Planning Statement
Air Quality Assessment
5–17 Haverstock Hill

eight associates

+44 (0)207 0430 418

www.eightassociates.co.uk
info@eightassociates.co.uk

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George Adamopoulos
Star Real Estate

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Document prepared by

Ryan Menezies

Quality assured by

Ben Shirbini

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Overview

Eight Associates has been commissioned to carry out an Air Quality Assessment (AQA) for the proposed development at 5–17 Haverstock Hill, in the London Borough of Camden. The site (0.207 hectares) is located directly to the north of Chalk Farm underground station (Grade II listed), at the junction of Chalk Farm Road, Adelaide Road and Haverstock Hill within an area of more limited change and predominantly occupied by a 6 storey brick building, known as 'Eton Garage', built up to the boundary of the underground station with street elevations facing onto Adelaide Road and Haverstock Hill. There are 6 ground floor retail units along the Adelaide Road frontage which fall within a designated neighbourhood parade. An element of hard standing is located to the rear of the site, with vehicle entrances provided from Adelaide Road and Haverstock Hill.

The following are proposed on the site:

- 118-room hotel with ancillary ground floor restaurant and cafe
- 18 social rented housing units
- 17 market housing units
- Café and retail

5–17 Haverstock Hill is located in an Air Quality Management Area (AQMA), which has been declared for exceedances of the annual mean objective for NO_2 and PM_{10}. A review of the latest monitoring data for particulate matter confirms that NAQOs for PM_{10} and $PM_{2.5}$ are currently being achieved, while the NAQO for NO_2 is currently being exceeded.

Due to the location of the development within an AQMA, and the development proposals introducing new sensitive receptors into an area with poor existing air quality, an Air Quality Assessment (AQA) has been undertaken to accompany the planning application for the scheme. 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 meets the requirements for AQN.

Dispersion modelling has been undertaken to predict the concentrations of NO_2 and PM_{10} at the development site. The dispersion modelling predicts that mean annual concentrations of PM_{10} are currently below 40 µg/m^3 (the '2018 baseline' scenario) and would be below 40 µg/m^3 for the opening year of the development (the '2022 no development' and '2022 with development' scenarios). The dispersion modelling predicts that mean annual concentrations of NO_2 are likely to be below 40 µg/m^3 at all the receptors for the '2018 baseline' scenario. These receptors represent the proposed ground to 6th floor levels. The proposed development is likely to result in exposure of future building users at these receptors, therefore the recommended mitigation measures relating to the ventilation strategy should be incorporated to reduce human exposure.

The unmitigated risk to local sensitive receptors from emissions of dust and pollution from construction is deemed to be medium risk. 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. The most notable mitigation measure being NO_2 filters on inlets.

Opportunities to incorporate green infrastructure in development proposals have been reviewed and evaluated for their benefits for air quality and the mitigation of exposure to poor air quality for building users. Soft landscaped amenity space is proposed at roof level, which will enhance aesthetics, biodiversity and air quality.

Introduction

Air Quality Assessment

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eight associates

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info@eightassociates.co.uk

Project Overview

Eight Associates has been commissioned to carry out an Air Quality Assessment (AQA) for the proposed development at 5–17 Haverstock Hill, in the London Borough of Camden. The site (0.207 hectares) is predominantly occupied by a 6-storey brick building, known as 'Eton Garage', built up to the boundary of the underground station with street elevations facing onto Adelaide Road and Haverstock Hill.

The following are proposed on the site:

- 118-room hotel with ancillary ground floor restaurant and cafe
- 18 social rented housing units
- 17 market housing units
- Café and retail

The London Borough of Camden has declared an Air Quality Management Area (AQMA) over the entire Camden area, due to continued exceedances against National Air Quality Objectives (NAQOs). The development site is located in an AQMA, which has been declared for exceedances of the annual mean objective for NO_2 and PM_{10}. Due to the proposed nature of the development, introducing new sensitive receptors into an area with existing poor air quality, an AQA has been undertaken to accompany the planning application.

Scope of Assessment

An Air Quality Assessment (AQA) has been undertaken in accordance with relevant planning policy and best-practice guidance at a national, regional and local level. 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.
- 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 policy and guidance.

National	National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2019)
	Land-Use Planning & Development Control: Planning For Air Quality (Environmental Protection UK (EPUK), Institute of Air Quality Management (IAQM), 2017)
	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(09) (Department for Environment, Food & Rural Affairs (DEFRA), 2012)
Regional	Intend to Publish London Plan (Mayor of London, 2019)
	The London Plan (Mayor of London, 2016)
	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)
	Cleaning the Air – The Mayor's Air Quality Strategy (Mayor of London, 2010)
	Air Quality and Planning Guidance (London Councils, 2007)
Local	Camden Clean Air Quality Action Plan 2019-2022 (London Borough of Camden, 2019)
	Camden Local Plan (London Borough of Camden, 2017)

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International legislation and policy

EU Directive 2008/50/EC1 on Ambient Air Quality and Cleaner Air for Europe (the CAFE Directive) sets out the ambient air quality standards for a range of key pollutants, requiring specific objectives for ambient concentrations for pollutants (EU limit values) to be achieved and maintained (Table 2). EU Directive 2008/50/EC1 also contains a series of limit values for the protection of human health and critical levels for the protection of vegetation.

Table 2: EU limit values for key pollutants.

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
Carbon monoxide (CO)	10 µg/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 35 times per year	8 hour mean	31 December 2005

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National legislation and policy

The Air Quality Standards Regulations 2010 implements the requirements of EU Directive 2008/50/EC1 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.

The National Planning Policy Framework (NPPF) published in 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.

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 relevant EU obligations and 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 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. This is known as Local Air Quality Management (LAQM).

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 (superseding the Air Quality Standards Regulation 2007) 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. For instance, the compliance date for the EU NO_2 limit values is 1 January 2010, which is five years later than the date for the NAQO.

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.

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London-wide policy and guidance

Intend to Publish London Plan (Mayor of London, 2019)

Policy SI 1 in the Intend to Publish London Plan 'Improving air quality' states that:

- 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.
- To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:
    - 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.
    - 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 retrofitted 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.
- 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.
- 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.
- Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development.

The London Plan (Mayor of London, 2016)

Policy 7.14 in the London Plan 'Improving air quality' states that development proposals should:

- Minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans;
- Be at least 'Air Quality Neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs))

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London-wide policy and guidance (continued)

- Ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches; and
- Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permissions should only be granted if no adverse air quality impacts from the biomass boiler are identified."

Cleaning 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:

- 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 NOx for new biomass boilers and NOx 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 CO2 reduction targets for new developments which will be achieved using the Mayor's Energy Hierarchy. These measures will result in reductions of NOx 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.

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+44 (0)207 0430 418

www.eightassociates.co.uk
info@eightassociates.co.uk

London Borough of Camden policy and guidance

Camden Local Plan 2017 (London Borough of Camden)

- Policy CC4 – Air Quality

  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.

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

Camden Clean Air Action Plan 2019 – 2022

The overarching aim of the Clean Air Action Plan is to:

1. Continue to meet the EU objectives for Carbon Monoxide, Benzene, 1,3-Butadiene, Lead and PM_{10}.
2. Continue to reduce concentrations of PM_{10} and $PM_{2.5}$, and to meet the EU Objective for NO_2.
3. Drive forward compliance with WHO Guidelines by 2030

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+44 (0)207 0430 418

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Site Overview

The 5–17 Haverstock Hill development site is located in the London Borough of Camden. The OS grid reference for the site is X (Eastings) 528126, Y (Northings) 184421, and the closest post code is NW3 2BP (Figure 1).

