Planning Statement
Air Quality Assessment
529 Finchley Road

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Overview

Eight Associates has been commissioned to carry out an Air Quality Assessment (AQA) for the proposed development at 529 Finchley Road, London, NW3 7BG, in the London Borough of Camden. The proposals consist of the refurbishment and conversion of the existing building into 65m^2 of retail floorspace and a mix of 6 studio, one and two bedroom residential units.

The unmitigated risk to local sensitive receptors from emissions of dust and pollution from construction is deemed to be low. However, the risk will be mitigated further through the measures set out in the Air Quality & Dust Management Plan (AQDMP), which will be implemented through the contractor's Construction Environmental Management Plan. With the mitigation measures in place, the residual effects arising from the construction phase of the proposed development would be deemed 'not significant'.

The entire borough was declared as an Air Quality Management Area (AQMA) in 2002 for exceedances of the National Air Quality Objectives (NAQOs) for nitrogen dioxide (NO_2) and 24-hour mean exceedance for particulate matter (PM_{10}). Currently, the borough does not meet the NAQOs for NO_2 and it is well as it is widely accepted that there is no safe level for particulates (PM_{10} and smaller). The site is not located in any Focus Areas and is not considered as a hotspot of poor Air Quality in Camden.

A review of the latest monitoring data for NO_2 at the closest locations to the development indicates that the NAQO at the closest monitoring station has been achieved in the latest reporting year of 2019. NAQOs at another monitoring site was consistently achieved for reporting years 2016–2019. The LAEI 2016 modelled mean annual NO_2 concentrations were estimated at approximately 58 µg/m^3 at the site, exceeding both the NAQO and WHO guideline.

Nearby monitored mean annual PM_{10} concentrations achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of PM_{10} at the site were estimated at approximately 29 µg/m^3, achieving the NAQO but exceeding the WHO guideline.

No nearby monitored mean annual $PM_{2.5}$ concentrations were recorded. The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are estimated as approximately 16 µg/m^3, achieving the NAQO but exceeding the WHO guideline.

Since the development is introducing new sensitive receptors to the area and the north east façade is exposed to emissions from road transport using a principal road, namely A41 Finchley Road and the west façade facing Ingham Road, atmospheric dispersion modelling was carried out. The performance of the modelled receptors at both the north east (facing Finchley Road) and west façade (facing Ingham Road) indicates the effects of NO_2 concentrations in the three different scenarios, 'Baseline 2019', '2023 no development' and '2023 with development' to be significant. PM_{10} and $PM_{2.5}$ concentrations at both facades are predicted to be below the NAQOs. Therefore, residents having access to openable windows, especially those facing Finchley Road, will be exposed to high level of pollution.

For developments within London, the AQA methodology includes the requirement to undertake an assessment against the Air Quality Neutral (AQN) guidance. The scheme has been assessed for both the impacts of transport and building operation against the AQN guidance and it meets the requirements for AQN.

To reduce exposure of future occupants to pollutants, mechanical ventilation systems and fixed windows are proposed. Further mitigation measures include sustainable mode of transport and low and zero carbon technologies.

Introduction

Air Quality Assessment

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Project Overview

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The London Borough of Camden has declared an Air Quality Management Area (AQMA) for the whole Borough due to continued exceedances against National Air Quality Objectives (NAQOs) for the annual mean NO_2 and 24-hour mean exceedance for PM_{10}. Due to the proposed nature of the development, introducing new sensitive receptors into an area with existing poor air quality, mainly influenced by emissions from road transport using Finchley Road, an AQA has been undertaken to accompany the planning application.

Scope of Assessment

An AQA has been undertaken in accordance with relevant planning policy and best-practice guidance at national, regional and local levels. The AQA includes:

- Establishment and review of existing air quality;
- Establishment of nearby sensitive receptors to air pollution;
- Assessment of air quality and dust impacts during the construction phase;
- Assessment of air quality impacts expected during the operation of the new development;
- Evaluation of outline proposals against the Air Quality Neutral (AQN) benchmarks; and
- Assessment of the mitigation strategy to limit the exposure of building users and nearby receptors, to air pollution.

Key policy and guidance documents considered in the AQA are outlined in Table 1.

Table 1: National, regional and local policies and guidance.

National	National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021)
	The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Department for Environment, Food & Rural Affairs, Defra), 2007
	Land-Use Planning & Development Control: Planning for Air Quality (Environmental Protection UK (EPUK), Institute of Air Quality Management (IAQM), 2017)
	Clean Air Strategy (Department for Environment, Food & Rural Affairs, Defra), 2019
	Air Quality Plan for Nitrogen dioxide (NO_2) in UK (Defra, 2017)
	Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)
	Local Air Quality Management: Technical guidance LAQM.TG (16) (Department for Environment, Food & Rural Affairs, Defra), 2018
Regional	The London Plan 2021 (Mayor of London, 2021)
	Sustainable Design and Construction: Supplementary Planning guidance (Mayor of London, 2014)
	The Control of Dust and Emissions during Construction and Demolition: Supplementary Planning Guidance (Mayor of London, 2014)
	Clearing the Air – The Mayor's Air Quality Strategy (Mayor of London, 2010)
	Air Quality and Planning Guidance (London Councils, 2007)
Local	Camden Local Plan 2017 (London Borough of Camden, 2017)
	Camden Planning Guidance – Air Quality (London Borough of Camden, 2021)
	Clean Air Action Plan 2019-2022 (London Borough of Camden, 2018)

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National Legislation and Policy

The Air Quality Standards Regulations 2010 implements the requirements of EU Directive 2008/50/EC into UK legislation. Defra, on behalf of the UK Government, has produced a series of plans for the UK to meet the EU targets in the shortest possible time, the latest being the UK plan for tackling roadside NO_2 concentrations in July 2017 (NO_2 being identified as the primary pollutant for which the EU limit values are exceeded). An overview document has been produced, together with detailed plans for 37 zones where the objectives for NO_2 were not met in 2015.

The plan for the Greater London area sets out a range of measures to reduce NO_2 concentrations and indicates that with these measures, London will be compliant by 2025.

Table 2 sets out the ambient air quality standards for a range of key pollutants requiring specific objectives for ambient concentrations for pollutants (UK limit values) to be achieved and maintained.

Table 2: UK limit values for key pollutants.[1]

Pollutants	Concentrations	Measured as	Date to be achieved by
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 µg/m^3	Annual mean	31 December 2005
Particles (PM_{10})	50 µg/m^3 not to be exceeded more than 35 times per year	24-hour mean	31 December 2004
	40 µg/m^3	Annual mean	31 December 2004
Particles ($PM_{2.5}$)	25 µg/m^3	Annual mean	31 December 2010

Table 2: UK limit values for key pollutants (continued).

Pollutants	Concentrations	Measured as	Date to be achieved by
Carbon monoxide (CO)	10 mg/m^3	Max. daily 8-hour mean	31 December 2003
Sulphur dioxide (SO_2)	266 µg/m^3 not to be exceeded more than 35 times per year	15-minute mean	31 December 2005
	350 µg/m^3 not to be exceeded more than 24 times per year	1 hour mean	31 December 2004
	125 µg/m^3 not to be exceeded more than 3 times per year	24-hour mean	31 December 2004
Ozone (O_3)	100 µg/m^3 not to be exceeded more than 10 times per year	8-hour mean	31 December 2005

National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021)

The National Planning Policy Framework (NPPF) published in February 2019 sets out the UK Government's planning policies for England. Planning law requires that applications for planning permission must be determined in accordance with the local development plan, unless material considerations indicate otherwise.

[1] The full UK limit values can be viewed on Defra's UK AIR website.

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The NPPF is also a material consideration in planning decisions. It states that the purpose of the planning system is to contribute to the achievement of sustainable development; and that planning decisions on individual applications must reflect statutory requirements. Specifically, in terms of air quality, it requires the planning system to prevent development from contributing to or being put at unacceptable risk from unacceptable levels of air pollution.

Planning policies should promote compliance with or contribute towards achievement of EU limit values and NAQOs, taking into account the presence of AQMAs and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development within an AQMA is consistent with the local Air Quality Action Plan (AQAP).

The NPPF is supported by a series of Planning Practice Guidance (PPG) documents. The guidance in relation to air quality provides guiding principles on how planning can take account of the impact of new development on air quality.

National Air Quality Management

Part IV of the Environment Act 1995 requires the UK Government to publish an Air Quality Strategy and for local authorities to review, assess and manage air quality within their areas, known as Local Air Quality Management (LAQM).

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Defra, 2007)

The 2007 Air Quality Strategy establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objectives (NAQOs) for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality Standards Regulations 2010 and the Air Quality (Amendment) (England) Regulations 2002. It should be noted that the EU limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and legal responsibility.

The EU limit values are mandatory whereas the NAQOs are policy objectives. Local authorities are not required to achieve them but have to work towards their achievement. In addition, the EU limit values apply in all locations except where members of the public do not have access and there is no fixed habitation, on factory premises or at industrial installations, and on the carriageway/central reservation of roads except where there is normally pedestrian access. Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the NAQOs, it must designate these areas as AQMAs and develop an Air Quality Action Plan (AQAP) setting out measures to reduce pollutant concentrations with the aim of meeting the NAQOs.

Clean Air Strategy (Defra, 2019)

Additionally, the Clean Air Strategy 2019 sets outs goals that will be more stringent than EU requirements with the aim of reducing human exposure to toxic pollutants by taking into account the World Health Organisation's guidelines. The policies in the Strategy aim to reduce $PM_{2.5}$ concentrations across the UK so that the number of people living in locations above the WHO annual mean guideline limit of 10 µg/m^3 is reduced by 50% by 2025. Moreover, the Strategy will feed information to local authorities on how the cumulative impacts of nitrogen deposition in natural habitats should be assessed and mitigated through the planning system.

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Regional Policy and Guidance

The London Plan 2021 (Mayor of London, 2021)

Policy SI 1 in the Intended London Plan 'Improving air quality' states that:

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

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

1 Development proposals should not:

- lead to further deterioration of existing poor air quality
- 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
- create unacceptable risk of high levels of exposure to poor air quality.

2 In order to meet the requirements in Part 1, as a minimum:

- development proposals must be at least Air Quality Neutral
- 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
- 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
- development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.

C Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:

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

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

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

Clearing the Air – The Mayor's Air Quality Strategy (Mayor of London, 2010)

The Mayor of London produced an Air Quality Strategy in 2002 under the requirements of the Greater London Authority Act 1999, which was superseded by the subsequent Air Quality Strategy, published in December 2010. The Air Quality Strategy sets out how the National Air Quality Strategy would be implemented in London as a whole.

The Mayor's Air Quality Strategy outlines a number of policies to deliver the required reductions in PM_{10} and NO_2 concentrations in Greater London, to meet the EU limits. The planning process is required to improve air quality by ensuring that new developments, as a minimum, are 'air quality neutral'. With regard to the proposed development the key policies are as follows:

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- Policy '6 – Reducing emissions from construction and demolition sites' which states that the Mayor will work with the London Council to review and update the Best Practice guidance for construction and demolition sites and create supplementary planning guidance to assist implementation;
- Policy '7 – Using the planning process to improve air quality – new developments in London as a minimum shall be 'air quality neutral' which states that the Mayor will encourage boroughs to require emissions assessments to be carried out alongside conventional air quality assessments. Where air quality impacts are predicted to arise from developments these will have to be offset by developer contributions and mitigation measures secured through planning conditions, section 106 agreements or the Community Infrastructure Levy;
- Policy '8 – Maximising the air quality benefits of low to zero carbon energy supply' which states that the Mayor will apply emission limits for both PM and NO_x for new biomass boilers and NO_x emission limits for Combined Heat and Power (CHP) plant. Air quality assessments will be required for all developments proposing biomass boilers or CHP plants and operators will be required to provide evidence yearly to demonstrate compliance with the emission limits; and
- Policy '9 – Energy efficient buildings' which states that the Mayor will set CO_2 reduction targets for new developments which will be achieved using the Mayor's Energy Hierarchy. These measures will result in reductions of NO_x emissions.

