.2
5	2nd floor	23.7	16.7	10.8	25.7	17.3	11.2
5	3rd floor	23.5	16.6	10.8	25.5	17.2	11.1
6	4th floor	23.4	16.6	10.7	25.3	17.2	11.1
Objective / Criterion / Guideline		**40**	**32/20** [a]	**20/10** [b]	**40**	**32/20** [a]	**20/10** [b]

[a] While the annual mean PM_{10} objective is 40 µg/m^3, 32 µg/m^3 is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG22 (Defra, 2022). A value of 32 µg/m^3 is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017). 20 µg/m^3 is the WHO Guideline value adopted in the LB Camden AQ CPG.

[b] The 20 µg/m^3 $PM_{2.5}$ objective, which was to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it. 10 µg/m^3 is the GLA target for annual mean $PM_{2.5}$; again,

there is no requirement for local authorities to meet this. 10 µg/m^3 is also the WHO Guideline value adopted in the Camden AQ SPD.

Comparison against the GLA and CPG Criteria

7.3 The results demonstrate that modelled concentrations of NO_2 and PM_{10} are below the criteria adopted by LB Camden in its Air Quality CPG of 38 µg/m^3 for NO_2 and 20 µg/m^3 for PM_{10} in 2026, even when assuming no reduction in emissions or background concentrations (i.e. the 2022 values presented in Table 14).

7.4 However, the adopted $PM_{2.5}$ criteria of 10µg/m^3 (which is the same as the GLA $PM_{2.5}$ target, which has a target compliance date of 2030) is exceeded at all modelled receptors. This is in part due to the conservative background $PM_{2.5}$ concentrations used within the assessment which are above 10 µg/m^3 in both 2022 and 2026 and is based on measured concentration from a roadside monitor rather than a background monitor as a worst-case. Exceedances of the guideline are common and their nationwide achievement is very unlikely to be possible before 2030, especially in London (Defra, 2019).

7.5 Given the number of national, regional and local measures being implemented to achieve the WHO $PM_{2.5}$ guideline by 2036, concentrations of $PM_{2.5}$ are only likely to be above the guideline in the first few years of the development; the measures in Defra's Clean Air Strategy are predicted to achieve an 95% reduction in population exceedance of a $PM_{2.5}$ concentration of 10 µg/m^3 by 2030 (Defra, 2019). Furthermore, local automatic monitoring data has shown continual improvement in local $PM_{2.5}$ concentrations since 2015.

Significance of Operational Air Quality Effects

7.6 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A5, and takes account of the assessment that:

- pollutant concentrations at worst-case locations within the proposed development will all be below the objectives, thus future residents will experience acceptable air quality;
- annual mean $PM_{2.5}$ concentrations at receptors may marginally exceed the GLA target/CPG criteria, but this is a common occurrence and the proposed development will have a negligible contribution to existing $PM_{2.5}$ concentrations; and
- the proposed development is 'car free' and will not introduce any combustion plant to provide heat and power, and therefore will have an insignificant effect on local air quality.

8 'Air Quality Neutral'

8.1 The purpose of the London Plan's requirement that development proposals be 'air quality neutral' is to prevent the gradual deterioration of air quality throughout Greater London. The 'air quality neutrality' of a proposed development, as assessed in this section, does not directly indicate the potential of the proposed development to have significant impacts on human health (this has been assessed separately in the previous section). The air quality assessment has been undertaken using the latest GLA's London Plan Guidance (Air Quality Neutral) (GLA, 2023).

Building Emissions

8.2 The proposed development will be provided with heat and hot water by ASHPs and PVs. Paragraph 3.1.3 of the guidance states "*most non-combustion heat sources such as electric panel heaters and heat pumps (including air source and ground source heat pumps) are assumed to have zero heat-related NOx emissions*".

8.3 As the proposed development does not include any combustion plant for the routine provision of electricity, heating or hot water it will thus have no direct building emissions. The proposed development is, therefore, better than air quality neutral in terms of building emissions.

Road Transport Emissions

8.4 The proposed development, which is classified as a 'major' development, is 'car-free' and provides only one, on-street blue badge parking space in accordance with London Plan parking policies (Caneparo Associates, 2023). Paragraph 4.1.3 of the GLA's Air Quality Neutral guidance states "*where major developments meet the definition of 'car-free', they can be assumed to meet the TEB*."

8.5 The proposed development is thus air quality neutral in terms of transport emissions.

Summary

8.6 As the proposed development is 'car-free' and will utilise all-electric energy sources for the provision of heat and hot water, it therefore complies with the requirement that all new developments in London are at least air quality neutral.

9 Mitigation

Good Design and Best Practice

9.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required.

9.2 The EPUK/IAQM guidance predates the recent publication by Defra of long-term air quality targets for $PM_{2.5}$. As explained in Paragraph 3.5, meeting the new target will require positive action from many different sectors. While it is not appropriate to determine individual planning applications based on whether future $PM_{2.5}$ concentrations in an area will be above or below the concentration target, it is nevertheless appropriate that new development contributes to meeting the national targets by ensuring that air quality is taken into account in development design.

9.3 The proposed development incorporates the following good design and best practice measures:

- scheme design such that the most sensitive uses (residential) are the furthest from sources of pollution (major roads such as Gray's Inn Road); the residential units are located on Acton Street and have no ground-level residential occupation;
- 'car-free' development with provision of only one, on-street car parking space, which is a blue-badge space, to discourage the use of private vehicles to access the proposed development;
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public, cycling and walking);
- provision of a Delivery, Servicing & Waste Management Plan to manage deliveries and set out the measures that will be adopted at the Site to mitigate the impact of servicing;
- provision of extensive cycle parking on-site for office and residential use;
- use of solar and ASHPs to avoid the need for on-site combustion; and,
- provision of the intakes for mechanical ventilation with heat recovery (MVHR) for the residential units at the rear of the building away from Acton Street and Gray's Inn Road.