The total area of the 5–17 Haverstock Hill, development site is approximately 0.207 hectares (2,070m^2). Former Car Park/ Storage (Sui Generis) (Including ancillary offices). The site is bordered by Haverstock Hill to the north and Adelaide Road to the south.

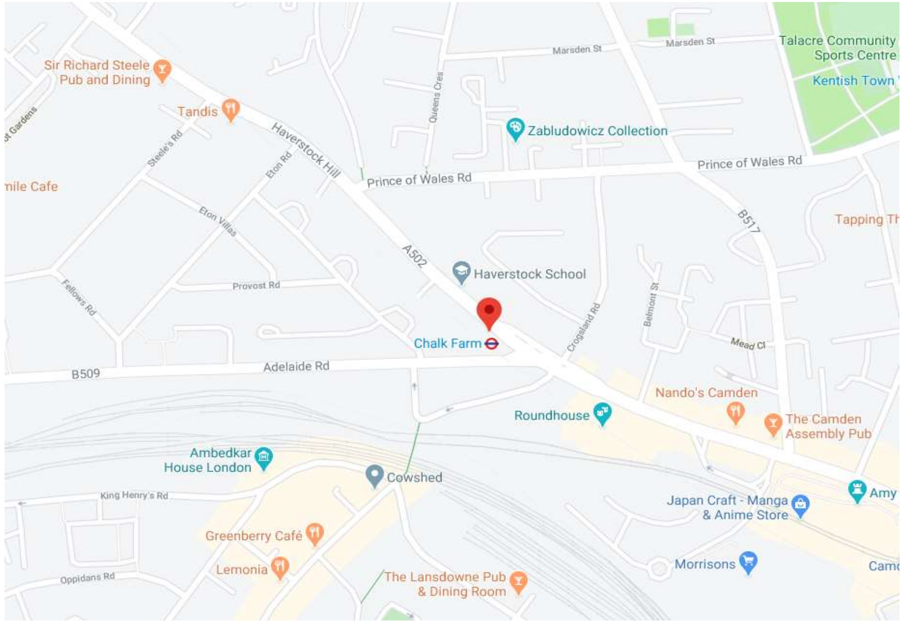

Figure 1: Map showing development site location.

Description of proposed development

The proposed development will consist of 118 hotel rooms (typically 17m^2 each) with ancillary ground floor restaurant and café, 18 social rented housing units, and 17 market housing units. The developments GIA is 9,143m^2. A ground floor is given in Figure 2.

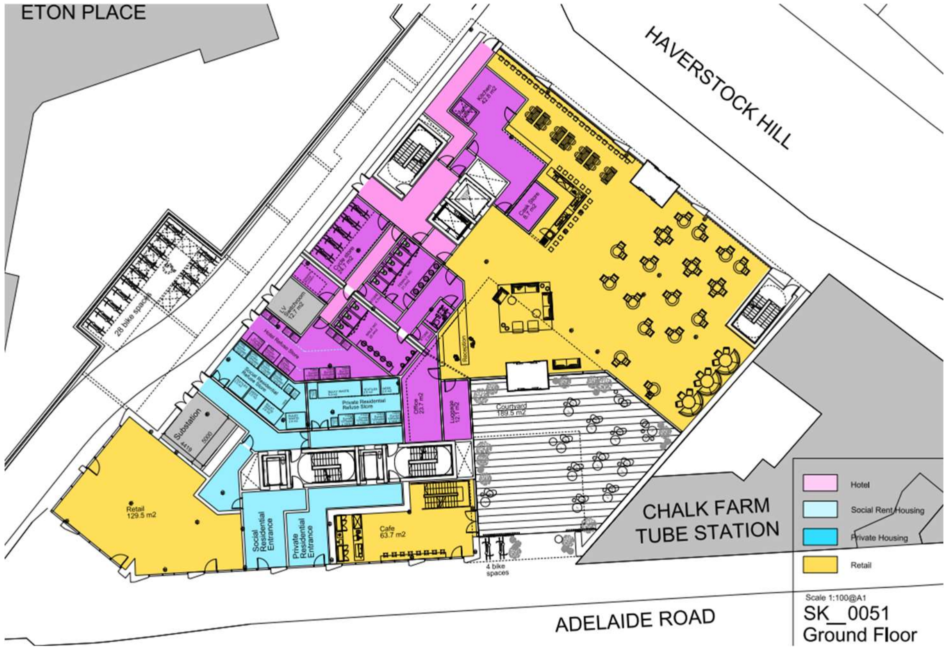

Figure 2: Proposed development ground floor plan.

Local Receptors
Air Quality Assessment
5–17 Haverstock Hill

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+44 (0)207 0430 418

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info@eightassociates.co.uk

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 human 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 and a 50m radius for ecological receptors (Figure 3).

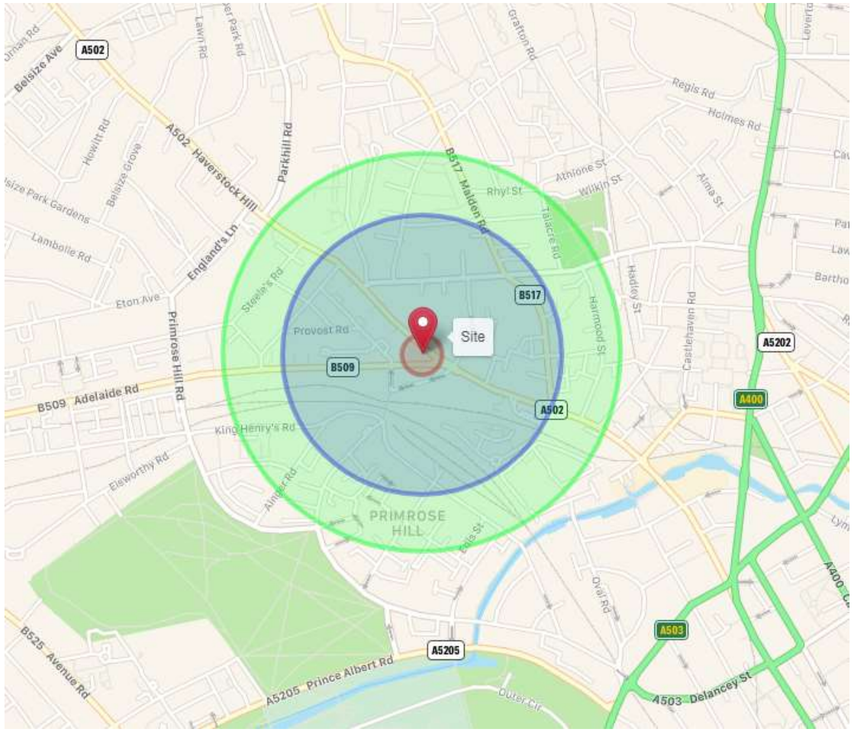

Figure 3: Aerial view showing 500m radius (green), 350m radius (blue) and 50m radius from site (red).