Sustainable Design and Construction: Supplementary Planning Guidance (Mayor of London, 2014)

The Supplementary Planning Guidance (SPG), which supports the London Plan, was first published in 2006 and was updated in April 2014. The following guidance on air quality is provided in Section 4:

- Developers should design schemes to be 'Air Quality Neutral';
- Developments should be designed to minimise the generation of air pollutants;
- Developments should be designed to minimise exposure to poor air quality;
- Energy plant, including boilers and CHP) should meet relevant emission limits; and
- Developers and contractors should follow the relevant guidance on minimising impacts from construction and demolition.

The SPG states that where developers are unable to meet the 'air quality neutral' benchmark, consideration should be given to off-site NO_x and PM_{10} abatement measures.

The Control of Dust and Emissions during Construction and Demolition: Supplementary Planning Guidance (SPG) (Mayor of London, 2014)

This SPG provides detailed best practice guidance, seeking to address emissions from construction activities, including construction machinery with respect to London's 'low emission zone' for non-road mobile machinery (NRMM), introduced in 2015. The SPG incorporates the Institute of Air Quality Management (IAQM) 'Guidance on the assessment of dust from demolition and construction' approach for assessing the risk of dust impacts from construction.

Local Policy and Guidance

Camden Local Plan 2019-2022 Proposed Submission Version (London Borough of Havering, 2017)

The Local Plan sets out the vision and strategy for future growth and sustainable development up to 2022. The policies below relate directly to air quality and development:

Policy CC4 – Air Quality

- The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.
- The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.
- Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

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Camden Planning Guidance – Air Quality (London Borough of Camden, 2021)

The whole of Camden is an Air Quality Management Area (AQMA) as it does not meet national air quality objectives for nitrogen dioxide (NO2) and because it is widely accepted that there is no safe level for particulates (PM10 and smaller). Air quality is particularly severe along major roads through the borough, and in the south of borough which is characterised by high levels of traffic. Major roads are those either in the Transport for London Road Network or designated as a Major Road by Camden.

- All of Camden is a designated Air Quality Management Area due to the high concentrations of nitrogen dioxide (NO2) and particulate matter (PM10).
- All developments are to protect future occupants from exposure to poor air quality.
- All developments are to limit their impact on local air quality and be at least air quality neutral.

Policy 3.5.Air quality assessments are to include the following:

- Emissions: An inventory of the PM10 and NOx emissions associated with the proposed development, including the type and quantity of emission concentrations, during the construction and operational phase. This shall cover transport, stationary and mobile emission sources.
- Modelling: The application of atmospheric dispersion modelling to predicted NO2 and PM10 concentrations, both with and without the proposed development. Dispersion modelling shall be the carried out in accordance with Air Quality and Planning Guidance, London Councils (2007) and London Local Air Quality Management Plan Technical Guidance 2016. Modelling should not predict improvements to future years (future vehicle emissions or future background concentrations).

Clean Air Action Plan 2019–2022 (London Borough of Camden, 2018)

Camden's Clean Air Action Plan has been produced as part of our duty to London Local Air Quality Management. It outlines the action we will take to improve air quality in Camden between 2019 and 2022.

Some relevant actions related to reducing emissions from buildings and new development include:

- Working to reduce emissions from our own estate and operations;
- Helping residents and visitors to reduce emissions and exposure;
- Using planning policy and regulation to reduce air pollution;
- Implementing innovative projects across the borough to improve air quality;
- Using our influence to lobby for increased financial and regulatory support for the mitigation of air pollution;
- Maintaining a monitoring network and ensuring the data is freely accessible;
- Raising awareness on how to reduce emissions and exposure

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Site Overview

The development site at 529 Finchley Road is on the west side of Finchley Road in the north of The London Borough of Camden. The OS grid reference for the site is X (Eastings) 525291, Y (Northings) 185637 and the postcode is NW3 7BG. It is bounded by the buildings to the north-west and the south-east and Finchley Road to the north-east, as illustrated in Figure 1.

The total area of the site is approximately 200m^2 (0.02 ha). The existing building on site is a four storey building in use as a fitness centre and a language school.

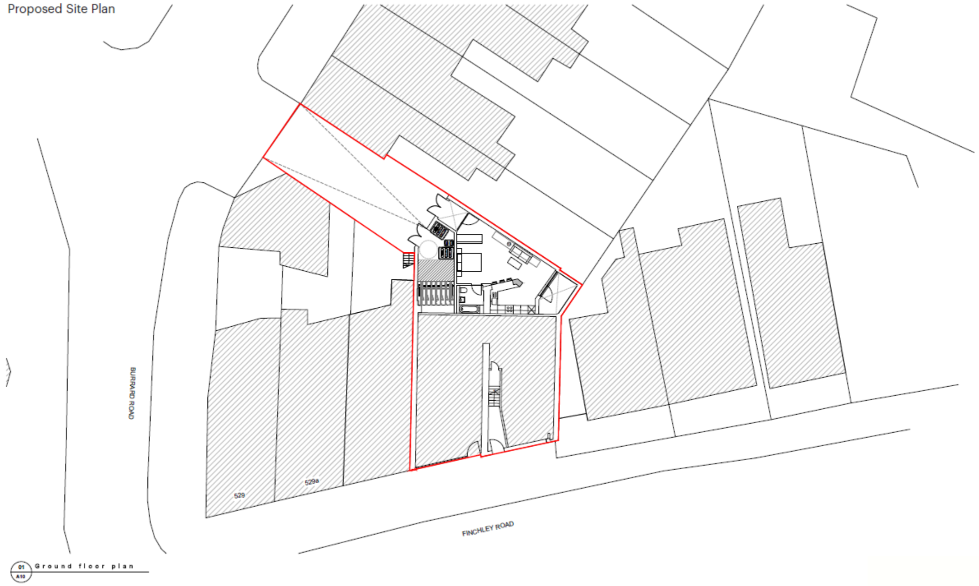

Figure 1: The red line illustrates the approximate location of the site.

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Description of Proposed Development

The proposals consist of the refurbishment and conversion of the existing building into 65m^2 of retail floorspace and a mix of 6 studio, one and two bedroom residential units. Illustrations of the proposed ground floor plan, first floor plan and elevation are shown in Figure 2, Figure 3 and Figure 4, respectively.

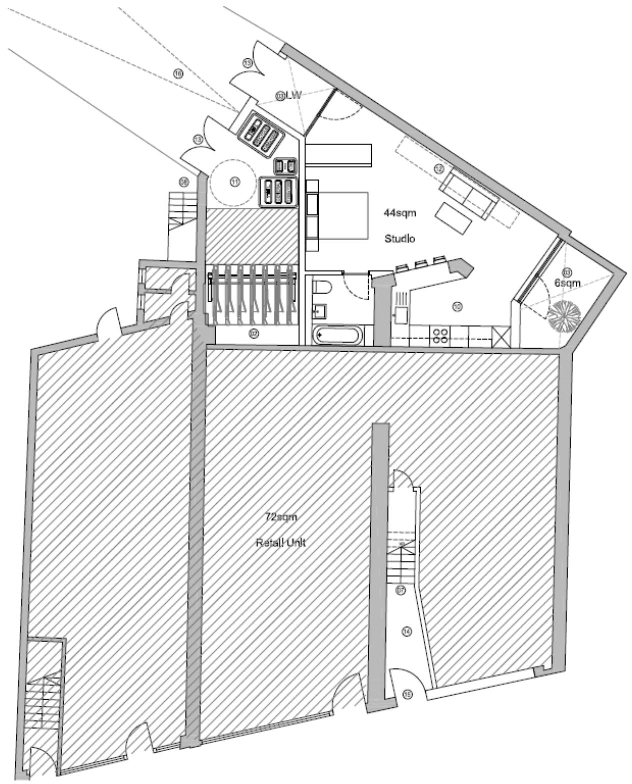

Figure 2: Proposed ground floor plan showing the retail space, residential unit and residential ancillaries.

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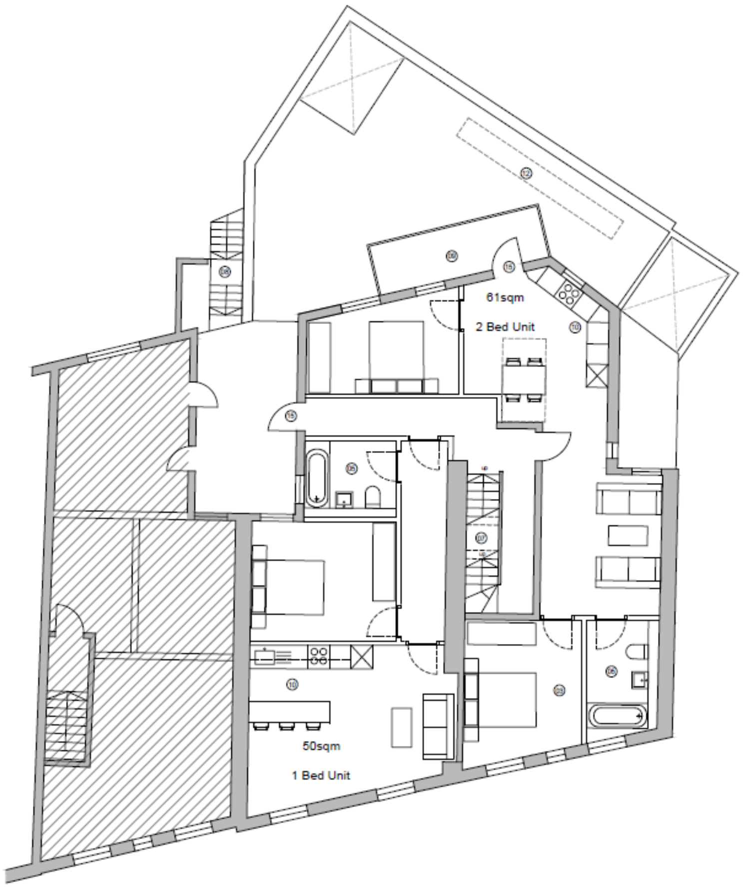

Figure 3: Proposed first floor plan illustrating the retail space, residential units.

Figure 4: The north east elevation facing Finchley Road.

Local Receptors
Air Quality Assessment
529 Finchley Road

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Overview of Local Sensitive Receptors

A sensitive receptor is a location that may be affected by the emission of pollutants and / or particulate matter during construction or from the operation of a completed development, including from building plant and transport uses as a result of the new development.

In accordance with the Institute of Air Quality Management (IAQM) ‘Guidance on the assessment of dust from demolition and construction’, the need for a detailed assessment of the air quality impacts from construction should be determined where the following receptors are present:

- Where there is a human receptor within:
    - 350m of the boundary of the site; and/or
    - 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- Where there is an ecological receptor within:
    - 50m of the boundary of the site; and/or
    - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

For the purposes of identifying receptors, which may be sensitive to potential air quality impacts of dust and emissions from construction, a 350m radius from the development site is used for human receptors, a 50m radius for ecological receptors and a 500m radius is used for the trackout route for both types of receptors, as shown in Figure 5.