Recommended Mitigation

Construction Impacts

9.4 Measures to mitigate dust emissions will be required during the construction phase of the development in order to minimise effects upon nearby sensitive receptors.

9.5 The site has been identified as a *Medium* Risk site during demolition and trackout and *Low* Risk during construction and earthworks, as set out in Table 13. The GLA's SPG on *The Control of Dust and Emissions During Construction and Demolition* (GLA, 2014) describes measures that should be

employed, as appropriate, to reduce the impacts, along with guidance on what monitoring should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A8.

9.6 The mitigation measures should be written into a dust management plan (DMP). The DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan, and may require monitoring. The GLA's guidance suggests that, for a Medium Risk site, automatic monitoring of particulate matter (as PM_{10}) will be required. It also states that, on certain sites, it may be appropriate to determine the existing (baseline) pollution levels before work begins. However, the guidance is clear that the Local Authority should advise as to the appropriate air quality monitoring procedure and timescale on a case-by-case basis.

9.7 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Road Traffic Impacts

9.8 The assessment has demonstrated that future residents of the proposed development will be exposed to pollutants concentrations below the respective air quality objectives in the year of opening, even when using the worst-case modelling assumptions requested by LB of Camden which assume no improvement in emissions or background concentrations between 2022 and 2026.

9.9 Therefore, the overall air quality effect of the proposed development will be 'not significant'; it will not introduce any new exposure into areas of unacceptable air quality and, as the development is 'car-free', nor will development-generated traffic emissions have a significant impact on local air quality. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

9.10 Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The local air quality plan that the GLA is required to produce in order to address limit value exceedances in its area will also help to improve air quality; the implementation and expansion of the ULEZ can reasonably be expected to lead to significant improvements. The Council's Local Transport Plan and Air Quality Action Plan will also be helping to deliver improved air quality.

Air Quality Neutral

9.11 The proposed development is better than air quality neutral with respect to both transport and building emissions. Therefore, no further mitigation is required.

10 Residual Impacts

Construction

10.1 The IAQM guidance, on which the GLA's guidance is based, is clear that, with appropriate mitigation in place, the residual effects will normally be 'not significant'. The mitigation measures set out in Section 9 and Appendix A8 are based on the GLA guidance. With these measures in place and effectively implemented the residual effects are judged to be 'not significant'.

10.2 The IAQM guidance does, however, recognise that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. During these events, short-term dust annoyance may occur, however, the scale of this would not normally be considered sufficient to change the conclusion that overall the effects will be 'not significant'.

Road Traffic Impacts

10.3 The residual impacts will be the same as those identified in Section 7. The overall effects of the proposed development will be 'not significant'.

11 Conclusions

11.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction. It has also identified the air quality conditions that future residents will experience and whether or not the proposed development is air quality neutral (as required by the London Plan).

Construction Impacts

11.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

Operational Impacts

11.3 Air quality conditions for future residents of the proposed development have been shown to be acceptable, with concentrations below the air quality objectives throughout the site, even when applying the highly conservative modelling assumptions required within the Camden Air Quality CPG.

11.4 $PM_{2.5}$ concentrations may continue to marginally exceed the GLA target in the opening year, but this is widespread throughout London and will likely be addressed by a package of measures, such as extending the ULEZ, implemented by the GLA.

11.5 A number of best practice measures have been included within the design of the proposed development to reduce the impact of the proposed development on air quality; as the proposed development is 'car-free' and does not include any on-site combustion, it will have a negligible effect on local air quality.

11.6 The overall operational air quality effects of the proposed development are therefore judged to be 'not significant'. As the impacts of the proposed development are not significant, additional mitigation measures are not required.

Air Quality Neutral

11.7 As the development is 'car-free' and has no on-site combustion, the proposed development complies with the requirement that all new developments in London should be at least air quality neutral.

Policy Implications

11.8 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 185 of the NPPF, being appropriate for its location both in terms of its effects on the local

air quality environment and the air quality conditions for future residents. It is also consistent with Paragraph 186, as it will not affect compliance with relevant limit values or national objectives.

11.9 The proposed development is compliant with Policy SI 1 of the London Plan in the following ways:

- it will not cause exceedances of legal air quality limits;
- it will not create unacceptable risk of high levels of exposure to poor air quality;
- design solutions have been used to address air quality issues rather than post-design mitigation, including design measures to minimise exposure; and
- it will be air quality neutral.

11.10 The proposed development is also consistent with Policy A1 of LB of Camden's Local Plan, as the development will not have a significant detrimental effect on air quality, and hence the amenity of existing communities. It is also consistent with Policy CC4, as the development does not increase exposure to poor air quality.