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www.eightassociates.co.uk
info@eightassociates.co.uk

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 proposed development has a number of human receptors within 350m of the site. The surrounding area is densely populated and contains numerous residential dwellings. Key human receptors are identified below:

Schools

The following schools are within 350m of the development:

- Haverstock School – approximately 60m north of the site.
- Child Care Pre-Cadet School – approximately 115m northeast of the site.

Nurseries

The following nursery is within 350m of the development:

- Ready Steady Go Nursery School – approximately 280m south of the site.
- Littlehaven Nursery – approximately 330m south of the site.

Hospitals

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

Doctors

The following doctors' surgeries are within 350m of the development.

- Primrose Hill Surgery – approximately 320m southwest of the site.

Ecological receptors

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

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

Current local status

An Air Quality Management Area (AQMA) has been declared for the entire London Borough of Camden due to continued exceedances of NO_2 and PM_{10} NAQOs. A number of focus areas for NO_2 have been declared due to these areas having both high concentrations of NO_2 and significant human exposure (Figure 5). The site is not located within an NO_2 focus area. The red circle on the figure below represents the site's location.

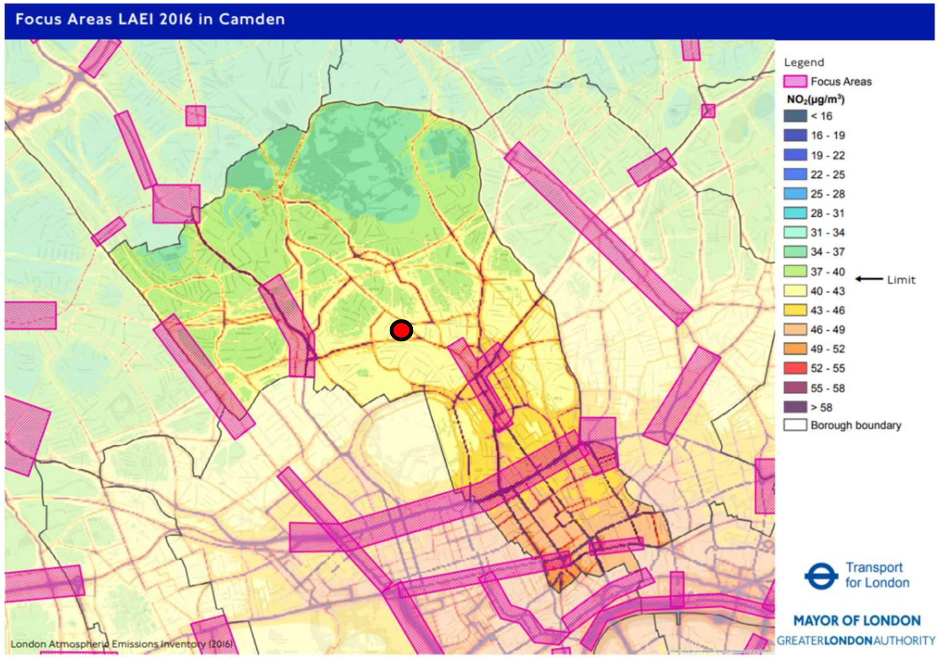

Figure 5: London Borough of Camden's NO_2 focus areas.

Local monitoring stations

Nearby operational diffusion tubes and automatic monitoring stations in the London Borough of Camden have been identified, based on their proximity to the development site, completeness of data and relevance to the development site. The monitoring sites identified in proximity to the development site are outlined in Table 3.

Table 3: Air quality monitoring stations identified near to the site.

Site ID	Site name and type	Pollutants monitored	Distance to exposure (m)	Distance to kerb (m)	Distance from site (km)
CA23	Camden Road, diffusion tube, roadside	NO_2	5	<1	1.084
CA16	Kentish Town Road, diffusion tube, roadside	NO_2	1	1	1.116
CD1	Swiss Cottage, automatic monitoring, kerbside	NO_2, PM_{10}, $PM_{2.5}$	7	1.5	1.493
CA24	Chetwynd Road, diffusion tube, roadside	NO_2	2	1	1.640
CA17	47 Fitzjohn's Road, diffusion, roadside	NO_2	5	5	1.724

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+44 (0)207 0430 418

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Local monitoring stations (continued)

A map showing the approximate locations of the closest NO_2 diffusion tubes and automatic monitoring stations in relation to the development site is shown in Figure 6 below.

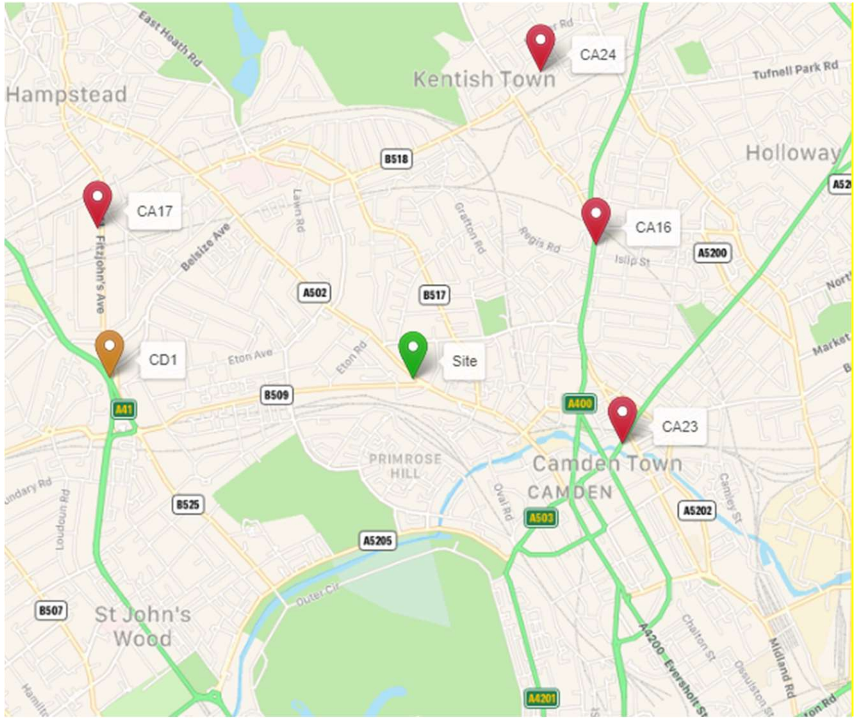

Figure 6: Map showing location of development site (shown in green) in relation to nearby NO_2 diffusion tubes (shown in red) and automatic monitoring stations (shown in orange).

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 4. Results for each monitoring station and reporting year are shown in red where the NAQO is exceeded and grey where there is a lack of sufficiently robust monitored data.

The data shows that the NAQO for mean annual NO2 concentration (for the mean annual concentration to be no more than 40 µg/m3) has been consistently exceeded at each location between the latest reporting years of 2015–2018.

Table 4: 2015–2018 NO_2 annual mean concentrations near to the site.