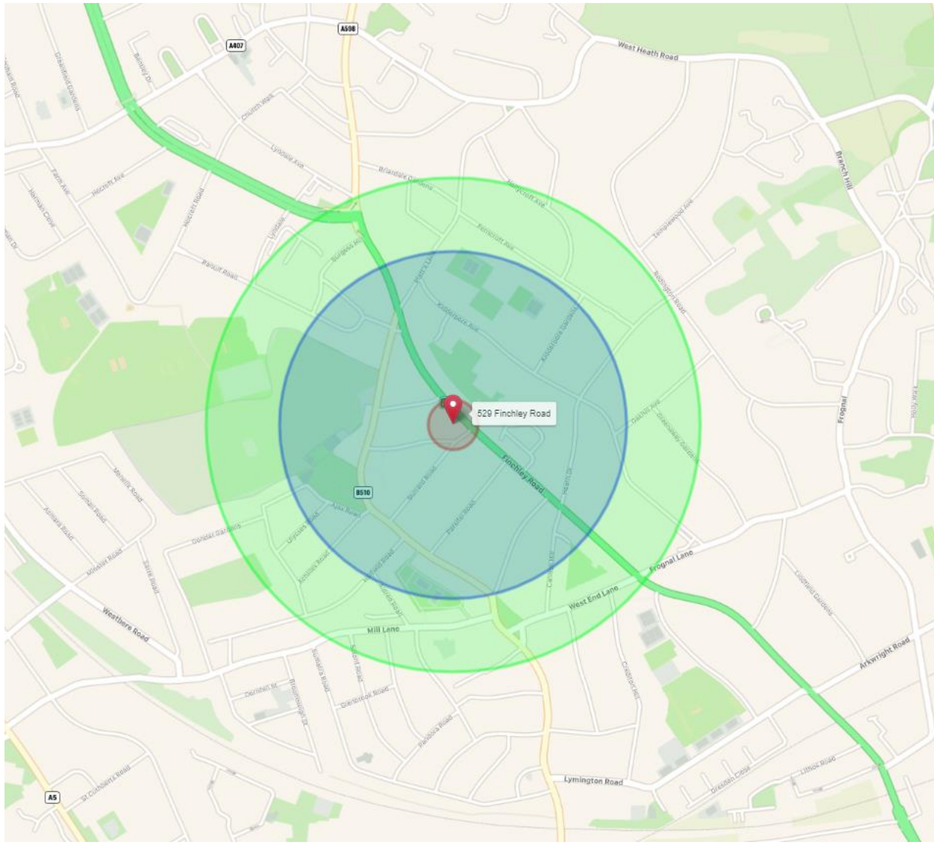

Figure 5: Map view showing a 500m radius (green), a 350m radius (blue) and a 50m radius (red) from the site.

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Human Receptors

A human receptor refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM_{10} over a time period relevant to the air quality objectives, as defined in the Government's technical guidance for Local Air Quality Management. In terms of annoyance effects, this will most commonly relate to residential dwellings, but may also refer to other premises such as schools, hospitals, museums, vehicle showrooms, food manufacturers and amenity areas.

The site is located in an area of mixed residential and commercial character. Key human receptors are described below (all distances detailed are approximate).

Schools

The following schools have been identified within 350m of the development or within 500m of the trackout route:

- Academia Gratis – approximately 150m north-west.
- Hampstead School of Art – approximately 200m north.
- St Margaret's School – approximately 350m north east.

Nurseries

The following nurseries / pre-schools have been identified within 350m of the development or within 500m of the trackout route:

- Montessori by Busy Bees Fortune Green – approximately 210m west.
- PACE – Fortune Green Playcentre – approximately 290m west.
- Emmanuel C of E Primary school – approximately 400m south.
- Camden Community Nursery – approximately 400m south.
- Beckford Primary School – approximately 500m south west.

Hospitals

No hospitals have been identified within 350m of the development or within 500m of the trackout route.

Doctors

The following doctors have been identified within 500m of the trackout route:

- Dr L Stewart – Chomley Gardens Surgery, 543 Finchley Rd, London NW3 7BJ – approximately 100m north west.
- The Surgery, 1 Cholmley Gardens, London NW6 1AE – approximately 400m south.

Ecological Receptors

Potential sensitive ecological receptors have been determined using geographic information obtained from MAGIC's website.

No statutory or non-statutory ecological sites have been identified within 50m of the development or within 500m of the trackout route.

The following habitats, that could represent ecological receptors but are not defined as either statutory:

- National Forest Inventory (GB) between Parsifal Road and Lyncroft Gardens– approximately 165m south.
- Priority Habitat Inventory, Deciduous Woodland at the Hampstead Cemetery – approximately 200m west.
- Farmland Birds, Turtle Dove – approximately 225m north east.
- National Forest Inventory (GB) between Oakhill Avenue and Redington Gardens – approximately 340m north east.
- National Forest Inventory (GB) and Deciduous Woodland (England) between Redington Road and Hollycroft Avenue – approximately 415m north east.
- Open Mosaic Habitat, National Forest Inventory (GB) at Gondar Gardens– approximately 480m south west.

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Introduction

Construction phase impacts, as a result of the proposed development, have been assessed using the Institute of Air Quality Management (IAQM) 'Guidance on the assessment of dust from demolition and construction'. The construction phase impacts have been assessed for their risks in line with section 5 of the IAQM guidance.

Assessment of Construction Impacts

Using the evaluation criteria within the IAQM's guidance, the potential dust emission magnitude has been identified for each stage of the proposed development as shown in Table 3.

Table 3: Dust emission magnitudes for construction activities.

Activity	Dust emission magnitude	Justification
Demolition	Small	The total building volume to be demolished will be less than 20,000 m^3 and demolition activities will occur at no greater than 10 m above ground.
Earthworks	Small	The total site area is less than 2,500 m^2. There would be less than 5 heavy earth moving vehicles active at any one time– approximately 200 m^2.
Construction	Small	The total new building volume will be less than 25,000 m^3.
Trackout	Small	It is anticipated that there will be a minimal unpaved site area, which will be used for vehicle trackout. It is considered likely that there would be no more than approximately 8 outward vehicle movements of HDV (>3.5t) vehicles in any one day.

The overall sensitivity of the surrounding area to dust soiling, human health impacts and ecological effects has been determined by reviewing the sensitivity of the receptors and distance from the source. A summary of sensitivity of nearby receptors to dust impacts is given in Table 4.

Table 4: Sensitivity of nearby receptors to dust impacts.

Sensitivity of people to dust soiling	Sensitivity of people to PM_{10} health impacts	Sensitivity to ecological effects
Medium	Medium	Low
More than 10 residential units have been identified within 50m of the site.	More than 10 residential units are located within 50m. Nurseries, schools and doctors are present within 350m of the site. The annual mean PM_{10} was 29 µg/m^3 in 2016 as per LAEI.	No internationally or nationally designated ecological sites in proximity of the site. It is not established whether there are particularly important or vulnerable plant species in nearby green spaces, therefore precautionary principle is applied.

The dust emission magnitude determined in Table 3 has been combined with the sensitivity assessment in Table 4 to define the risk of impacts for each phase of development in the absence of mitigation measures. The sensitivity of the surrounding area has been defined in accordance with IAQM guidance and the results are given in Table 5.

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Table 5: Risk to local sensitive receptors from construction dust impacts.

	Risk without mitigation	Activity			
		Demolition	Earthworks	Construction	Trackout
Potential impact	Dust soiling	Low	Low	Low	Negligible
	Human health	Low	Low	Low	Negligible
	Ecological effects	Negligible	Negligible	Negligible	Negligible
Overall risk of dust impacts with no mitigation		Low risk			

The overall risk of dust impacts from the construction phase without mitigation measures proposed has been assessed as being low risk. The risk across the four construction activities has been determined to be low risk or negligible. The risk of all the activities with regards to ecology is deemed to be negligible. Therefore, no further mitigation measures need specifically be recommended for protecting ecology.

Effects of Mitigation Measures

A schedule of mitigation measures has been developed for the construction phase, based on the 'Control of Dust and Emissions during Construction and Demolition: Supplementary Planning Guidance' (Mayor of London, 2014). These measures are outlined in the Air Quality & Dust Management Plan (AQDMP) (Appendix A). The measures will be incorporated in the appointed Contractor's Construction Environmental Management Plan.

The recommended AQDMP measures address the key construction activities identified and a summary of the proposed measures to satisfactorily reduce the risks from the respective construction phases is given in Table 6. The implementation of the proposed measures is deemed to mitigate the risk for each activity and thus the residual effects are deemed to be negligible.

Table 6: Summary of proposed AQDMP mitigation measures for construction phase.

Activity	Relevant mitigation measures
General (all activities)	Site management measures 1–10. Preparing and maintaining the site measures 11–23. Operating vehicle/machinery and sustainable travel measures 24–30. Operations measures 31–35. Waste management measure 36–37.
Demolition	Measures 38–41.
Earthworks	Measures 42–44
Construction	Measures 45–48.
Trackout	Measures 49–58.

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Current Local Status

The London Borough of Camden was declared an AQMA for the entire borough in 2002. The AQMA has been declared due to annual mean exceedances of NO_2 and 24–hour mean exceedances of PM_{10}. Currently, the borough does not meet all the NAQOs for NO_2, as well as it is widely accepted that there is no safe level for particulates. These pollutants ate primarily produced by road traffic. However, other contributors include construction, domestic gas use and industry.

The Camden Clean Air Action Plan 2019–2022 identified five Focus Areas, based on modelling using the London Atmospheric Emissions Inventory (LAEI) 2013[2], which were updated in 2016. Table 7 and Figure 6 illustrate the Focus Areas as determined by LAEI 2016 modelling data. Focus Areas are locations designated as having high levels of pollution and human exposure.

Table 7: List of Focus Areas in Camden based on LAEI 2016.

ID LAEI 2016	Focus Areas
28	Camden High Street from Mornington Crescent to Chalk Farm and Camden Road
29	Holborn and Southampton Row junction
30	Kilburn Town Centre
31	Euston Road
32	Swiss Cottage from South Hampstead to Finchley Road Station

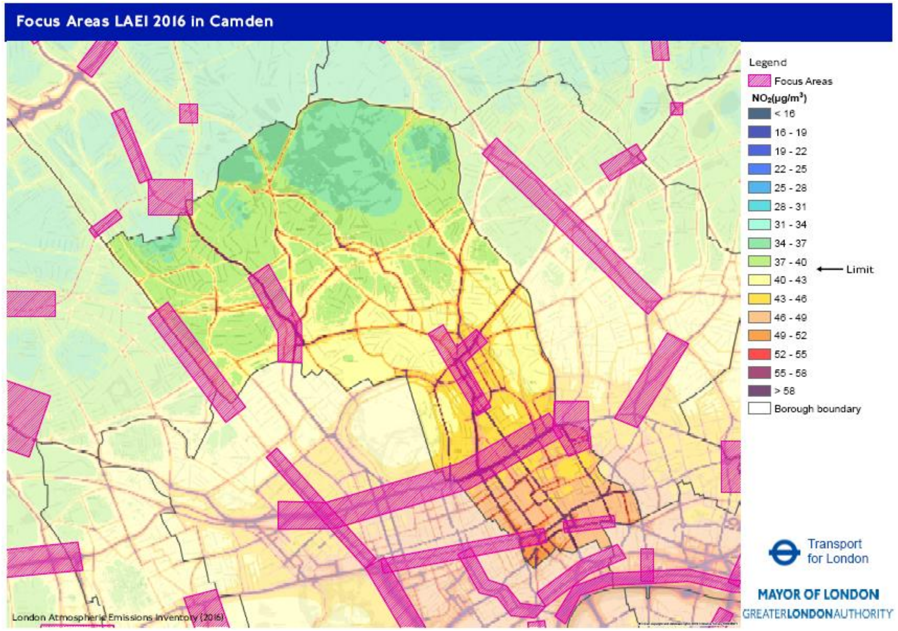

Figure 6: Focus Areas in Camden based on LAEI 2016.

[2] LAEI 2013 datasets were used in the AQAP.

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Local Monitoring Stations

Four automatic monitoring sites and 33 non-automatic monitoring sites have been identified in the London Borough of Camden Air Quality Annual Status Report 2019. Based on their proximity to the development site, completeness of data and relevance to the site, the following monitoring sites are reviewed in Table 8. Three non-automatic monitoring sites have been identified that are considered to be representative of the surroundings of the site.

Table 8: Air quality monitoring stations identified near the site.

Site ID	Site name and type	Pollutants monitored	Distance to exposure (m)	Distance to kerb (m)	Inlet height (m)	Distance from site (m)
CA25A	Emmanuel Primary School, diffusion tube, roadside	NO_2	3.0	2.0	2.0	390
CA7	Frognal Way, diffusion tube, urban background	NO_2	6.0	30.0	3.0	930
CA17	47 Fitzjohn's Road, diffusion tube, roadside	NO_2	5.0	5.0	2.0	1,300

A map, showing the approximate locations of the closest NO_2 diffusion tubes, in relation to the development site, is shown in Figure 7.