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13 Glossary

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System model for Roads
AQAL	Air Quality Assessment Level
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BEB	Building Emissions Benchmark
CAZ	Clean Air Zone
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
EV	Electric Vehicle
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
Focus Area	Location that not only exceeds the annual mean limit value for NO_2 but also has a high level of human exposure
GIA	Gross Internal Floor Area
GLA	Greater London Authority
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HGV	Heavy Goods Vehicle
HMSO	Her Majesty's Stationery Office
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit

kph	Kilometres Per hour
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LB	London Borough
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
µg/m^3	Microgrammes per cubic metre
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
NRMM	Non-road Mobile Machinery
OEP	Office for Environmental Protection
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
SPG	Supplementary Planning Guidance
SPD	Supplementary Planning Document
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
TEA	Triethanolamine – used to absorb nitrogen dioxide
TEB	Transport Emissions Benchmark
TEMPro	Trip End Model Presentation Program

TfL	Transport for London
ULEZ	Ultra Low Emission Zone
WHO	World Health Organisation

14 Appendices

A1 London-Specific Policies and Measures

London Plan

Design-led Approach

A1.1 Policy D3 on optimising site capacity through the design-led approach states that *"development proposals should…help prevent or mitigate the impacts of noise and poor air quality"*. The explanatory text around this Policy states the following:

"Measures to design out exposure to poor air quality and noise from both external and internal sources should be integral to development proposals and be considered early in the design process. Characteristics that increase pollutant or noise levels, such as poorly-located emission sources, street canyons and noise sources should also be designed out wherever possible. Optimising site layout and building design can also reduce the risk of overheating as well as minimising carbon emissions by reducing energy demand".

Electric Vehicle Charging

A1.2 To support the uptake of zero tailpipe emission vehicles, Policy T6.1 of the London Plan states:

"All residential car parking spaces must provide infrastructure for electric or Ultra-Low Emission vehicles. At least 20 per cent of spaces should have active charging facilities, with passive provision for all remaining spaces".

London Environment Strategy

A1.3 The air quality chapter of the London Environment Strategy sets out three main objectives, each of which is supported by sub-policies and proposals. The Objectives and their sub-policies are set out below:

"Objective 4.1: Support and empower London and its communities, particularly the most disadvantaged and those in priority locations, to reduce their exposure to poor air quality.

- *Policy 4.1.1 Make sure that London and its communities, particularly the most disadvantaged and those in priority locations, are empowered to reduce their exposure to poor air quality*
- *Policy 4.1.2 Improve the understanding of air quality health impacts to better target policies and action*

Objective 4.2: Achieve legal compliance with UK and EU limits as soon as possible, including by mobilising action from London Boroughs, government and other partners

- *Policy 4.2.1 Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport*
- *Policy 4.2.2 Reduce emissions from non-road transport sources, including by phasing out fossil fuels*
- *Policy 4.2.3 Reduce emissions from non-transport sources, including by phasing out fossil fuels*
- *Policy 4.2.4 The Mayor will work with the government, the London boroughs and other partners to accelerate the achievement of legal limits in Greater London and improve air quality*
- *Policy 4.2.5 The Mayor will work with other cities (here and internationally), global city and industry networks to share best practice, lead action and support evidence based steps to improve air quality*

Objective 4.3: Establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, meeting world health organization health-based guidelines for air quality

- *Policy 4.3.1 The Mayor will establish new targets for $PM_{2.5}$ and other pollutants where needed. The Mayor will seek to meet these targets as soon as possible, working with government and other partners*
- *Policy 4.3.2 The Mayor will encourage the take up of ultra low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines*
- *Policy 4.3.3 Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality*
- *Policy 4.3.4 Work to reduce exposure to indoor air pollutants in the home, schools, workplace and other enclosed spaces"*

A1.4 While the policies targeting transport sources are significant, there are less obvious ones that will also require significant change. In particular, the aim to phase out fossil-fuels from building heating and cooling and from NRMM will demand a dramatic transition.

Low Emission Zone (LEZ)

A1.5 The LEZ was implemented as a key measure to improve air quality in Greater London. It entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived

from lorries and vans. Since 1 March 2021, a standard of Euro VI has applied for HGVs, buses and coaches, while a standard of Euro 3 has applied for large vans, minibuses and other specialist diesel vehicles since 2012.

Ultra Low Emission Zone (ULEZ)

A1.6 London's ULEZ was introduced on 8 April 2019. The ULEZ currently operates 24 hours a day, 7 days a week in the same area as the current Congestion Charging zone. All cars, motorcycles, vans and minibuses are required to meet exhaust emission standards (ULEZ standards) or pay an additional daily charge to travel within the zone. The ULEZ standards are Euro 3 for motorcycles, Euro 4 for petrol cars, vans and minibuses and Euro 6 for diesel cars, vans and minibuses. The ULEZ does not include any requirements relating to heavy vehicle (HGV, coach and bus) emissions, as these are addressed by the amendments to the LEZ described in Paragraph A1.5.

A1.7 The ULEZ currently covers the entire area within the North and South Circular roads, applying the emissions standards set out in Paragraph A1.6. The ULEZ is to be expanded across all London boroughs in August 2023.

Other Measures

A1.8 Since 2018, all taxis presented for licencing for the first time had to be zero emission capable (ZEC). This means they must be able to travel a certain distance in a mode which produces no air pollutants, and all private hire vehicles (PHVs) presented for licensing for the first time had to meet Euro 6 emissions standards. Since January 2020, all newly manufactured PHVs presented for licensing for the first time had to be ZEC (with a minimum zero emission range of 10 miles). The Mayor's aim is that the entire taxi and PHV fleet will be made up of ZEC vehicles by 2033.

A1.9 The Mayor has also proposed to make sure that TfL leads by example by cleaning up its bus fleet, implementing the following measures:

- TfL will procure only hybrid or zero emission double-decker buses from 2018;
- a commitment to providing 3,100 double decker hybrid buses by 2019 and 300 zero emission single-deck buses in central London by 2020;
- introducing 12 Low Emission Bus Zones by 2020;
- investing £50m in Bus Priority Schemes across London to reduce engine idling; and
- retrofitting older buses to reduce emissions (selective catalytic reduction (SCR) technology has already been fitted to 1,800 buses, cutting their NOx emissions by around 88%).