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2018	2017	2016	2015
CA23	Non-automatic, roadside (<1m from kerb)	1,084	55.6	75.4	61.7	63.3
CA16	Non-automatic, roadside (1m from kerb)	1,116	54.7	74.9	58.7	63.5
CD1	Automatic, kerbside (1.5m from kerb)	1,493	54.0	53.0	66.0	61.0
CA24	Non-automatic, roadside (1m from kerb)	1,640	39.7	55.0	41.9	46.5
CA17	Non-automatic, roadside (5m from kerb)	1,724	48.1	–	56.4	55.8

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+44 (0)207 0430 418

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info@eightassociates.co.uk

Monitored nitrogen dioxide (NO_2) (continued)

A summary of the latest monitoring results for the annual exceedances of the NO_2 hourly mean concentration of 200 µg/m^3 is given in Table 5. Only continuous monitoring stations are capable of monitoring progress against this NAQO. The NAQO (for no more than 18 exceedances of the 200 µg/m^3 hourly mean) was met at this location between 2015 and 2018, with the exception of 2016.

Table 5: 2015–2018 NO_2 annual exceedances of hourly mean of 200 µg/m^3 near to the site.

Site ID	Monitoring station type	Distance from site (m)	Count of annual exceedances of hourly mean of 200 µg/m^3			
			2018	2017	2016	2015
CD1	Automatic, kerbside (1.5m from kerb)	1,493	2	1	37	11

Monitored particulate matter under 10 µm diameter (PM_{10})

A summary of the latest monitoring results for PM_{10} annual mean concentrations at the closest monitoring stations to the development site is given in Table 6. Only the continuous monitoring stations in the vicinity of the development have the capability of monitoring mean annual PM_{10} concentrations. The NAQO (for the mean annual concentration to be no more than 40 µg/m^3) has been met at this location for 2015 to 2018.

Table 6: 2015–2018 PM_{10} annual mean concentrations near to the site.

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2018	2017	2016	2015
CD1	Automatic, kerbside (1.5m from kerb)	1,493	21	19	20	22

A summary of the latest monitoring results for the annual exceedances of the PM_{10} daily mean concentration of 50 µg/m^3 is given in Table 7. Only continuous monitoring stations are capable of monitoring progress against this NAQO. The NAQO (for no more than 35 exceedances of the 50 µg/m^3 daily mean) has been met at this location for 2015 to 2018.

Table 7: 2015–2018 PM_{10} annual exceedances of daily mean of 50 µg/m^3 near to the site.

Site ID	Monitoring station type	Distance from site (m)	Count of annual exceedances of daily mean of 50 µg/m^3			
			2018	2017	2016	2015
CD1	Automatic, kerbside (1.5m from kerb)	1,493	4	8	7	8

Monitored fine particulate matter 2.5 µm diameter ($PM_{2.5}$)

A summary of the latest monitoring results for $PM_{2.5}$ annual mean concentrations at the closest monitoring stations to the development site is given in Table 8. Only the continuous monitoring stations in the vicinity of the development have the capability of monitoring mean annual $PM_{2.5}$ concentrations. The NAQO (for the mean annual concentration to be no more than 25 µg/m^3) has been met at this location for 2015 to 2018.

Table 8: 2015–2018 $PM_{2.5}$ annual mean concentrations near to the site.

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2018	2017	2016	2015
CD1	Automatic, kerbside (1.5m from kerb)	1,493	11	16	15	12

Modelled nitrogen dioxide (NO_2)

The London Atmospheric Emissions Inventory (LAEI) 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 is shown in Figure 7. Mean annual NO_2 concentrations are estimated as approximately 40 µg/m^3 at the site for 2016. The modelled data indicates that the NAQO and WHO guideline (mean annual concentration no greater than 40 µg/m^3) was likely not achieved at the site during 2016. Road traffic emissions are likely to be the primary source of NO_2 pollution in the area.

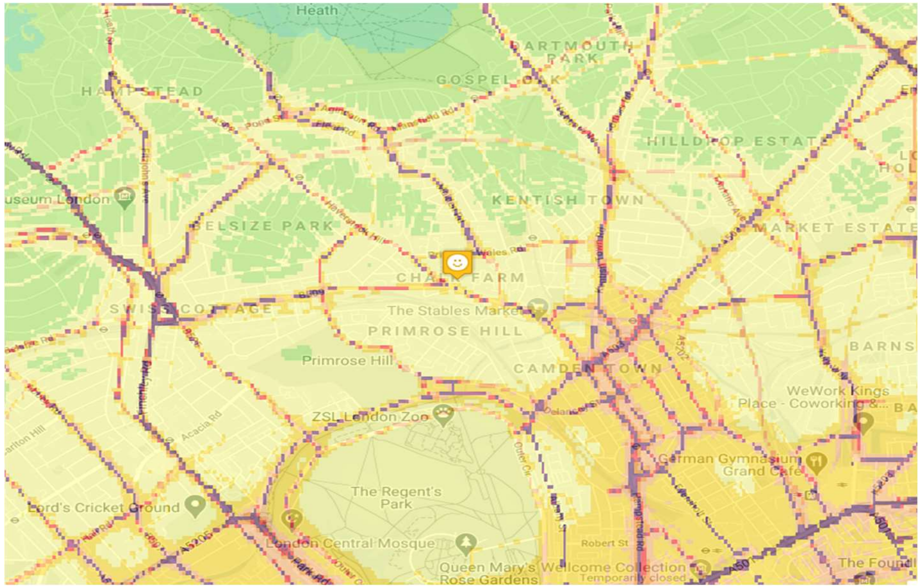

Figure 7: 2016 modelled NO_2 concentrations for the site and surrounding area.

Monitored particulate matter under 10 µm diameter (PM_{10})

The LAEI 2016 modelled mean annual concentrations of PM_{10} are shown in Figure 8. Mean annual PM_{10} concentrations at the site are estimated as approximately 25 µg/m^3 for 2016. The modelled data indicates 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 not achieved at the site.

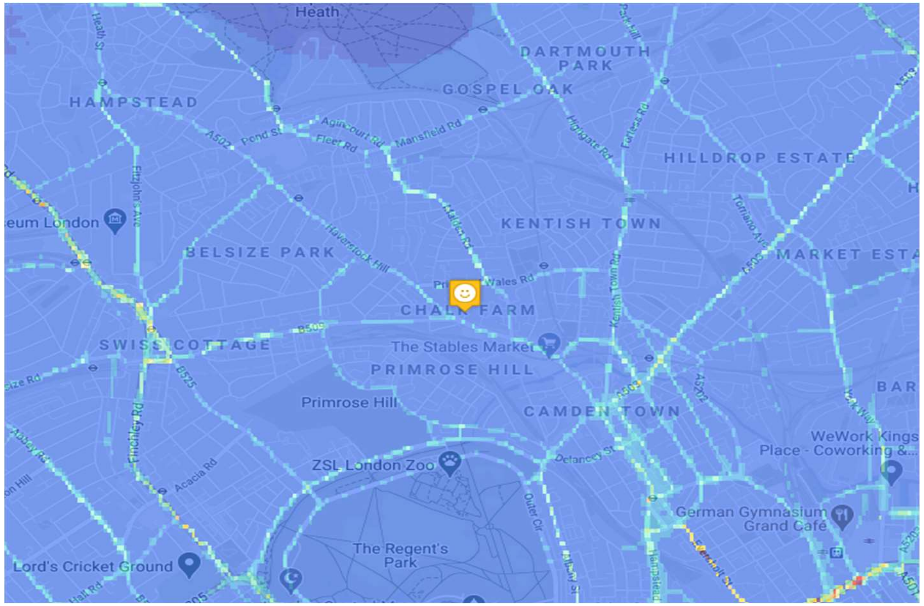

Figure 8: 2016 modelled PM_{10} concentrations for the site and surrounding area.