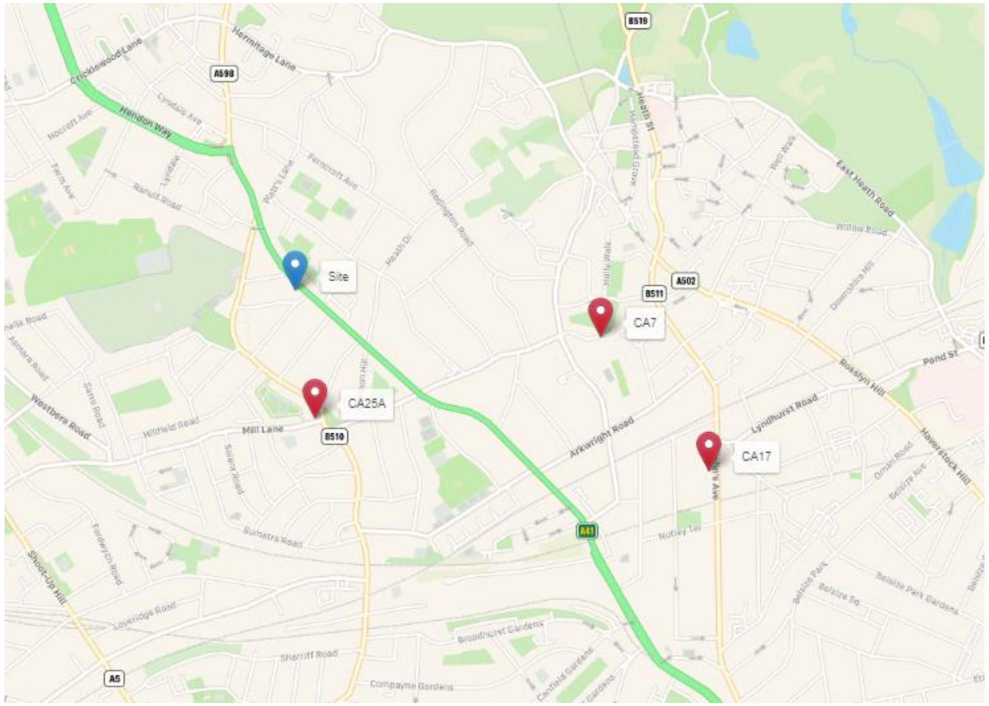

Figure 7: Map showing location of development site (shown in blue) in relation to nearby automatic monitoring stations (shown in yellow) and NO_2 diffusion tubes (shown in red).

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Monitored Nitrogen Dioxide (NO_2)

A summary of the latest monitoring results for NO_2 annual mean concentrations at the closest monitoring stations to the development site is given in Table 9. Results for each monitoring station and reporting year are shown in green where the NAQO is achieved, in red where the NAQO is exceeded and in grey where data have not been reported.

The data show that the NAQO for mean annual NO_2 concentration (for the mean annual concentration to be no more than 40 µg/m^3) closest to the development site, has been achieved at site CA25A in the latest reporting year 2019. NAQOs at monitoring site CA7 has consistently been achieved for reporting years 2016–2019. NAQOs at monitoring site CA17 has exceeded for reporting years 2016–2019 but is consistently decreasing. Moreover, there is a decreasing trend in NO_2 levels. Additionally, air quality is predicted to improve in the future with actions such as the introduction of electric vehicles and low emission zones.

Table 9: 2016–2019 NO_2 annual mean concentrations near the site.[i]

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2019	2018	2017	2016
CA25A	Non-automatic, roadside (2.0 m from kerb)	390	37.88	–	–	–
CA7	Non-automatic, urban background (30.0m from kerb)	930	22.82	22.12	29.64	27.91
CA17	Non-automatic, roadside (5.0 m from kerb)	1.300	42.53	48.13	66.27	56.38

Since the borough does not undertake any automatic monitoring near the site, NO_2 hourly mean concentration cannot be reported. Monitoring station are located further away from Finchley Road – the major source of emissions from road transport than the site. It is likely that the site emission values will be higher.

Monitored Particulate Matter under 10 µm diameter (PM_{10})

Since the borough does not undertake any automatic monitoring near the site, PM_{10} concentration cannot be reported.

Monitored Fine Particulate Matter 2.5 µm diameter ($PM_{2.5}$)

Since the borough does not undertake any automatic monitoring near the site, $PM_{2.5}$ concentration cannot be reported.

Modelled Nitrogen Dioxide (NO_2)

The London Atmospheric Emissions Inventory (LAEI)[3] is a database of geographically referenced datasets of pollutant emissions and sources in Greater London. The base year for the latest and current LAEI is 2016 and includes NO_2, PM_{10} and $PM_{2.5}$ as key pollutants.

The LAEI 2016 modelled mean annual concentrations of NO_2 for the site and surrounding area are shown in Figure 8. Mean annual NO_2 concentrations were estimated at approximately 58 µg/m^3 at the site for 2016. The modelled data indicate that the NAQO and WHO guidelines (mean annual concentration no greater than 40 µg/m^3) were both exceeded at the site during 2016.

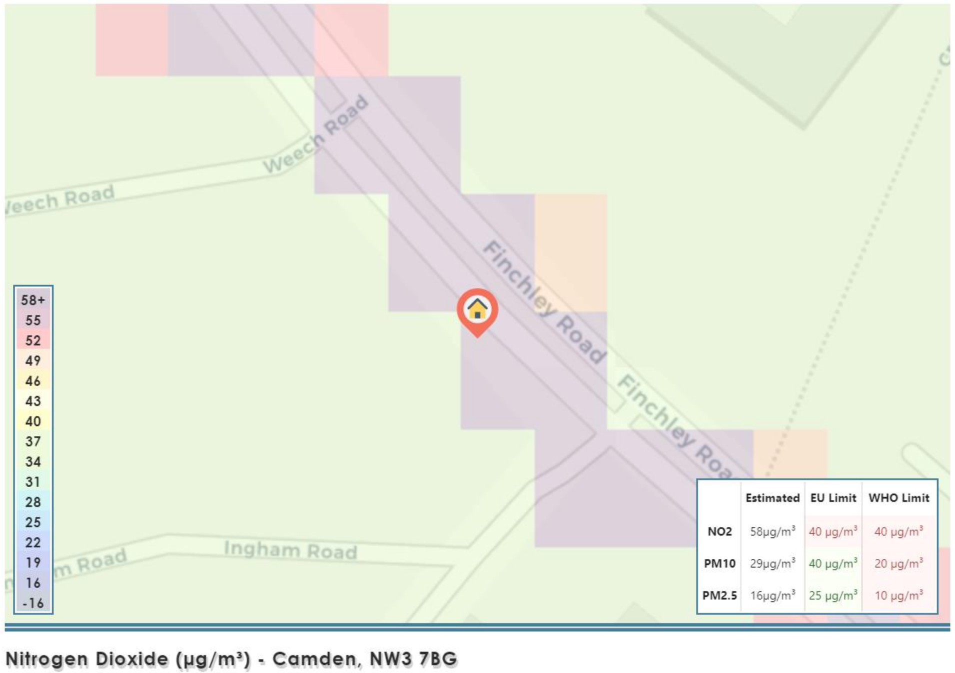

Figure 8: 2016 modelled NO_2 concentrations for the site and surrounding area.

[3] London Atmospheric Emissions Inventory (LAEI) 2016, Greater London Authority. LAEI 2016 mapped data accessed from London Air.

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Modelled Particulate Matter under 10 µm Diameter (PM_{10})

The LAEI 2016 modelled mean annual concentrations of PM_{10} are shown in Figure 9. Mean annual PM_{10} concentrations at the site were estimated at approximately 29 µg/m^3 for 2016. The modelled data indicate that the NAQO (mean annual concentration no greater than 40 µg/m^3) was achieved at the site for 2016 but the WHO guideline (mean annual concentration no greater than 20 µg/m^3) was exceeded.

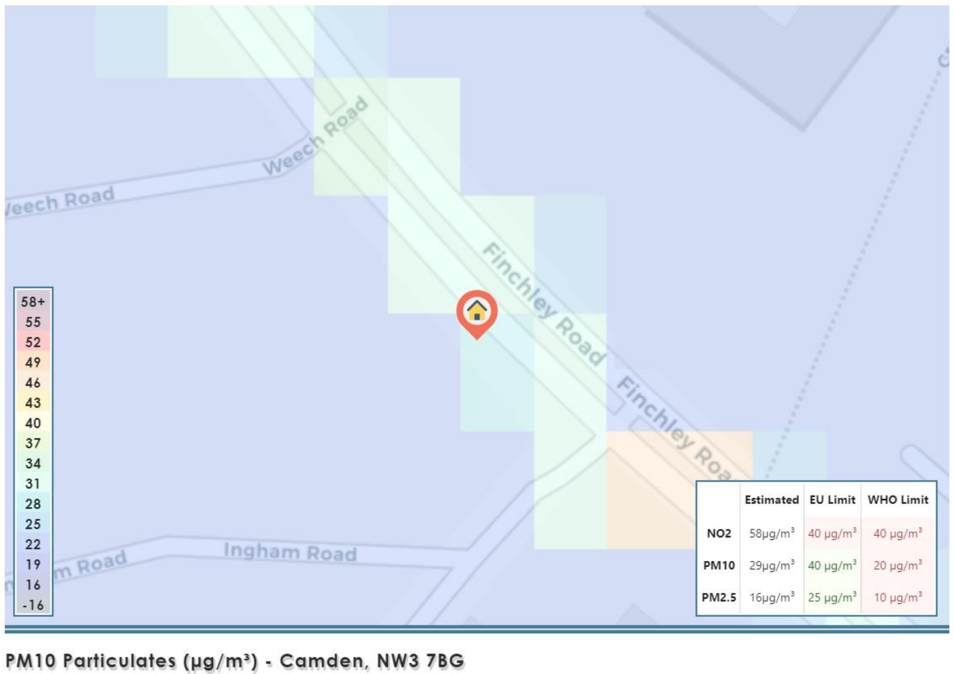

Figure 9: 2016 modelled PM_{10} concentrations for the site and surrounding area.

Monitored Fine Particulate Matter 2.5 µm Diameter ($PM_{2.5}$)

The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are shown in Figure 10. Mean annual $PM_{2.5}$ concentrations at the site were estimated at approximately 16 µg/m^3 for 2016. The modelled data indicate that the NAQO (mean annual concentration no greater than 25 µg/m^3) for 2016 was achieved at the site, but the WHO guideline (mean annual concentration no greater than 10 µg/m^3) was exceeded.

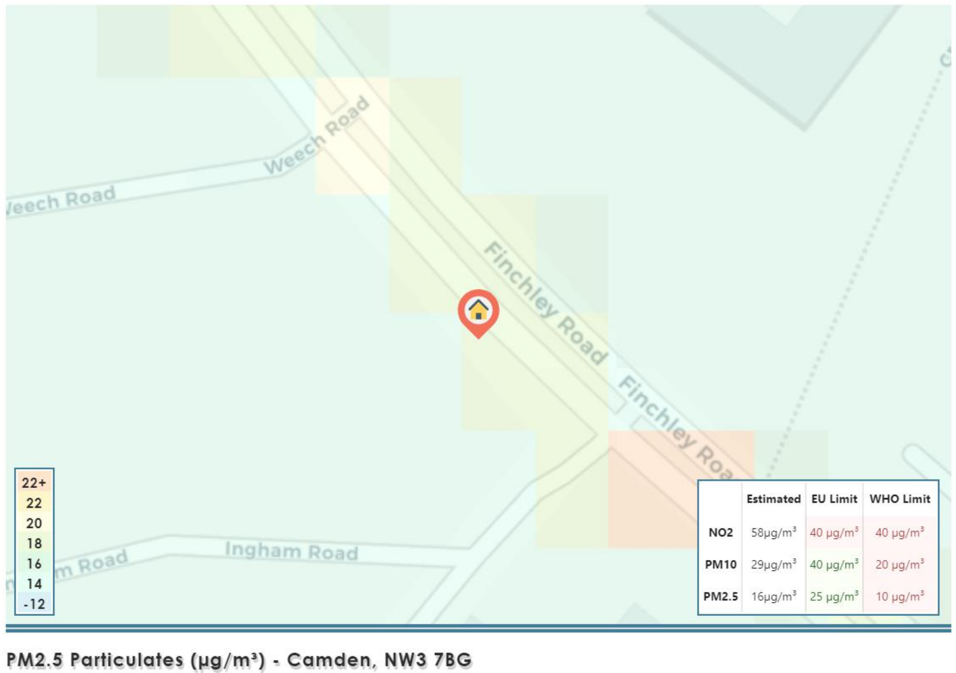

Figure 10: 2016 modelled PM_{10} concentrations for the site and surrounding area.