A2 Construction Dust Assessment Procedure

A2.1 The criteria developed by IAQM (2016), upon which the GLA's guidance is based, divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

A2.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A2.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A2.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A2.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A2.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A2.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A2.1.

Table A2.1: Examples of How the Dust Emission Magnitude Class May be Defined

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

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A2.8 The sensitivity of the area is defined taking account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters to reduce the risk of wind-blown dust.

A2.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A2.2. These receptor sensitivities are then used in the matrices set out in Table A2.3, Table A2.4 and Table A2.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A2.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A2.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A2.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A8.

STEP 4: Determine Significant Effects

A2.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A2.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A2.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A2.3: Sensitivity of the Area to Dust Soiling Effects on People and Property [10]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
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

[10] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude for trackout, 200 m from sites with a *medium* dust emission magnitude and 50 m from sites with a *small* dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A2.4: Sensitivity of the Area to Human Health Effects [10]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m³	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A2.5: Sensitivity of the Area to Ecological Effects [10]

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A2.6: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

A3 EPUK & IAQM Planning for Air Quality Guidance

A3.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A3.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A3.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A3.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;
- Wherever possible, new developments should not create a new "street canyon", as this inhibits pollution dispersion;

- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) "rapid charge" point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A3.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

"It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the "damage cost approach" used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential".

A3.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

"There may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Impacts of the Development on the Local Area

A3.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A3.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or
- the development will have a centralised energy facility or other centralised combustion process.

A3.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A3.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A3.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

A3.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

"The criteria provided are precautionary and should be treated as indicative. They are intended to function as a sensitive 'trigger' for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A3.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A3.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A3.15 There is no official guidance in the UK in relation to development control on how to describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A3.16 The guidance recommends that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts and, in such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*' impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A3.17 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A3.18 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

A4 Professional Experience

Dr Denise Evans, BSc (Hons) PhD MIEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 23 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Julia Burnell, MEnvSci (Hons) MIEnvSc MIAQM

Miss Burnell is a Senior Consultant with AQC with over seven years' experience in the field of air quality. She has experience of undertaking a range of air quality assessments for power, transportation, and mixed-use development projects both in the UK and internationally. She is also experienced at preparing environmental permit applications for medium combustion plant/specified generator sites and has commissioned and maintained numerous ambient air quality monitoring surveys. Prior to her work with AQC, Julia completed an MEnvSci (Hons) in Environmental Science (four-year integrated master's). She is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

A5 Modelling Methodology

Road Traffic

Model Inputs

A5.1 Predictions have been carried out using the ADMS-Roads dispersion model (v5). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, street canyon width, street canyon height and porosity, where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 11.0) published by Defra (2023d). Model input parameters are summarised in Table A5.1 and, where considered necessary, discussed further below.

Table A5.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	Yes
Advanced Street Canyons Modelled?	Yes
Noise Barriers Modelled?	No
Meteorological Monitoring Site	Battersea Helipad
Meteorological Data Years	2019
Dispersion Site Surface Roughness Length (m)	1
Dispersion Site Minimum MO Length (m)	50
Met Site Surface Roughness Length (m)	0.5
Met Site Minimum MO Length (m)	100
Gradients?	No

A5.2 AADT flows, and the proportions of HDVs, for the model extent have been determined from the interactive web-based map provided by DfT (2022). The 2019 AADT flows have been factored forwards to the assessment year of 2022 and 2026 using growth factors derived using the TEMPro System v7.2 (DfT, 2017). Traffic speeds have been based on those presented in the LAEI, with some having been adjusted based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A5.2. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2020).

Table A5.2: Summary of Traffic Data used in the Assessment

Road Link	2022		2026	
	AADT	%HDV	AADT	%HDV
A501 Euston Road/Gray's Inn Road (N)	53,626	8.5	55,931	8.5
A501 Euston Road/Gray's Inn Road (S)	24,270	7.0	25,313	7.0
A5200 Gray's Inn Road (N)	13,475	7.2	14,054	7.2
A501 Acton Street	9,142	9.1	9,535	9.1
A5200 Gray's Inn Road (S)	13,475	7.2	14,054	7.2
A501 Swinton Street	12,164	4.3	12,686	4.3
A501 Penton Rise	13,385	4.8	13,961	4.8
A201 Kings Cross Road to Swinton	8,007	10.1	8,352	10.1
A201 Kings Cross Road, Swinton to Acton	13,234	6.2	13,802	6.2
A201 Kings Cross Road, Acton Street to Roseberry Ave	15,971	4.7	16,658	4.7

A5.3 Figure A5.1 shows the road network included within the model, along with the speed at which each link was modelled, and shows which sections of road have been modelled as canyons.