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 9. Mean annual $PM_{2.5}$ concentrations at the site are estimated as approximately 14 µg/m^3 for 2016. The modelled data indicates 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) for $PM_{2.5}$ was not achieved.

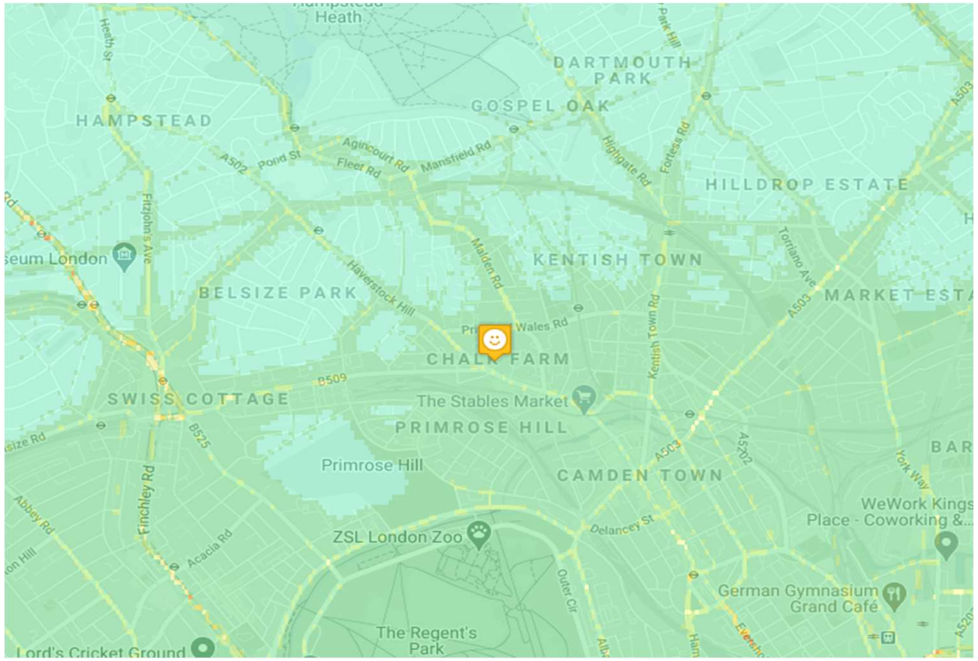

Figure 9: 2016 modelled $PM_{2.5}$ concentrations for the site and surrounding area.

Modelled background concentrations

DEFRA provides modelled background concentrations for key pollutants across the UK squares. The 2018–2022 modelled background concentrations for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for the area surrounding the site are given in Table 8.

Table 8: 2018–2022 modelled background concentrations near to the site.

Pollutant / particulate matter	Background concentration (µg/m^3)				
	2022	2021	2020	2019	2018
NO_x	39.5	41.1	42.8	46.7	50.7
NO_2	25.0	25.9	26.7	28.5	30.2
PM_{10}	17.3	17.4	17.6	17.9	18.2
$PM_{2.5}$	11.5	11.7	11.8	12.0	12.2

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Existing air quality conclusions

Nitrogen dioxide (NO_2)

A total of 5 NO_2 diffusion tubes and automatic monitoring stations, monitoring mean annual NO_2 concentrations, have been identified close to the development site. Mean annual NO_2 concentrations at nearby kerbside and roadside monitoring sites consistently exceed the NAQOs and WHO guidelines between 2015 and 2018.However, these monitoring sites are just over 1000m from the proposed development, as well as, they are roadside monitors which results in higher than usual concentrations. The LAEI 2016 modelled mean annual NO_2 concentrations are estimated as approximately 40 µg/m^3 at the site, while the DEFRA modelled background concentration of NO_2 is 30.2 µg/m^3 for 2018 and decreasing to 25.0 µg/m^3 by 2022. It is likely that mean annual NO_2 concentrations are currently below the NAQO but exceed and WHO guidelines. The predominant source of NO_2 emissions near the development site is likely to be Haverstock Hill to the north and Adelaide Road to the south.

Course particulate matter (PM_{10})

Nearby monitored mean annual PM_{10} concentrations and 24-hourly PM_{10} concentrations achieve the NAQO objectives, but mean annual concentrations exceed the WHO guidelines. The LAEI 2016 modelled mean annual concentrations of PM_{10} at the site are estimated as approximately 25 µg/m^3. The DEFRA modelled background concentration of PM_{10} is 18.2 µg/m^3 for 2018, decreasing to 17.3 µg/m^3 by 2022. It is likely that mean annual NO_2 concentrations currently achieve the NAQO but exceed the WHO guidelines.

Fine particulate matter ($PM_{2.5}$)

Nearby monitored mean annual $PM_{2.5}$ concentrations achieve the NAQO objectives, but mean annual concentrations exceed the WHO guidelines. The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are estimated as approximately 14 µg/m^3. The DEFRA modelled background concentration of $PM_{2.5}$ is 12.2 µg/m^3 for 2018, decreasing to 11.5 µg/m^3 by 2022. It is likely that mean annual $PM_{2.5}$ concentrations currently achieve the NAQO but exceed the WHO guidelines.

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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

The proposed development will consist of 118 hotel rooms (typically 17m^2 each) with ancillary ground floor restaurant and café, 18 social rented housing units, and 17 market housing units. The developments GIA is 9,143m^2.

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 9.

Table 9: Dust emission magnitudes for construction activities.

Activity	Dust emission magnitude	Justification
Demolition	Medium	The total building volume to be demolished will be between 20,000 m^3 – 50,000 m^3 and demolition activities will occur between 10–20m above ground.
Earthworks	Small	The total site area is less than 2,500 m^2. It is anticipated that no more than 5 heavy earth–moving vehicles will be active at any one time.
Construction	Medium	The total new building volume will be between approximately 25,000m^3– 100,000m^3. Potentially dusty construction materials, on site concrete batching.
Trackout	Medium	It is anticipated that there will be 10–50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material, unpaved road length 50–100m.

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Assessment of construction impacts (continued)

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 10.

Table 10: Sensitivity of nearby receptors to dust impacts.

Sensitivity of people to dust soiling	Sensitivity of people to PM health impacts	Sensitivity to ecological effects
High	High	Low
Residential properties (10–100) within 350m of the site which can be expected to be occupied throughout the day. Other sensitive receptors to dust are present, including places of work, schools, and doctors.	Residential properties, schools and doctors' surgeries are present within 350m of the development site.	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 on the previous page has been combined with the sensitivity assessment in the above table to define the risk of impacts for each phase of development in the absence of mitigation. The sensitivity of the surrounding area has been defined in accordance with IAQM guidance and the results are given in Table 11.

Table 11: Risk to local sensitive receptors from construction dust impacts.

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

The overall risk of dust impacts from the construction phase without mitigation measures proposed has been assessed as being medium risk. The risk of trackout activities for ecology is deemed to be low, therefore no further mitigation measures need specifically recommending for protecting ecology from trackout activities.

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Effects of mitigation measures

A schedule of mitigation measures has been developed for the construction phase. 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 12.

Table 12: Summary of proposed AQDMP mitigation measures for construction phase.

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

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Introduction

Policy 7.14 in the London Plan 'Improving air quality' requires that developments should be at least Air Quality Neutral (AQN) and 'not lead to further deterioration of existing poor air quality'. The proposed development has been assessed for its performance against the AQN guidance and benchmarks, for both transport and building-related emissions.