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Modelled Background Concentrations

Defra provides modelled background concentrations for key pollutants across the UK. The 2019–2023 modelled background concentrations for NO_2, PM_{10} and $PM_{2.5}$ for the area surrounding the site are given in Table 100. The background concentrations for NO_2, PM_{10} and $PM_{2.5}$ achieve the NAQOs. Modelling did not account for improvements for future years, according to CPG Policy 3.5.

Table 100: 2019 modelled background concentrations near the site.[4]

Pollutant/particulate matter	Background concentration (µg/m³)				
	2023	2022	2021	2020	2019
NO_2	22.0	22.6	23.4	24.2	25.2
PM_{10}	17.3	17.5	17.7	17.9	18.4
$PM_{2.5}$	11.2	11.4	11.5	11.6	11.9

Existing Air Quality Conclusions

Nitrogen Dioxide (NO_2)

A total of three NO_2 diffusion tubes monitoring mean annual NO_2 concentrations, have been identified close to the development site. The data show that the NAQO for mean annual NO_2 concentration (for the mean annual concentration to be no more than 40 µg/m³) closest to the development site, has been achieved at site CA25A in the latest reporting year of 2019. NAQOs at monitoring sites CA7, was consistently achieved for reporting years 2016–2019. NAQOs at monitoring site CA17 has exceeded for reporting years 2016–2019 but is consistently decreasing.

Additionally, The Defra modelled background concentration of NO_2 is 25.2 µg/m3 for 2019. It is likely that mean annual NO_2 concentrations currently exceed both the NAQO and WHO guidelines at the development site.

Coarse particulate matter (PM10) and fine particulate matter (PM2.5)

Since the borough does not undertake any automatic monitoring near the site, PM_{10} and $PM_{2.5}$ concentrations cannot be reported.

[4] Defra Local Air Quality Management – Background Maps. Data are obtained for the London Borough of Camden for the nearest grid square (X coordinate 525500, Y coordinate 185500) for 2019 (from 2019 baseline).

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Operational Impacts: Dispersion Modelling

Introduction

A detailed assessment of the feasibility of openable windows facing Finchley Road (has been undertaken using the atmospheric dispersion modelling software, ADMS-Roads Extra[5].

ADMS-Roads is a comprehensive tool for investigating air pollution problems due to networks of roads that may be in combination with industrial sites, for instance small towns or rural road networks. The software uses a steady state gaussian dispersion model and incorporates advanced meteorological pre-processing, along with computation of vertical profiles of wind, turbulence, and temperature.

Model Inputs

A summary of the key model inputs and parameters is given in Appendix B. An overview of the dispersion model scenarios is given in this section of the report.

Modelled scenarios

Three scenarios are modelled as part of the assessment:

- '2019 baseline' – existing baseline traffic flows, 2019 meteorological data and emissions factors.
- '2023 no development' – projected 2023 traffic flows, 2019 meteorological data and 2019 emissions factors.
- '2023 with development' – projected 2023 traffic flows and additional traffic from the proposed 529 Finchley Road development, 2019 meteorological data and 2019 emissions factors.

Emissions sources

For the purpose of this assessment, emissions from local roads close to the site, and for which adequate traffic flow data exists, have been modelled. These roads predominantly comprise the primary access routes to the proposed development site. Pollutant concentrations from all other sources, including all non-local emissions and local emissions from all other sources apart from the roads which are predicted to significantly change are derived from the Defra modelled background concentrations.

Traffic flow data

An overview of all traffic flow data is given in Appendix C. Baseline traffic flow data for the average annual daily traffic flow (AADF) for the local road network has been obtained from the Department for Transport (DfT) website[6]. The latest DfT reporting year, 2019, has been selected for the '2019 baseline' scenario.

[5] ADMS-Roads Extra version 5 (Cambridge Environmental Research Consultants (CERC)). Further details can be found on the website.

[6] Department for Transport (DfT) Road Traffic Statistics. Accessed from the website.

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Traffic flow data for 2023, the projected opening year of the development, has been obtained using the English and Welsh Regional Traffic Growth and Speed Forecasts (RTFs) and the local TEMPRO factor[7], as illustrated in Table 11.

- Final Growth Factor = RTF factor x (Local TEMPRO factor / Regional TEMPRO factor)[8]

Table 11: Traffic growth factor values for the period of 2019-2023.

Growth Factor	Value
RTF 2023	1.0532
TEMPRO Growth Factor for Inner London (2019-2023)	1.0436
TEMPRO Growth Factor for London Borough of Camden (2019-2023)	1.0335
Final Growth Factor for 2023	1.0429

The final growth factor can then be used to predict the AADF in 2023 in the 'no development' scenario.

The scheme can be considered to be car-free. Thus, the final growth factor and 0 additional trips are used in the '2023 with development' scenario.

Traffic speeds

Traffic speeds have been estimated based on-site observations and national speed limits. As such, an average traffic speed of 60 miles/hour is applied to all the road sections. Furthermore, it is assumed that the average traffic speeds on the local road network are the same for the opening year of 2023, as they are for the baseline year of 2019. See Appendix C for the full traffic flow data used for each modelling scenario and Appendix D for the layout of roads used in the model.

Street canyon effect

Narrow streets with tall buildings on either side have the potential to create a confined space, which can interfere with the dispersion of pollution from traffic and may result in heightened pollutant concentrations in these streets. In dispersion modelling, these narrow streets are described as street canyons, defined as 'narrow streets where the height of buildings on both sides of the road is greater than the road width'. ADMS-Roads includes a street canyon module to account for the additional turbulent flow patterns occurring inside such a narrow street, with relatively tall buildings on both sides. Street canyon effects have not been incorporated in the dispersion model.

[7] The TEMPRO factor is obtained from Trip End Model Presentation Program (TEMPro) (Department for Transport).

[8] The methodology is obtained from LAQM.

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Modelled pollutants

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been modelled. Note that NO_2 concentrations have been modelled as NO_x and converted to NO_2, using the Defra NO_x to NO_2 Calculator[9], in accordance with Local Air Quality Management: Technical Guidance (TG16) (Defra, 2018).

Meteorological data

Hourly meteorological data from the Heathrow Airport meteorological station, as the closest and most applicable station, has been used. Wind speed and direction data from Heathrow Airport meteorological station has been plotted as a wind rose in Figure 11.

Improvements for future years

Modelling did not account for improvements for future years, according to CPG Policy 3.5, including future vehicle emissions or future background concentrations.

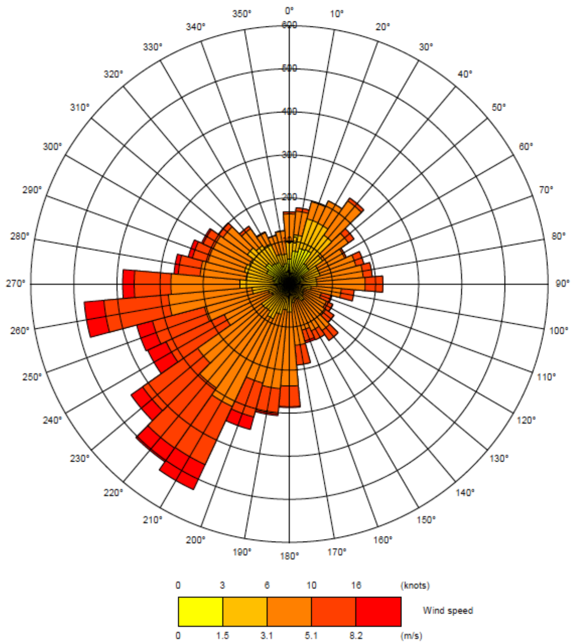

Figure 11: Wind rose for Heathrow Airport (2019).

[9] Defra (2020) NO_x to NO_2 Calculator v8.1. Accessed from the website.

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Background concentrations

Background concentrations of pollutants and particulate matter have been obtained from Defra as listed in Table 100. Defra provides a breakdown of the contribution of background concentrations from specific source types for most pollutants. The background concentration contributed by road transport from within the local area has been removed, to isolate the modelled effects of the road transport emissions on concentrations.

2019 background concentrations are used for the '2019 baseline', the '2023 no development' and '2023 with development' scenarios.

Model Outputs

Dispersion models cannot predict short-term concentrations as accurately as mean annual concentrations. Furthermore, model verification for short-term concentrations is challenging, particularly with limited monitoring stations capable of recording short-term concentrations. As such, only mean annual concentrations of NO_2 and PM_{10} and $PM_{2.5}$ will be modelled. TG16 (Defra, 2018) provides guidance on estimating NO_2 hourly NAQO and PM_{10} 24-hourly NAQO exceedances, where it is not possible to model the hourly and 24-hourly impacts, respectively. See the sections 'Results for NO_2' and 'Results for PM_{10}' for further details.

Model Verification

Systematic errors in dispersion modelling results may arise from a range of factors, such as uncertainties in vehicle traffic flows, speeds, and the composition of the vehicle fleet. Such errors can be addressed and corrected for by making comparisons with monitoring data. The accuracy of the future year modelling results is relative to the accuracy of the base year results. Therefore, greater confidence can be placed in the future year concentrations if good agreement is found for the base year.

Verification of the dispersion model has been undertaken, by comparing modelled pollutant concentrations to monitored pollutant concentrations for the baseline year. Model verification is used to determine the performance of the model against 'real-world' monitored pollutant concentrations and has been undertaken in accordance with the Local Air Quality Management: Technical Guidance (TG16) (Defra, 2018).

Discrepancies between modelled and measured concentrations can arise for a number of reasons, for example:

- Traffic data uncertainties, including uncertainties in emissions factors caused by discrepancies between test cycle and real-world emissions.
- Background concentration estimates.
- Meteorological data uncertainties.
- Sources not explicitly included within the model e.g. car parks and bus stops.
- Overall model limitations, including treatment of roughness and meteorological data, treatment of traffic speeds, slowing down and idling at junctions).
- Uncertainty in monitoring data, particularly diffusion tubes.

Dispersion models may perform differently when comparing results for kerbside, roadside and background monitoring sites. For example, models may predict reasonable concentrations towards background sites, but under-predict at locations closer to the roadside. In addition to the consideration of kerbside, roadside and background sites during model verification, the different types of locations should be considered when comparing modelled and monitored concentrations. For example, modelling undertaken for roadside sites in urban areas (including areas with street canyons) may require a different adjustment to modelling undertaken for roadside sites near motorways or trunk roads in open settings.

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Model refinement

The dispersion model was run using all the receptors identified in Table 8. Several refinements were carried out, CA7 monitoring station was removed and the final model consisted of the roads A41, B511 and B510.

Comparison

Mean annual NO_2 concentrations have been used for model verification. A comparison of monitored and modelled concentrations is given in Table 12.

Table 12: Comparison of modelled and monitored concentrations for NO_x and NO_2 (µg/m^3).

Site ID	2019 monitored NO_2	2019 monitored road contribution NO_x	2019 modelled road contribution NO_x	Ratio of monitored to modelled road contribution NO_x
CA25A	37.88	25.72	256.1	0.10
CA17	42.53	36.17	247.6	0.15

The mathematical relationship between monitored and modelled road contribution NO_x is given in Figure 12, with a trendline passing through zero and its derived equation.