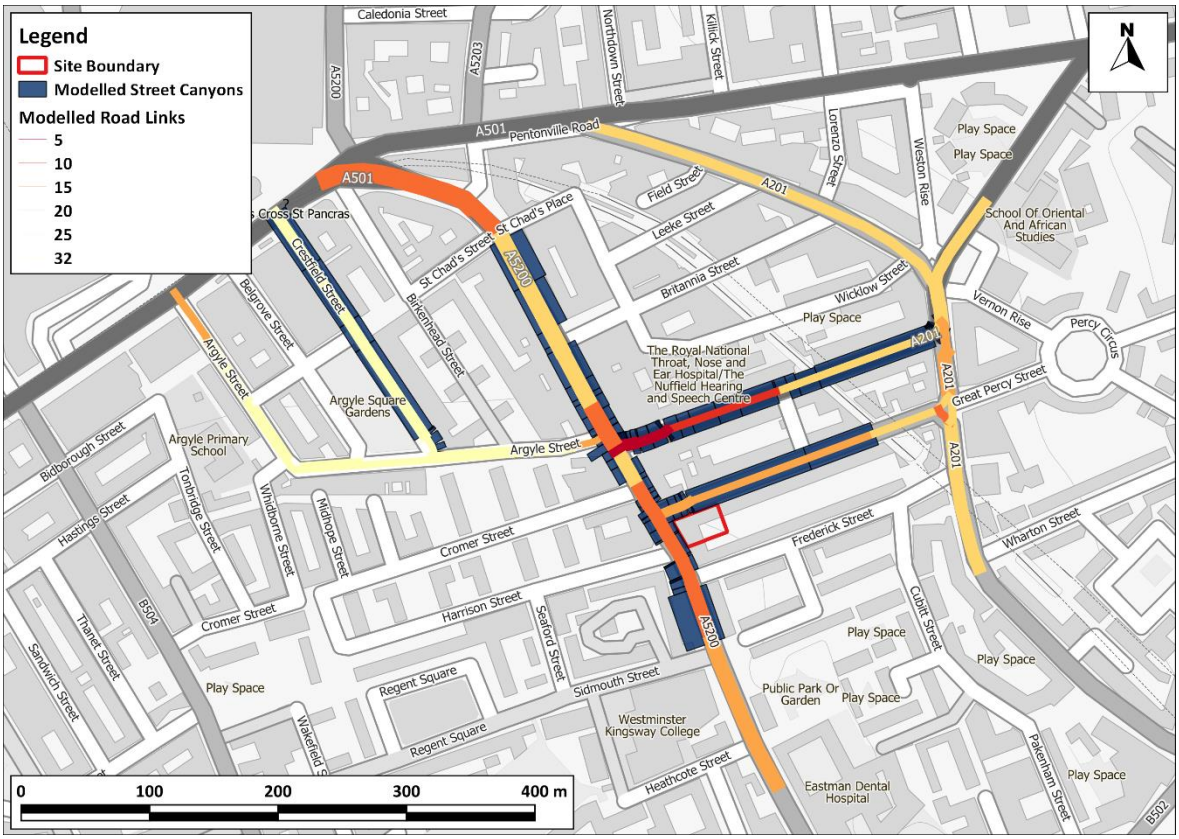

Figure A5.1: Modelled Road Network, Speeds & Street Canyons

A5.4 For the purposes of modelling, it has been assumed that the Acton Street and Gray's Inn Road facades of the proposed development are within a street canyon formed by the buildings of each road. These roads have a number of canyon-like features, which reduce dispersion of traffic emissions, and can lead to concentrations of pollutants being higher here than they would be in areas with greater dispersion. Acton Street and Gray's Inn Road, as well as Swinton Street and Argyle Square, have therefore been modelled as street canyons using ADMS-Roads' advanced canyon module, with appropriate input parameters determined from plans, on-site measurements, local mapping and photographs. The advanced canyon module has been used along with the urban canopy flow module, the input data for which have been published by Cambridge Environmental Research Consultants (CERC, 2016), who developed the ADMS models. The modelled canyons are shown in Figure A5.1.

A5.5 Hourly sequential meteorological data in sectors of 10 degrees from Battersea Heliport meteorological station for 2019 have been used in the model. Meteorological data from 2019 has been used rather than 2022 to align with the year that the 330 Gray's Inn Road monitoring survey was undertaken, which is used for model verification. The Battersea Heliport meteorological

monitoring station is located on the Thames at the London Heliport in Battersea, approximately 7.7 km to the southwest of the proposed development. Both the application site and the Battersea Heliport meteorological monitoring station are located in the London where they will be influenced by the effects of inland meteorology over urban topography. The topography of the model domain is similar to that around the meteorological monitoring station and measurements from this site are considered to provide the most robust basis to predict meteorology within the model domain. A wind rose for the site for 2019 is provided in Figure A5.2. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