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 13) using the factors for Class C3 for the residential units, Class C1 for the hotel, and Class E for the retail areas.

Table 13: Transport Emissions Benchmark (TEB).

Development metric	Hotel	Residential	Retail	Total
Applicable planning use class for TEB	Hotel (C1)	Residential (C3)	Retail (E)	–
Gross internal area (m^2)	4,147	3,807	768	8,722
Number of dwellings – residential only	118	34	0	152
Location (CAZ/inner/outer)	Inner	Inner	Inner	–
NO_x TEB factor (g/m^2/year) – non-residential only	0.0	0.0	219.0	219.0
NO_x TEB factor (g/dwelling/year) – residential only	558.0	558.0	0.0	–
Total NO_x TEB (kg/year)	65.8	19.0	168.2	253.0
PM_{10} TEB factor (g/m^2/year) – non-residential only	0.0	0.0	39.3	–
PM_{10} TEB factor (g/dwelling/year) – residential only	100.0	100.0	0.0	–
Total PM_{10} TEB (kg/year)	11.8	3.4	30.2	45.4

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Transport emissions (continued)

A Transport Assessment (TA) was produced by WSP in September 2020, which confirms details regarding car parking and car trip estimates that are relevant to this section of the report:

- The development will be car-free. Cycle parking provision and associated facilities will be provided in accordance with the Intend to Publish (ITP) London Plan standards and London Cycle Design Standards (LCDS)
- Cycle access to the proposed development will be provided from Adelaide Road. This entrance will be step-free and the access route and internal corridors towards the cycle stores will be designed in line with the London Cycle Design Standards (LCDS).
- There are six car clubs located within a 10-minute walking distance from the site, provided by Zipcar and Enterprise Car Club. The closest are on Adelaide Road and Chalk Farm Road, both 180m away or a 2-minute walk from the site. Other nearby locations include Regent's Park Road, 220m away or a 3-minute walk from the site, and Haverstock Hill, 450m away or a 5-minute walk from the site
- The proposed development will feature c.690m2 of Class E floorspace. It is intended that the restaurant will be ancillary use to the hotel, to cater for guests; it will offer breakfast, lunch, and dinner options. The restaurant will also be open to the public, and the café and retail uses will be available for public use. It is considered the proposed scale and nature of the units would generally serve the local resident and daytime population of the surrounding area, as well as new residents at the site. It is considered that walk-in trips from the adjacent network would be generated. It is suggested that the need to travel longer distances is unlikely, resulting in very few (if any) primary trips on the local highway and transport networks, except for some staff trips.

It can be concluded that there are likely to be a negligible number of car trips associated with the proposed development. No car trips are calculated in the TA for residential and retail areas and therefore the development passes the AQN test for transport emissions (Table 14).

Table 14: Comparison of calculated transport emissions against TEBs.

Development metric	Hotel	Residential	Retail	Total
Applicable planning use class for TEB	Hotel (C1)	Residential (C3)	Retail (E)	–
Daily trips by car	4	0	0	4
Annual trips by car	1,460	0	0	1,460
Location (CAZ/inner/outer)	Inner	Inner	Inner	–
Average distance travelled per car trip (km)	3.7	3.7	5.9	13.3
Annual distance travelled by car (km/year)	5,402.0	0.0	0.0	5,402.0
NO_x emissions factor (g/km)	0.370	0.370	0.370	–
Total NO_x emissions (kg/year)	2.0	0.0	0.0	2.0
Difference from NO_x TEB to actual	-63.8	-19.0	-168.2	-251.0
Transport NO_x AQN result	Pass	Pass	Pass	Pass
PM_{10} emissions factor (g/km)	0.0665	0.0665	0.0665	–
Total PM_{10} emissions (kg/year)	0.4	0.0	0.0	0.4
Difference from PM_{10} TEB to actual	-11.4	-3.4	-30.2	-45.0
Transport PM_{10} AQN result	Pass	Pass	Pass	Pass

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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 15) using the factors for Class C3 for the residential units, Class C1 for the hotel, and Class E for the retail areas.

Table 15: Building Emissions Benchmark (BEB).

Development metric	Hotel	Residential	Retail	Total
Applicable planning use class for BEB	C1	C3	E	–
Gross internal area (m^2)	4,147	3,807	768	8,722
NO_x BEB factor (g/m^2/year)	70.9	68.5	22.6	162.0
Total NO_x BEB (kg/year)	294.0	260.8	17.4	572.2
PM_{10} BEB factor (g/m^2/year)	4.07	5.97	1.29	11.33
Total PM_{10} BEB (kg/year)	16.9	22.7	1.0	40.6

An Energy Strategy was produced by Quinn Ross Energy Ltd in September 2020, 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 and combined heat and power (CHP) has been avoided for the scheme. A highly efficient VRF heat pump system is specified for space heating and cooling, along with a separate heat pump system for hot water generation. Based on there being no gas consumption, the development passes the AQN test for building emissions (Table 16 overleaf).

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Building emissions (continued)

Table 16: Comparison of calculated building emissions against BEBs.

Development metric	Hotel	Residential	Retail	Total
Applicable planning use class for BEB	C1	C2	E	–
Total annual gas consumption from boilers (kWh/year)	0	0	0	0
Boilers NO_x emissions factor (mg/kWh)	0	0	0	–
Total NO_x emissions from boilers (kg/year)	0.0	0.0	0.0	0.0
Total annual gas consumption from CHP (kWh/year)	0.0	0.0	0.0	0.0
CHP NO_x emissions factor (mg/kWh)	0.0	0.0	0.0	–
Total NO_x emissions from CHP (kg/year)	0.0	0.0	0.0	0.0
Total NO_x emissions (kg/year)	0.0	0.0	0.0	0.0
Difference from NO_x BEB to actual	−294.0	−260.8	−17.4	−572.2
Building NO_x AQN result	Pass	Pass	Pass	Pass
Total annual oil or solid fuel consumption (kWh/year)	0.0	0.0	0.0	0.00
PM_{10} emissions factor (mg/kWh)	0.0	0.0	0.0	–
Total PM_{10} emissions (kg/year)	0.0	0.0	0.0	0.00
Difference from PM_{10} BEB to actual	−16.9	−22.7	−1.0	−40.6
Building PM_{10} AQN result	Pass	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 Air Quality Neutral Test and be designed so that they are at least ‘air quality neutral’ (AQN). A development is considered to be AQN if it can be demonstrated either that 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 Transport Emissions Benchmark (TEB) and Building Emissions Benchmark (BEB) and therefore passes the AQN test. No additional mitigation for the purposes of AQN is required.

Operational Impacts: Dispersion Modelling
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Introduction

A detailed assessment of the effects of the operational phase of the proposed development has been undertaken using the atmospheric dispersion modelling software, ADMS-Roads Extra.

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. ADMS-Roads Extra is an enhanced version of ADMS-Roads, which typically allows for more sources to be studied simultaneously. ADMS software uses a steady state gaussian dispersion model and is utilised worldwide to perform air quality analyses for a range of permitting, regulatory, academic research, and planning purposes. The software 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:

- '2018 baseline' – existing baseline traffic flows, 2018 meteorological data and emissions factors.
- '2022 no development' – projected 2022 traffic flows, 2018 meteorological data and 2022 emissions factors.
- '2022 with development' – projected 2022 traffic flows and additional traffic from the proposed 5-17 Haverstock Hill development, 2018 meteorological data and 2022 emissions factors

Emissions sources

For the purposes 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 annual average daily traffic flow (AADT) for the local road network has been obtained from the Department for Transport (DfT) website. The latest DfT reporting year, 2018, has been selected for the '2018 baseline' scenario.