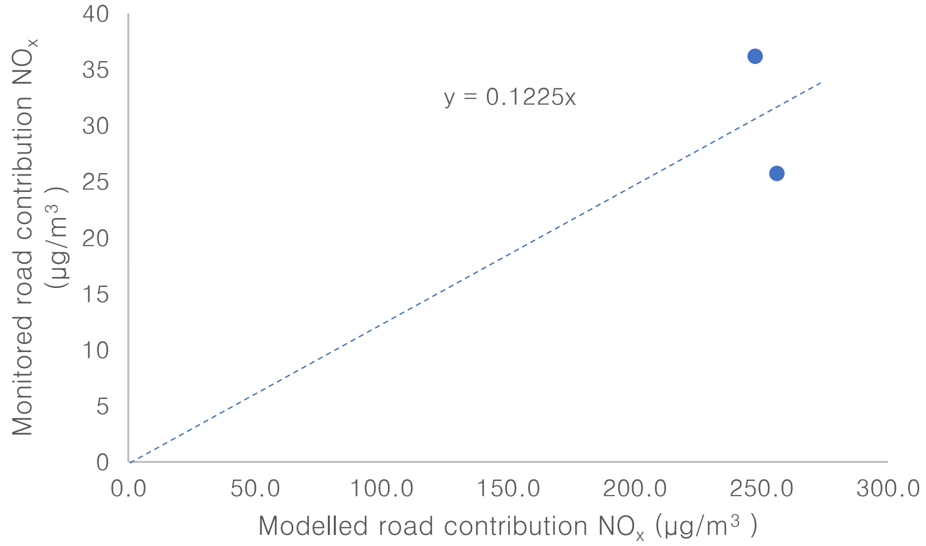

Figure 12: Comparison of monitored and modelled road contribution of NO_x at monitoring sites.

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Adjustment

The adjustment factor derived from Figure 12 (0.1225) has been applied to the modelled road contribution NO_x concentrations before being converted to annual mean NO_2 concentrations using the Defra NO_x to NO_2 calculator (Table 13).

Table 13: Model verification results for NO_x and NO_2 (µg/m^3).

Site ID	Road contribution NO_x adjustment factor	Adjusted 2019 modelled road contribution NO_x	2019 modelled total NO_2	2019 monitored NO_2	% difference modelled to monitored NO_2
CA25A	0.1225	31.4	40.42	37.9	-6.3%
CA17	0.1225	30.3	39.96	42.5	6.4%

The correlation between modelled and monitored NO_2 concentrations at the monitoring sites has been achieved by applying a model correction factor, detailed in Table 13. The final adjusted model results in modelled concentrations that are within 10% of the monitored concentrations, as required by TG16 (Defra, 2018). This demonstrates that the adjusted model predictions are in line with the 'real-world' monitoring concentrations.

The NO_x adjustment process and derived road contribution NO_x adjustment factor has subsequently been applied to predicted concentrations at receptors for the '2019 baseline', '2023 no development' and '2023 with development' scenarios. The road contribution NO_x adjustment factor (0.1225) has subsequently been applied to all predicted concentrations of PM_{10} and $PM_{2.5}$, in accordance with TG16 (Defra, 2018).

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Modelled Receptors

Dispersion modelling determines the concentrations of pollutants at specified receptors. Receptors have been modelled at the façade of each block but at different heights as detailed in Table 14. A plan of the modelled receptor locations is given in Figure 13.

Table 14: Summary of modelled receptors.

Receptor ID	X coordinate	Y coordinate	Description	Height (m)
RA1–RA3	551580	188484	The west façade facing Ingham Road, first floor to third floor	5.0, 8.0, 11.0
RB1–RB2	551567	188509	The north east façade facing Finchley Road, first floor to second floor	5.0, 8.0

Figure 13: Plan of modelled receptors West Elevation.

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Figure 14: Plan of modelled receptors North East Elevation.

Significance of Effects

The significance of effects from the operational phase of the development may be assessed by comparing the change in mean annual concentrations at receptors between the modelled scenarios, in accordance with the EPUK and IAQM's 'Land-Use Planning & Development Control: Planning For Air Quality' (2017) guidance. Significance of the effects of changing concentrations is defined in accordance with the qualitative descriptors and thresholds defined in Table 15.

The significance of effects is a measure of both the pre-development concentration at a receptor (for the '2023 no development' scenario), and the change from the pre-development concentration to post-development ('2023 with development' scenario), against the relevant Air Quality Assessment Level (AQAL). In this case, the AQAL is the respective National Air Quality Objective (NAQO) for NO_2, PM_{10} and $PM_{2.5}$. Note that changes of 0% or less (i.e. less than 0.5%) are described as 'negligible'.

Table 15: Significance of effects matrix.

Long-term average concentration at receptor	% change in mean annual concentration relative to AQAL			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

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Results for NO_2

Table 16: Results of NO_2 concentrations for '2019 baseline'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	58.00	48.77	41.53
North East Façade	71.94	50.82	–

Table 17: Results of NO_2 concentrations for '2023 no development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	59.18	49.70	42.25
North East Façade	73.37	51.79	–

Table 18: Results of NO_2 concentrations for '2023 with development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	59.18	49.70	42.25
North East Façade	73.37	51.79	–

Table 19: Significance of effects from NO_2 concentrations for '2023 with development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	Substantial	Substantial	Substantial
North East Façade	Substantial	Substantial	–

NO_2 annual mean concentration

Table 16, Table 17 and Table 18 provide an overview of the predicted mean annual NO_2 concentrations for all modelled receptors at the development site:

- NO_2 concentrations at the site are predicted to be smaller for the '2019 baseline' scenario (Table 16), Increasing for the '2023 no development' and '2023 with development' scenarios. NO_2 concentrations for the '2019 baseline' were significantly above the NAQO (mean annual NO_2 concentration of 40 $\mu g/m^3$) and above 44 $\mu g/m^3$, accounting for a potential 10%margin for error at all receptors.
- NO_2 concentrations for the '2023 no development' and '2023 with development' scenarios are predicted to be significantly above the NAQO, accounting for a potential 10%margin for error at all receptors. The concentrations of NO_2 are similar for both scenarios mainly because the scheme is proposed to be car-free and the proposed trips for deliveries are minimal.
- Residents using openable windows are predicted to be exposed to high level of pollution.
- Modelling did not account for improvements for future years, according to CPG Policy 3.5, including future vehicle emissions or future background concentrations.

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NO_2 hourly mean NAQO exceedances

Research undertaken on behalf of Defra in 2003[10] identified that exceedances of the NO_2 hourly mean NAQO are unlikely to occur where the annual mean is below 60 µg/m^3. In accordance with TG16 (Defra, 2017), this assumption is still considered to be valid, particularly for roadside locations, where road traffic is the primary source of emissions. The dispersion modelling predicts that this would be achieved at all receptors for the '2023 no development' and '2023 with development' scenarios, except the north east façade first floor receptor.

Significance of impacts

With reference to the EPUK and IAQM's (2017) guidance, the significance of effects from NO_2 concentrations on the proposed development is 'substantial at all modelled receptors, as shown in Table 19. As the percentage change in relation to NAQO is greater than, or equal to, 110%, the significance of effects at all receptors is defined as 'substantial. The impact of NO_2 concentrations on the development is deemed to be significant.

Results for PM_{10}

Table 20: Results of PM_{10} concentrations for '2019 baseline'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	23.3	21.4	20.1
North East Façade	26.3	21.8	–

Table 21: Results of PM_{10} concentrations for '2023 no development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	23.50	21.60	20.23
North East Façade	26.61	22.01	–

Table 22: Results of PM_{10} concentrations for '2023 with development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	23.50	21.60	20.23
North East Façade	26.61	22.01	–

Table 23: Significance of effects from PM_{10} concentrations for '2023 with development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	Negligible	Negligible	Negligible
North East Façade	Negligible	Negligible	–

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

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PM_{10} annual mean concentration

Table 20,Table 21and Table 22 provide an overview of the predicted mean annual PM_{10} concentrations for all modelled receptors at the development site:

- PM_{10} concentrations at the site are predicted to be slightly smaller for the '2019 baseline' scenario (Table 20), increasing for the '2023 no development' and '2023 with development' scenarios. PM_{10} concentrations for the '2019 baseline' were significantly below the NAQO (mean annual PM_{10} concentration of 40 µg/m^3) and below 36 µg/m^3, accounting for a potential 10% margin for error at all receptors. The WHO guideline (mean annual PM_{10} concentration of 20 µg/m^3) was even achieved at west façade receptors, unlike the north east façade first floor receptors.
- PM_{10} concentrations are predicted to be well below the NAQO (mean annual PM_{10} concentration of 40 µg/m^3) and below 36 µg/m^3, accounting for a potential 10% margin for error, for the '2023 no development' and '2023 with development' scenarios at all receptors. The WHO limit (mean annual PM_{10} concentration of 20 µg/m^3) is achieved at west façade receptors, unlike the north east façade first floor receptor.
- Residents using openable windows are not predicted to be exposed to high level of PM_{10} concentration.

PM_{10} 24-hour mean NAQO exceedances

TG16 (Defra, 2018) provides a methodology to estimate the likely 24-hourly concentrations for PM_{10} from annual mean concentrations; $-18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$. The highest PM_{10} concentration for the '2019 baseline' scenario (26.3 µg/m^3) results in an estimated number of annual occurrences of the 24-hourly mean above 200 µg/m^3 of 15.6 (significantly more than the NAQO). It is therefore concluded that this NAQO would be achieved at the site.

Significance of impacts

The significance of effects of PM_{10} concentrations on the proposed development is deemed to be 'negligible' at all receptors, as demonstrated in Table 23.

Results for $PM_{2.5}$

Table 24: Results of $PM_{2.5}$ concentrations for '2019 baseline'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	15.53	14.37	13.53
North East Façade	17.43	14.62	–

Table 25: Results of $PM_{2.5}$ concentrations for '2023 no development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	15.69	14.48	13.61
North East Façade	17.66	14.74	–

Table 26: Results of $PM_{2.5}$ concentrations for '2023 with development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	15.69	14.48	13.61
North East Façade	17.66	14.74	–

Table 27: Significance of effects from $PM_{2.5}$ concentrations for '2023 with development'.

Receptor ID	First (5.0m)	Second (8.0m)	Third (11.0m)
West Façade	Negligible	Negligible	Negligible
North East Façade	Negligible	Negligible	–

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$PM_{2.5}$ annual mean concentration

Table 24, Table 25 and Table 26 provide an overview of the predicted mean annual $PM_{2.5}$ concentrations for all modelled receptors at the development site:

- $PM_{2.5}$ concentrations at the site are predicted to be smaller for the '2019 baseline' scenario (Table 24), increasing for the '2023 no development' and '2023 with development' scenarios. $PM_{2.5}$ concentrations for the '2019 baseline' were significantly below the NAQO (mean annual $PM_{2.5}$ concentration of 25 µg/m^3) and below 22.5 µg/m^3, accounting for a potential 10% margin for error at all receptors. However, the WHO guideline was not achieved.
- $PM_{2.5}$ concentrations are predicted to be well below the NAQO (mean annual $PM_{2.5}$ concentration of 25 µg/m^3) and below 22.5 µg/m^3, accounting for a potential 10% margin for error for 2023 no development' and '2023 with development' scenarios at all receptors. The WHO limits (mean annual $PM_{2.5}$ concentration of 10 µg/m^3) are exceeded at all modelled receptors.
- Residents using openable windows are not predicted to be exposed to high level of $PM_{2.5}$ concentration.

Significance of impacts

The significance of effects from $PM_{2.5}$ concentrations on the proposed development is deemed to be 'negligible' at all receptors, as demonstrated in Table 27.

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Introduction

Policy SI 1 in the London Plan 2021, 'Improving air quality' requires that development proposals should not lead to further deterioration of exiting poor air quality and that they must be at least Air Quality Neutral (AQN). The proposed development has been assessed for its performance against the AQN guidance and benchmarks, for both transport and building-related emissions.