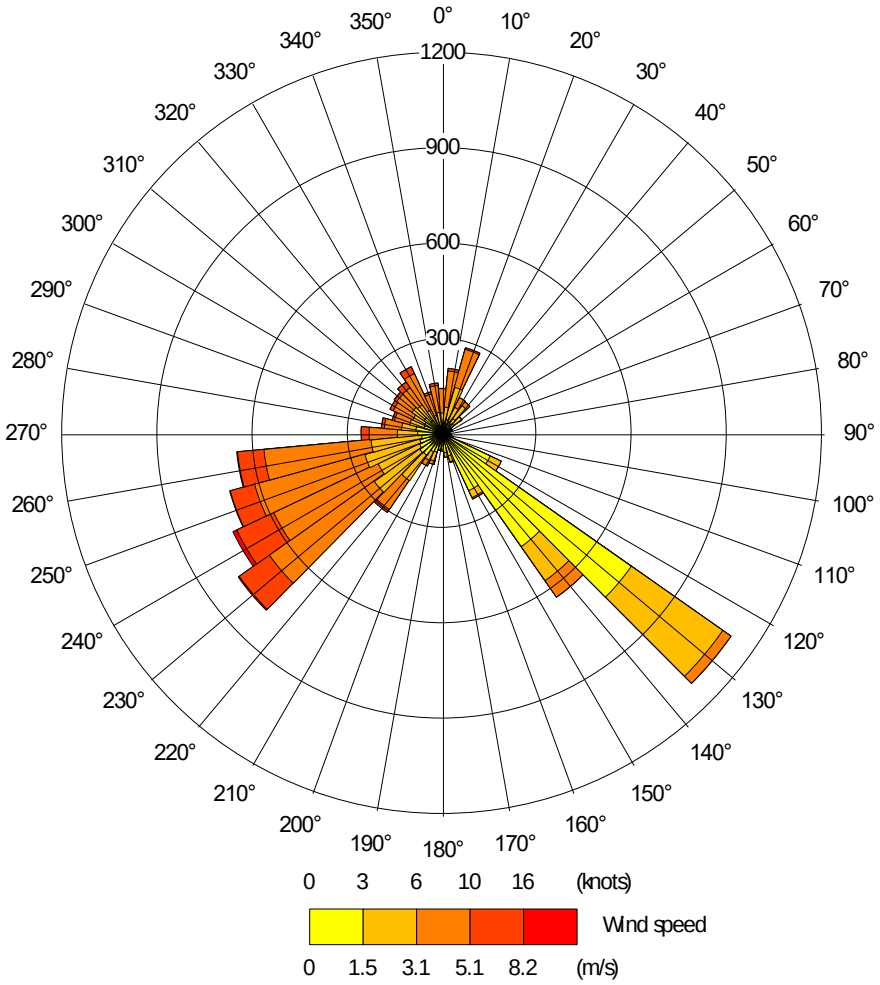

Figure A5.2: Wind Rose

Model Verification

A5.6 Evidence collected over many years has shown that, in most urban areas, dispersion modelling relying upon Defra's EFT has tended to systematically under-predict roadside nitrogen dioxide concentrations. To account for this, it is necessary to adjust the model against local measurements. The model has been run to predict annual mean NO_2 concentrations during 2022 at the GR1, GR2,

GR4 and GR5 diffusion tube monitoring sites from the 330 Gray's Inn Road monitoring survey (AQC, 2020a).

A5.7 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 of nitrogen oxides ($NOx = NO + NO_2$).

A5.8 The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentrations and the predicted background NO_2 concentration using the NOx from NO_2 calculator (Version 8.1) available on the Defra LAQM Support website (Defra, 2023d).

A5.9 The unadjusted model has under predicted the road-NOx contribution; this is a common experience with this and most other road traffic emissions dispersion models. An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A5.3). The calculated adjustment factor of 1.21 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations.

A5.10 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator. Figure A5.4 compares final adjusted modelled total NO_2 at each of the monitoring sites to measured total NO_2, and shows a close agreement.

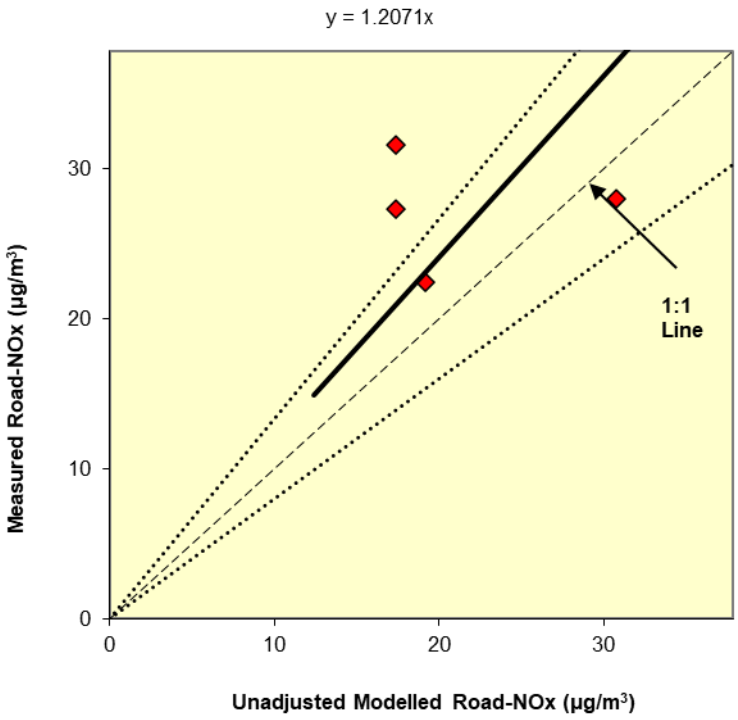

Figure A5.3: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations. The dashed lines show ± 25%.

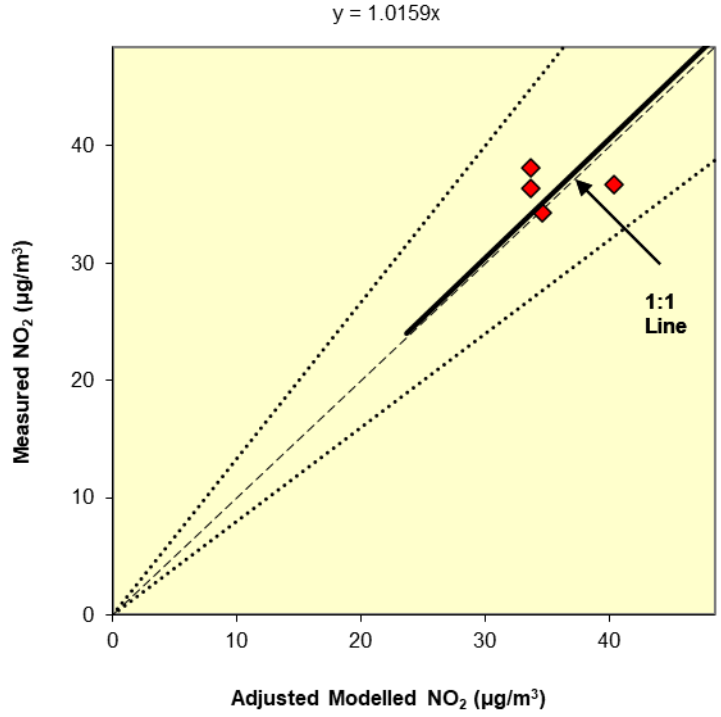

Figure A5.4: Comparison of Measured Total NO_2 to Final Adjusted Modelled Total NO_2 Concentrations. The dashed lines show ± 25%.