Traffic flow data for 2022, the projected opening year of the development, has been obtained using DfT's Trip End Model Presentation Program (TEMPro) software, by calculating an AADT growth factor from 2018 to 2022 (1.0457). These traffic flows are used for the '2022 no development' scenario.

The following transport estimates for daily road vehicle trips for the operational development have been provided by the transport consultant:

- 4 daily car trips.

These additional trips are added to traffic flows as follows; all journeys are assumed to be made via the major roads in the modelled network, then the trips are added to the 2022 AADT traffic flow for each major road within the study area. This method results in a simplified, but worst-case scenario for the distribution of traffic from the proposed development and is used for the '2022 with development' scenario.

Operational Impacts: Dispersion Modelling

Air Quality Assessment

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Model inputs (continued)

Traffic speeds

Traffic speeds have been estimated based on site observations and national speed limits. As such, an average traffic speed of 48 km/hour is applied to most road sections. A 100m 'slow-down phase' at 20km/hour is included at every major junction and roundabout in the model area. Furthermore, it is assumed that the average traffic speeds on the local road network are the same for the opening year of 2022, as they are for the baseline year of 2018. 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 been incorporated in the dispersion model for all relevant road links.

Modelled pollutants

Concentrations of NO_2 and PM_{10} 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, in accordance with Local Air Quality Management: Technical Guidance (TG16) (DEFRA, 2018).

Meteorological data

Hourly meteorological data from the London City Airport meteorological station (as the closest and most applicable station) has been used. Meteorological data for 2018 has been used, corresponding to the baseline dispersion modelling scenario. Wind speed and direction data from the London City Airport meteorological station has been plotted as a wind rose in Figure 10.

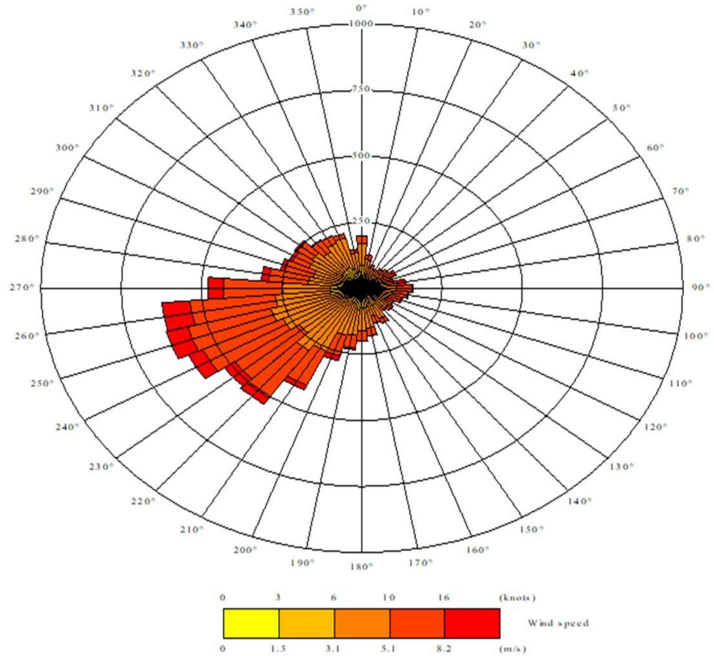

Figure 10: Wind rose for London City Airport (2018).

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Model inputs (continued)

Background concentrations

Background concentrations of pollutants and particulate matter have been obtained from DEFRA. 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 (Table 17).

2018 background concentrations are used for the '2018 baseline' scenario and 2022 background concentrations are used for the '2022 no development' and '2022 with development' scenarios.

Table 17: 2018–2022 modelled background concentrations near to the site.

Pollutant / particulate matter	Background concentration (µg/m^3)				
	2022	2021	2020	2019	2018
NO_x	39.5	41.1	42.8	46.7	50.7
NO_2	25.0	25.9	26.7	28.5	30.2
PM_{10}	17.3	17.4	17.6	17.9	18.2
$PM_{2.5}$	11.5	11.7	11.8	12.0	12.2

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} 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 'Operational Impacts: Dispersion Modelling: Results and discussion' section of this report 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) and Air Quality and Planning Guidance (London Councils, 2007).

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Model verification (continued)

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 this case, as the development site is close to a major road and road traffic is likely to be the predominant local source of emissions, model verification has been undertaken based on roadside monitoring sites only. 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. In this case, as the development site is located adjacent to a street canyon, model verification has been undertaken based on roadside monitoring sites within street canyons only.

Background concentrations

Background pollutant concentrations have been obtained from the DEFRA modelled background concentrations maps. In most cases, there is agreement with the DEFRA modelled background concentrations and local background monitoring sites. However, if local background monitoring data is available, the modelled background concentrations should be compared to local monitoring data. If local monitoring data is deemed to be more representative of the area, this should be used in place of modelled background data

Model refinement

Initially the dispersion model was run using the traffic speeds outlined in the 'Model inputs' section of this report. However, when using these speeds, it was found that the model was significantly under–predicting pollutant concentrations at locations close to the main roads near to the development site, relative to monitored concentrations.

The model was refined using speeds of 10km/hr with speeds of 5km/hr at the junctions. Furthermore, a number of minor roads were identified close to the development site and the nearby monitoring sites, which are likely to have an impact on pollutant concentrations at the modelled receptors. The locations and heights of the monitoring sites being used for comparison, along with the heights of buildings defined for the street canyons, were reviewed, however, no further refinement to the model could be made.

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Model verification (continued)

Comparison

Three monitoring sites have been located at roadside locations within street canyons close to the development site (CA23, CA16 and CD1). Pollutant concentrations at these sites are likely to be representative of the development site and therefore these sites have been used for model verification. Mean annual NO_2 concentrations only are monitored at these sites and therefore model verification has been carried out for mean annual NO_2 concentrations only. A comparison of monitored and modelled concentrations is given in Table 18.

Table 18: Comparison of modelled and monitored concentrations for NO_x and NO_2 (µg/m^3).

Site ID	2018 monitored NO_2	2018 monitored road contribution NO_x	2018 modelled road contribution NO_x	Ratio of monitored to modelled road contribution NO_x
CA23	55.6	54.5	40.8	1.34
CA16	54.7	51.9	38.7	1.34
CD1	54.0	49.9	32.2	1.55

The mathematical relationship between monitored and modelled road contribution NO_x is given in Figure 11, with a trendline passing through zero and its derived equation.