Air Quality Neutral: Transport Emissions

The AQN guidance provides a methodology for calculating the Transport Emissions Benchmark (TEB) for specific land use types. The TEB has been calculated for the development (Table 28) using the factors for Class C3 (residential) and Class E (commercial space).

The Transport Consultant has confirmed that zero proposed trips would be generated, as it is a car free development. These are considered within the transport emissions calculations.

Table 28: Transport Emissions Benchmark (TEB).

Development metric	Residential	Commercial	Total
Applicable planning use class for TEB	Residential (C3,4)	E	–
Gross internal area (m^2)	322	65	387
Number of dwellings – residential only	6	0	6
Location (CAZ/inner/outer)	Inner	Inner	–
NO_x TEB factor (g/m^2/year) – non-residential only	0.0	284.0	284.0
NO_x TEB factor (g/dwelling/year) – residential only	558.0	0.0	–
Total NO_x TEB (kg/year)	**3.3**	**18.5**	**21.8**
PM_{10} TEB factor (g/m^2/year) – non-residential only	0.0	16.3	–
PM_{10} TEB factor (g/dwelling/year) – residential only	100.0	0.0	–
Total PM_{10} TEB (kg/year)	**0.6**	**1.1**	**1.7**

Operational Impacts: Air Quality Neutral

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Table 29: Comparison of calculated transport emissions against TEBs.

Development metric	Residential	Commercial	Total
Applicable planning use class for TEB	Residential (C3,4)	E	–
Daily trips by car	0	0	0
Annual trips by car	0	23	23
Location (CAZ/inner/outer)	Inner	Inner	–
Average distance travelled per car trip (km)	3.7	5.9	9.6
Annual distance travelled by car (km/year)	0.0	132.8	132.8
NO_x emissions factor (g/km)	0.370	0.370	–
Total NO_x emissions (kg/year)	0.0	0.0	0.0
Difference from NO_x TEB to actual	−3.3	−18.4	−21.8
Transport NO_x AQN result	Pass	Pass	Pass
PM_{10} emissions factor (g/km)	0.0665	0.0665	–
Total PM_{10} emissions (kg/year)	0.0	0.0	0.0
Difference from PM_{10} TEB to actual	−0.6	−1.1	−1.7
Transport PM_{10} AQN result	Pass	Pass	Pass

The development passes the AQN test for transport emissions based on the proposed trip generations (Table 29).

Air Quality Neutral: Building Emissions

The AQN guidance provides a methodology for calculating the Building Emissions Benchmark (BEB) for specific land use types. The BEB has been calculated for the development (Table 30) using the factors for Class C3 and Class A1.

Table 30: Building Emissions Benchmark (BEB).

Development metric	Residential	Commercial	Total
Applicable planning use class for BEB	C3	E	–
Gross internal area (m^2)	322	65	387
NO_x BEB factor ($g/m^2/year$)	26.2	284	310.2
Total NO_x BEB (kg/year)	**8.4**	**18.5**	**26.9**
PM_{10} BEB factor ($g/m^2/year$)	2.28	16.3	18.58
Total PM_{10} BEB (kg/year)	**0.7**	**1.1**	**1.8**

An Energy Statement was produced by Eight Associates in June 2021, which is based on a strategy to reduce energy demand as far as practically and economically possible, by implementing energy efficiency measures before applying low carbon and renewable energy technologies.
The use of biomass, combined heat and power (CHP) and gas boilers have been excluded from the scheme. The residential units are served by electric instant point of use.

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Since the energy consumption will all be electricity-based, the development, therefore, passes the AQN test for building emissions (Table 31).

Table 31: Comparison of calculated building emissions against BEBs.

Development metric	Residential	Commercial	Total
Applicable planning use class for BEB	C3	E	–
Total annual gas consumption from boilers (kWh/year)	0	0	0
Boilers NO_x emissions factor (mg/kWh)	38	0	–
Total NO_x emissions from boilers (kg/year)	0.0	0.0	0.0
Total annual gas consumption from CHP (kWh/year)	0.0	0.0	0.0
CHP NO_x emissions factor (mg/kWh)	0.0	0.0	–
Total NO_x emissions from CHP (kg/year)	0.0	0.0	0.0
Total NO_x emissions (kg/year)	0.0	0.0	0.0
Difference from NO_x BEB to actual	−8.4	−18.5	−26.9
Building NO_x AQN result	Pass	Pass	Pass
Total annual oil or solid fuel consumption (kWh/year)	0.0	0.0	0.00
PM_{10} emissions factor (mg/kWh)	0.0	0.0	–
Total PM_{10} emissions (kg/year)	0.0	0.0	0.00
Difference from PM_{10} BEB to actual	−0.7	−1.1	−1.8
Building PM_{10} AQN result	Pass	Pass	Pass

Air Quality Neutral Statement

The Sustainable Design and Construction SPG issued by the Mayor of London, sets out the requirement for all major developments in Greater London to undertake an AQN Test and be designed so that they are at least 'air quality neutral'. A development is considered to be AQN if it can be demonstrated that either emissions from the operation of a proposed development and transport as a result of the proposed development achieve the relevant emissions benchmarks provided in the AQN guidance.

The development achieves both the TEB and BEB and, therefore, passes the AQN test. No additional mitigation for the purposes of AQN is required.

Operational Impacts: Mitigation Measures

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Pollution Mitigation Hierarchy

The development passes the AQN test for transport and building emissions. Additionally, the impact of NO_2 concentrations on the development are deemed to be significant at the both façades as per the air dispersion modelling. Therefore, additional mitigation or offsetting measures for the operational phase of the development will be required, including mechanical ventilation and fixed windows.

The principles of the pollution mitigation hierarchy, outlined in the Institute of Air Quality Management (IAQM) 'Mitigation of Development Air Quality: Position Statement', have been applied to the proposed development to minimise the exposure of future building users and occupants.

1. Prevention and Avoidance

Preference should be given to preventing or avoiding exposure/impacts to the pollutant in the first place by eliminating or isolating potential sources or by replacing sources or activities with alternatives.

Cycle storage

Cycling will be promoted by the inclusion of cycle storage in accordance with the London Plan.

Sustainable energy technologies

High energy efficiency performance building services have been used for these units. An on-site CO_2 reduction of 35% beyond Building Regulations through energy efficiency measures and maximised of renewable technologies (Air Source Heat Pumps).

2.a Reduction and Minimisation: Mitigation Measures that act on the Source

Reduction and minimisation of exposure/impacts should next be considered, once all options for prevention/avoidance have been implemented so far as is reasonably practicable (both technically and economically). To achieve this reduction/minimisation, preference should be given, in order, to:

No mitigation measures are proposed.

2.b. Reduction and Minimisation: Mitigation Measures that act on the Pathway

No mitigation measures are proposed.

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2.c. Reduction and Minimisation: Mitigation Measures at or Close to the Point of Receptor Exposure

Ventilation strategy

Due to high level of NO_2 concentrations at both facades the use of ventilation strategy is required. The ventilation strategy for the development will most likely be based on a mechanical system. Intakes for the mechanical ventilation system should be located as far as possible from the primary sources of pollution. In accordance with the latest BREEAM New Construction 2018 Hea 02 Ventilation guidance, fresh air intakes should preferably be at least 10m away from all external pollution sources, as well as at least 10m away from ventilation exhausts (to prevent recirculation of air).

All mechanical ventilation systems should be designed in accordance with BS EN 16798:2017 'Energy Performance of Buildings – Ventilation for Buildings' and BS EN ISO 16890:2016 'Air Filters for General Ventilation'. In accordance with these standards, consideration must be given to the quality of the outdoor air at the proposed location of the building and the design should incorporate the following mitigation measures:

- Air intakes should be located where the outdoor air is least polluted, where outdoor air pollution concentrations are not uniform around the building;
- Some form of filtration and/or air cleaning should be applied, where outdoor air pollution concentrations are significant. Tables 16 and 17 of BS EN 16798:2017 (Part 3) should be followed to determine the appropriate required level of filtration efficiency for particulate and gaseous filtration systems.

To verify that the filtration system continues to operate as designed, the records of air filtration maintenance must be obtained, including evidence that filters have been properly maintained as per the manufacturer's recommendations. Additionally, activated carbon filters or combination particulate/carbon filters may be considered for installation in the main air ducts to filter recirculated air.

3. Off-setting

Off-setting a new development's air quality impact by proportionately contributing to air quality improvements elsewhere (including those identified in Air Quality Action Plans and low emission strategies) should only be considered once the solutions for preventing/avoiding, and then for reducing/minimising, the development-specific impacts have been exhausted. Even then, offsetting should be limited to measures that are likely to have a beneficial impact on air quality in the vicinity of the development site. It is not appropriate to attempt to offset local air quality impacts by measures that may have some effect remote from the vicinity of the development site.

The mitigation measures proposed are appropriate to the scale and nature of the development (see sections 1. to 2.c. above). No additional off-setting measures are proposed.

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Conclusions

The unmitigated risk to local sensitive receptors from emissions of dust and pollution from construction is deemed to be low. However, the risk will be mitigated further through the measures set out in the Air Quality & Dust Management Plan (AQDMP), which will be implemented through the contractor's Construction Environmental Management Plan. With the mitigation measures in place, the residual effects arising from the construction phase of the proposed development would be deemed 'not significant'.

The entire borough was declared as an Air Quality Management Area (AQMA) in 2002 for exceedances of the National Air Quality Objectives (NAQOs) for nitrogen dioxide (NO_2) and 24-hour mean exceedance for particulate matter (PM_{10}). Currently, the borough does not meet the NAQOs for NO_2, as well as it is widely accepted that there is no safe level for particulates (PM_{10} and smaller). The site is not located in any Focus Areas and is not considered as a hotspot of poor Air Quality in Camden.

A review of the latest monitoring data for NO_2 at the closest locations to the development indicates that the NAQO at the closest monitoring station has been achieved for the latest reporting years of 2019. NAQOs at another monitoring site were consistently achieved for reporting years 2016-2019. NAQOs at monitoring site CA17 has exceeded for reporting years 2016-2019 but is consistently decreasing. The LAEI 2016 modelled mean annual NO_2 concentrations were estimated at approximately 58 µg/m^3 at the site, exceeding both the NAQO and WHO guideline.

The LAEI 2016 modelled mean annual concentrations of PM_{10} at the site were estimated at approximately 29 µg/m^3, achieving the NAQO but exceeding the WHO guidelines.

No nearby monitored mean annual PM_{10} and $PM_{2.5}$ concentrations were recorded. The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are estimated as approximately 16 µg/m^3, achieving the NAQO but exceeding the WHO guideline.

Since the development is introducing new sensitive receptors to the area and the north east façade is exposed to emissions from road transport using a principal road, namely A41 Finchley Road, atmospheric dispersion modelling was carried out. The performance of the modelled receptors at both the north east (facing Finchley Road) and west façade (facing Ingham Road) indicates the effects of NO_2 concentrations in the three different scenarios, 'Baseline 2019', '2023 no development' and '2023 with development' to be significant. PM_{10} and $PM_{2.5}$ concentrations at both facades are considered to be low. Therefore, residents having openable windows and especially those facing Finchley Road will be exposed to high level of pollution..

For developments within London, the AQA methodology includes the requirement to undertake an assessment against the Air Quality Neutral (AQN) guidance. The scheme has been assessed for both the impacts of transport and building operation against the AQN guidance and it meets the requirements for AQN.

To reduce exposure of future occupants to pollutants, mechanical ventilation systems and fixed windows are proposed. Further mitigation measures include sustainable mode of transport and low and zero carbon technologies.

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Roles and Responsibilities

The Site Manager will have overall responsibility for dust management during construction and will ensure that all site personnel are effectively briefed and given adequate resources to undertake the air quality and dust management requirements, as set out in this Air Quality & Dust Management Plan (AQDMP).

Key roles and responsibilities for the Site Manager and site personnel are outlined in Table A-1.