5.10.1 Table A5.3 shows the statistical parameters relating to the performance of the model before and after adjustment, as well as the 'ideal' values (Defra, 2022). The values calculated for the model demonstrate that it is performing well both before and after adjustment.

Table A5.3: Statistical Model Performance

Statistical Parameter	Model-Specific Value	'Ideal' Value
Correlation Coefficient [a]	0.01	**1**
Root Mean Square Error (RMSE) [b]	3.21	**0**
Fractional Bias [c]	0.02	**0**

[a] Used to measure the linear relationship between predicted and observed data. A value of zero means no relationship and a value of 1 means absolute relationship.

[b] Used to define the average error or uncertainty of the model. The units of RMSE are the same as the quantities compared (i.e. µg/m^3). TG22 (Defra, 2022) outlines that, ideally, a RMSE value within 10% of the air quality objective (4µg/m^3) would be derived. If RMSE values are higher than 25% of the objective (10 µg/m^3) it is recommended that the model is revisited.

[c] Used to identify if the model shows a systematic tendency to over or under predict. Negative values suggest a model over-prediction and positive values suggest a model under-prediction.

PM_{10} and $PM_{2.5}$

A5.11 The approach described above for NOx and nitrogen dioxide determines the road increment of concentrations by subtracting the predicted local background from the roadside measurements. This works well for NOx because the differences between roadside and background concentrations typically represent a large proportion of the total measured value. The same is not true for PM_{10} and $PM_{2.5}$ concentrations, which are dominated by non-road emissions, even at the roadside. In practice, the influence of a local road on concentrations can often be smaller than the uncertainty in the mapped background concentration. As an example of this, 31% of all roadside and kerbside sites in London which measured $PM_{2.5}$ in 2019 with >75% data capture, recorded an annual mean concentration lower than the equivalent Defra mapped background value. Using measured background concentrations does not provide any significant benefit, owing largely to the spatial resolution of available measurements, but also because of measurement uncertainty. For example, hourly-mean $PM_{2.5}$ concentrations measured at roadside sites are often lower than those measured at nearby urban background sites, while concentrations at urban background sites are often lower than those measured at rural sites.

A5.12 For these reasons, it is not appropriate to calculate the annual mean road-increment to PM_{10} and $PM_{2.5}$ concentrations by subtracting either the mapped background or a local measured background concentration. This, in turn, means that the approach to model adjustment which is described for NOx and NO_2 is not appropriate for PM_{10} and $PM_{2.5}$. Historically, many studies have derived a model

adjustment factor for NOx and applied this to PM_{10} and $PM_{2.5}$. This is also not appropriate, since there is no reason to expect the same bias in emissions of NOx, PM_{10} and $PM_{2.5}$.

A5.13 While there is very strong evidence that EFT-based models have consistently under-predicted road-NOx concentrations in urban areas, there is no equivalent evidence for PM_{10} and $PM_{2.5}$. There is currently no strong basis for applying any adjustment to the model outputs. Predicted concentrations of PM_{10} and $PM_{2.5}$ have thus not been adjusted.

Post-processing

A5.14 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO_2, has been processed through the NOx to NO_2 calculator available on the Defra LAQM Support website (Defra, 2023d). The traffic mix within the calculator has been set to "All London traffic", which is considered suitable for the study area. The calculator predicts the component of NO_2 based on the adjusted road-NOx and the background NO_2.

A6 London Vehicle Fleet Projections

A6.1 TfL has published an Integrated Impact Assessment (Jacobs, 2017) setting out the impacts of the changes to the LEZ and ULEZ described in Paragraphs A1.5 and A1.7. The assessment predicts that the changes will reduce overall NOx emissions from vehicles in London by 28% in 2021 (32% in Inner London and 27% in Outer London) and by 21% in 2025 (24% in Inner London and 21% in Outer London). The percentage reduction reduces with time due to the natural turnover of the fleet that would have occurred regardless of the introduction of the proposed changes. The proposed changes will not significantly affect emissions in Central London, where the ULEZ will already be implemented, but concentrations here will still reduce due to the lower emissions in surrounding areas.

A6.2 The report projects that the changes will reduce exposure to exceedances of the annual mean nitrogen dioxide objective by 40% and 21% in Central London in 2021 and 2025, respectively; by 4% and 0% in Inner London in 2021 and 2025, respectively; and by 23% and 27% in Outer London in 2021 and 2025, respectively, when compared to the baseline scenario.

A6.3 The changes are not projected to have a significant effect on PM_{10} and $PM_{2.5}$ concentrations, although a small reduction is predicted.

A6.4 AQC's report on the performance of Defra's EFT (AQC, 2020b) also highlighted that the EFT's assumptions regarding future fleet composition in London and across the UK may be over-pessimistic in terms of NOx emissions (and no changes to the fleet mix within London were made between versions 9 and 10 of the EFT). The future fleet projection derived from the EFT for Outer London, for example, shows a very small reduction in the proportion of diesel cars between 2016 and 2030, and a very limited uptake of electric cars. The AQC report highlights that this contrasts with the expectations of many observers, as well as the most recent trends publicised by the media. When considered alongside the future requirements of the LEZ and ULEZ, these future fleet projections seem all the more unrealistic (i.e. worst-case in terms of emissions), as the changes to the LEZ and ULEZ would reasonably be expected to significantly increase the uptake of lower emissions vehicles in London.

A6.5 As outlined in Paragraph 4.17, the changes to the LEZ and ULEZ announced by the Mayor of London in June 2018, and the subsequent ULEZ expansion planned for August 2023, are not reflected in Defra's latest EFT and thus have not been considered in this assessment. The potentially over-pessimistic fleet projections built in to the EFT have not been addressed in this report either. Paragraphs A6.1 and A6.2 highlight that the changes to the LEZ and ULEZ will result in significant reductions in vehicle nitrogen oxides emissions and resultant nitrogen dioxide concentrations. The changes might reasonably also be expected to expedite the uptake of cleaner vehicles well beyond that projected in the EFT's fleet projections for London. As such, while the results presented in this

report represent a reasonably conservative reflection of likely concentrations and impacts in the absence of the changes to the LEZ and ULEZ, they almost certainly represent an unrealistically worst-case assessment of likely concentrations and impacts bearing in mind the implementation of these changes.

A7 Adjustment of Short-Term Data to Annual Mean

A7.1 A site-specific diffusion tube monitoring survey was undertaken to accompany the planning application for 330 Gray's Inn Road at seven locations close to the proposed development site, some of which were triplicate sites. The survey was undertaken from July 2019 to January 2020 and therefore do not represent a full calendar year. In the planning application for 330 Gray's Inn Road (ref: 2020/5593/P) (AQC, 2020a), the data were annualised to a 2019 annual mean equivalent based on the ratio of concentrations during the short-term monitoring period to those over the 2019 calendar year at three background sites operated as part of the Automatic Urban and Rural Network (AURN) where long-term data are available.

A7.2 For this assessment, the 2019 annual means have been further annualised to represent a 2022 annual mean equivalent, based on the ratio of concentrations during the 2019 calendar year to those over the 2022 calendar year at the same three background sites. This has been undertaken in accordance with the guidance set out in Box 7.9 of LAQM.TG22.

A7.3 The 2019 and 2022 annual mean nitrogen dioxide concentrations for each of the three automatic monitoring sites for each diffusion tube site are presented. The adjustment factors for each automatic monitor and calculated average factor for each diffusion tube site are presented in Table A7.1.

Table A7.1: Data used to Adjust Short-term Monitoring Data to 2022 Annual Mean Equivalent

Automatic Monitoring Site	2019 Calendar year	2022 Calendar year	Adjustment Factor	Overall Factor
London Bloomsbury	31.5	24.0	0.763	0.739
London Haringey Priory Park South	21.9	17.0	0.779	
London N. Kensington	27.3	18.4	0.676	

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A8 Construction Mitigation

A8.1 Table A8.1 presents a set of best-practice measures from the GLA guidance (GLA, 2014) that should be incorporated into the specification for the works. These measures should be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Table A8.1: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
Site Management		
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site		✓
Develop a Dust Management Plan (DMP)		✓
Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary		✓
Display the head or regional office contact information		✓
Record and respond to all dust and air quality pollutant emissions complaints		✓
Make a complaints log available to the local authority when asked		✓
Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the Local Authority when asked		✓
Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions are being carried out and during prolonged dry or windy conditions		✓
Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and ensure that the action taken to resolve the situation is recorded in the log book		✓
Preparing and Maintaining the Site		
Plan the 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 that are at least as high as any stockpiles on site		✓
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period		✓
Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution	✓	
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods		✓

Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Carry out regular dust soiling checks of buildings within 100 m of site boundary and provide cleaning if necessary	✓	
Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly		✓
Agree monitoring locations with the Local Authority		✓
Where possible, commence baseline monitoring at least three months before work begins		✓
Operating Vehicle/Machinery and Sustainable Travel		
Ensure all on-road vehicles comply with the requirements of the London LEZ (and ULEZ)		✓
Ensure all Non-road Mobile Machinery (NRMM) comply with London's NRMM emission standards. Currently, NRMM used on any site within Greater London are required to meet Stage IIIB of EU Directive 97/68/EC (The European Parliament and the Council of the European Union, 1997) and its subsequent amendments as a minimum, while NRMM used on any site within the Central Activity Zone, Canary Wharf or one of London's Opportunity Areas are required to meet Stage IV of the Directive as a minimum. The proposed development is within an area where this stricter requirement applies. From January 2025, NRMM used anywhere in London will be required to meet stage IV, while from January 2030 the stage V standard will apply. From January 2040 only zero emission machinery will be allowed.		✓
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		✓
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing)		✓
Operations		
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems		✓
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate		✓
Use enclosed chutes, conveyors and covered skips		✓
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate		✓
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods		✓

Waste Management		
Reuse and recycle waste to reduce dust from waste materials		✓
Avoid bonfires and burning of waste materials		✓
Measures Specific to Demolition		
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust)	✓	
Ensure water suppression is used during demolition operations.		✓
Avoid explosive blasting, using appropriate manual or mechanical alternatives		✓
Bag and remove any biological debris or damp down such material before demolition		✓
Measures Specific to Construction		
Avoid scabbling (roughening of concrete surfaces), if possible	✓	
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place	✓	
Measures Specific to Trackout		
Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site		✓
Avoid dry sweeping of large areas		✓
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport		✓
Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site	✓	