Table A-1: Schedule of AQDMP responsibilities.

Role	Responsibilities
Site manager	Ensure that the mitigation and monitoring requirements outlined in the AQDMP are carried out during works on site.
	Ensure that staff are aware of the requirements of the AQDMP and have access to the document. Regular training of staff should be implemented.
	Undertake and record dust inspections of the site as required by the AQDMP.
	Ensure that site documentation (including method statements and risk assessments) include adequate dust mitigation.
	Act on complaints and dust alerts as detailed in the AQDMP.
	Maintain up-to-date site log of air quality events and complaints.
	Investigate the cause of air quality events and apply additional mitigation are required.
	Act as the key point of contact for queries and complaints regarding air quality emissions from site.
	Report observations of dust events or deviations from the AQDMP procedures.

Table A-1: Schedule of AQDMP responsibilities (continued).

Role	Responsibilities
Site personnel	Carry out the works in accordance with the AQDMP requirements.
	Report observations of dust events or deviations from the AQDMP procedures.
	Attend environmental management training.

Hours of Work

Normal working hours for 529 Finchley Road construction site will be as follows:

- Monday – Friday: 08:00 – 18:00 hrs.
- Saturday: 08:00 – 13:00 hrs.

There will not typically be any construction activities undertaken outside of the stated working hours, including on Sundays, Public Holidays or Bank Holidays. In the event that construction activities are sought to be undertaken outside of the normal working hours, these will be agreed in writing with the local planning authority in advance.

Measures Relevant for Demolition, Earthworks, Construction and Trackout

Robust site management will be required to control the dust emissions from construction activities. Mitigation methods, in accordance with 'The Control of Dust and Emissions during Construction and Demolition' SPG (Mayor of London, 2014) have been proposed for the site.

All 'required' mitigation measures must be implemented. We would strongly recommend that all 'recommended' measures are implemented, along with those that are 'not required' where feasible.

Appendix A: Air Quality & Dust Management Plan

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It is recommended that these measures, as detailed in Table A-2, be set out in the site-specific Construction Environmental Management Plan, which will form part of the proposed development's overall Construction Management Plan.

Table A-2: Schedule of construction phase mitigation measure requirements.

Site management	
Mitigation measure	Compliance requirements
1) Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	Not required
2) Develop a Dust Management Plan.	Not required
3) Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary.	Required
4) Display the head or regional office contact information.	Required
5) Record and respond to all dust and air quality pollutant emissions complaints.	Required
6) Make a complaint log available to the local authority when asked.	Required
7) 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.	Required
8) Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions.	Required
9) Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.	Required

Table A-2: Schedule of construction phase mitigation measure requirements (continued).

Site management	
Mitigation measure	Compliance requirements
10) Hold regular liaison meetings with other high-risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.	Not required

Preparing and maintaining the site	
Mitigation measure	Compliance requirements
11) Plan site layout: machinery and dust causing activities should be located away from receptors	Required
12) Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site.	Required
13) Full enclosure of the site or specific operations where there is a high potential for dust production and the site is active for an extensive period..	Recommended
14) Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.	Not required
15) Avoid site runoff of water and mud.	Required
16) Keep site fencing, barriers and scaffolding clean using wet methods.	Recommended
17) Remove materials from site as soon as possible.	Recommended
18) Cover, seed or fence stockpiles to prevent wind whipping.	Not required
19) Carry out regular dust soiling checks of buildings within 100 m of site boundary and cleaning to be provided if necessary.	Not required

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Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Preparing and maintaining the site	
Mitigation measure	Compliance requirements
20) Provide showers and ensure a change of shoes and clothes are required before going off-site to reduce transport of dust.	Not required
21) Agree monitoring locations with the Local Authority.	Not required
22) Where possible, commence baseline monitoring at least three months before phase begins.	Not required
23) Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.	Not required

Operating vehicles/machinery and sustainable travel	
Mitigation measure	Compliance requirements
24) Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone.	Required
25) Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance.	Required
26) Ensure all vehicles switch off engines when stationary – no idling vehicles.	Required
27) Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where possible.	Required
28) Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Recommended

Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Operating vehicles/machinery and sustainable travel	
Mitigation measure	Compliance requirements
29) Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Not required
30) Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	Required

Operations	
Mitigation measure	Compliance requirements
31) 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.	Required
32) Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible).	Required
33) Use enclosed chutes, conveyors and covered skips.	Required
34) Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Required
35) 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.	Not required

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Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Waste management	
Mitigation measure	Compliance requirements
36) Reuse and recycle waste to reduce dust from waste materials.	Required
37) Avoid bonfires and burning of waste materials.	Required

Measures Specific to Demolition

Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Demolition	
Mitigation measure	Compliance requirements
38) Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Recommended
39) Ensure water suppression is used during demolition operations.	Required
40) Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Required
41) Bag and remove any biological debris or damp down such material before demolition.	Required

Measures Specific to Earthworks

Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Earthworks	
Mitigation measure	Compliance requirements
42) Re–vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.	Not required
43) Use Hessian, mulches or trackifiers where it is not possible to re–vegetate or cover with topsoil.	Not required
44) Only remove secure covers in small areas during work and not all at once.	Not required

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Measures Specific to Construction

Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Construction	
Mitigation measure	Compliance requirements
45) Avoid scabbling (roughening of concrete surfaces) if possible.	Recommended
46) 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.	Recommended
47) Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Not required
48) For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	Not required

Measures Specific to Trackout

Table A–2: Schedule of construction phase mitigation measure requirements (continued).

Trackout	
Mitigation measure	Compliance requirements
49) Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.	Recommended
50) Avoid dry sweeping of large areas.	Recommended
51) Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.	Recommended
52) Record all inspections of haul routes and any subsequent action in a site logbook.	Not required
53) Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned.	Not required
54) Inspect haul routes for integrity and instigate necessary repairs to the surface, as soon as reasonably practicable.	Not required
55) Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Recommended
56) Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Not required
57) Access gates to be located at least 10m from receptors, where possible.	Not required
58) Apply dust suppressants to locations where a large volume of vehicles enters and exit the construction site.	Not required

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Table B- 1: Summary of inputs and parameters used in dispersion model.

Parameter	Description	Input value
Software type	ADMS-Roads Extra version 5	-
Coordinate system	Setting to align geographical data with a coordinate system.	*OSGB 1936 / British National Grid* used.
Chemistry	Settings to calculate the atmospheric chemical reactions between nitric oxide (NO), ozone (O_3) and volatile organic compounds (VOCs).	No atmospheric chemistry parameters included.
Meteorology	Representative meteorological data from a local source.	*Heathrow Airport meteorological station*, hourly sequential data used.
Surface roughness	Setting to define the surface roughness of the model area based on its location and surface characteristics.	*1.5m* selected, representing a typical surface roughness for *large urban areas*.
Latitude	Setting to allow the location of the model area to be defined.	*52°* selected for United Kingdom.
Advanced dispersion site data	Settings to define specific surface albedo, minimum Monin-Obukhov length, Priestley-Taylor parameter and precipitation factor for site.	Advanced dispersion site parameters included for Minimum Monin-Obukhov length, and model defaults used for all other parameters.
Elevation of roads	Setting to allow the height of road links above ground level to be specified.	All road links set to ground level at *0m*.
Road width	Setting to allow the width of the road links to be specified.	Road widths selected for individual road links based on data obtained from OS map data.
Topography	Setting to allow complex terrain data to be included within the model in order to account for topographical effects on turbulence and plume spread.	No regional topographical data files available to complex terrain data inputs not used.
Time varied emissions	Setting to enable daily, weekly or monthly variations in emissions to be applied to emissions sources.	Time varied emissions data inputs are used.
Road type	Setting to allow the effect of different types of roads to be assessed.	London (inner) road type selected.
Road speeds	Setting to accommodate the effects of road speeds on different roads on emissions sources.	Individual road speeds based on national speed limits and observations from street images.

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Table B– 1: Summary of inputs and parameters used in dispersion model (continued).

Parameter	Description	Input value
Street canyon modelling	Settings to enable both 'basic' and 'advanced' street canyon modelling of road links.	Street canyon modelling is not relevant for this site.
Road source emissions	Settings to input road source emissions based on road traffic emission calculation method.	UK Emissions Factor Toolkit (EFT) version 9.0 selected for the respective baseline and proposed operational years of the development.
Point source emissions	Settings to input point sources, for example from industrial sources and energy centres.	No point source emissions included.

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Table C– 1: Traffic flow data [average speed, annual average daily traffic flow (AADT) and % contribution of heavy duty vehicles (HDVs) to AADT] for each modelled scenario.

Road name	Speed (km/h)	2019 baseline		2023 no development		2023 with development	
		AADT	% HDV	AADT	% HDV	AADT	% HDV
A41	48	38,996	6%	40,669	6%	40,669	6%
B511	48	15,058	3%	15,704	3%	15,704	3%
B510	48	10,570	6%	11,024	6%	11,024	6%

Appendix D: Dispersion Model Area

Air Quality Assessment

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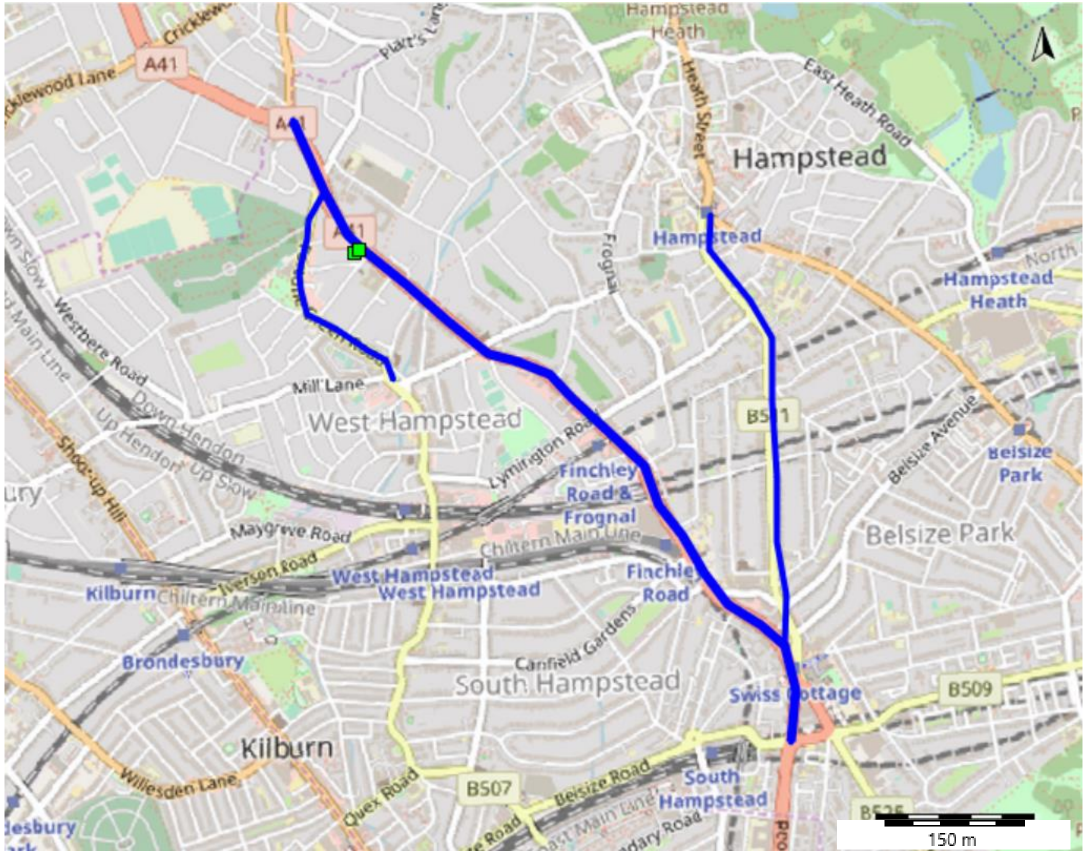

Figure D– 1: Dispersion model area, showing road emissions sources (in blue) and modelled receptors around the development (in green).

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