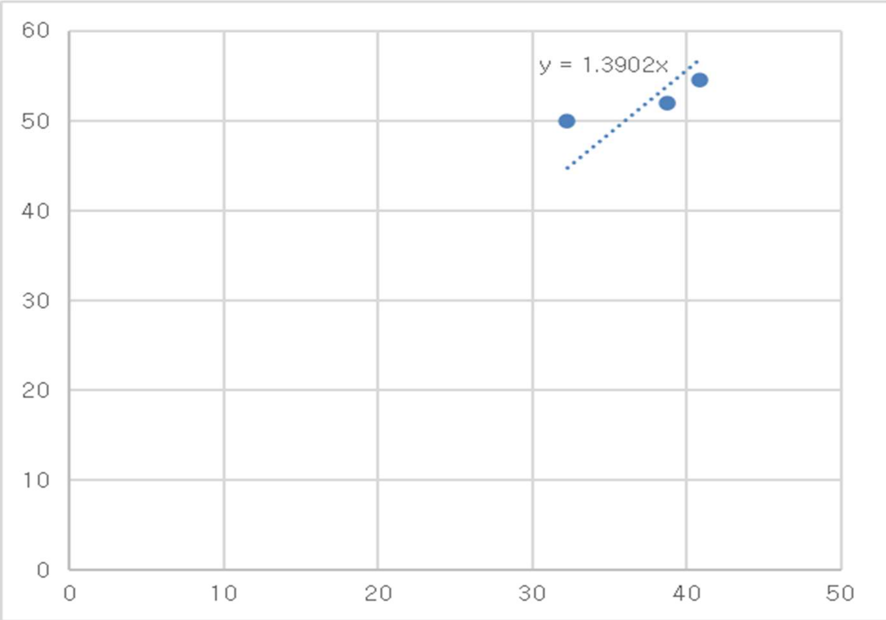

Figure 11: Comparison of monitored and modelled road contribution of NO_x at monitoring sites.

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Model verification (continued)

Adjustment

The adjustment factor derived from Figure 7 (1.3902) 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 19).

Table 19: Model verification results for NO_x and NO_2 (μg/m^3).

Site ID	Road contribution NO_x adjustment factor	Adjusted 2018 modelled road contribution NO_x	2018 modelled total NO_2	2018 monitored NO_2	% difference modelled to monitored NO_2
CA23	1.3902	56.7	52.8	55.6	5.3%
CA16	1.3902	53.8	51.8	54.7	5.6%
CD1	1.3902	44.8	49.6	54.0	8.8%

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 18. 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 '2018 baseline', '2022 no development' and '2022 with development' scenarios. No relevant PM_{10} monitoring data has been obtained for use in the dispersion model, therefore the road contribution NO_x adjustment factor (1.3902) has been subsequently applied to all predicted concentrations of PM_{10}, in accordance with TG16 (DEFRA, 2018).

Model receptors

Dispersion modelling determines the concentrations of pollutants at specified receptors. Receptors have been modelled at the 5–17 Haverstock Hill site, at the proposed locations and heights of proposed windows and balconies for the development (see Table 20).

Table 20: Summary of modelled receptors.

Receptor ID	X coordinate	Y coordinate	Description	Height (m)
R0A–R6A	528105	184447	Proposed development, northeast façade (along Haverstock Hill), ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5
R0B–R6B	528122	184433	Proposed development, northeast façade (along Haverstock Hill), ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5
R0C–R6C	528099	184403	Proposed development, south façade (along Adelaide Rd), ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5
R0D–R6D	528087	184403	Proposed development, south façade (along Adelaide Rd), ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5
R0E–R6E	528065	184405	Proposed development, south façade (along Adelaide Rd), ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5
R0F–R6F	528076	184422	Proposed development, northwest façade, ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5
R0G–R6G	528089	184437	Proposed development, northwest façade, ground to sixth floor	1.5, 4.5, 7.5, 10.5, 13.5, 16.5, 19.5

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Model receptors (continued)

A plan of the modelled receptor locations is given in Figure 12.

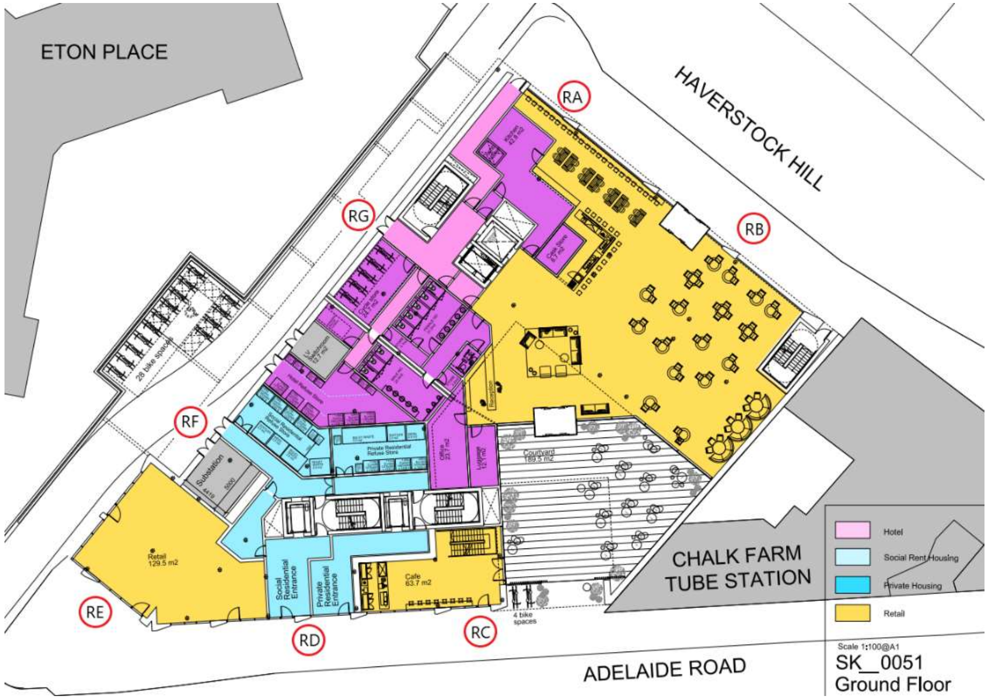

Figure 12: Plan of modelled receptors.

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 21.

The significance of effects is a measure of both the pre-development concentration at a receptor (for the '2022 no development' scenario), and the change from the pre-development concentration, to post-development ('2022 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 and PM_{10}. Note that changes of 0% or less (i.e. less than 0.5%) are described as 'negligible'.

Table 21: 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 nitrogen dioxide (NO_2)

Table 22: Results of NO_2 concentrations for '2018 baseline'.

Receptor ID	Ground (1.5m)	1st (4.5m)	2nd (7.5m)	3rd (10.5m)	4th (13.5m)	5th (16.5m)	6th (19.5m)
R0A-R6A	33.7	33.0	32.1	31.5	31.1	30.9	30.8
R0B-R6B	33.8	33.1	32.2	31.5	31.1	30.9	30.8
R0C-R6C	33.9	33.0	32.0	31.4	31.1	30.9	30.8
R0D-R6D	33.7	32.9	32.0	31.4	31.1	30.9	30.8
R0E-R6E	33.1	32.6	31.9	31.4	31.1	30.9	30.8
R0F-R6F	32.4	32.2	31.8	31.5	31.2	30.9	30.8
R0G-R6G	32.5	32.3	31.9	31.5	31.2	30.9	30.8

Table 23: Results of NO_2 concentrations for '2022 no development'.

Receptor ID	Ground (1.5m)	1st (4.0m)	2nd (6.5m)	3rd (9.0m)	4th (11.5m)	5th (14.0m)	6th (16.5m)
R0A-R6A	26.7	26.4	25.9	25.6	25.5	25.4	25.3
R0B-R6B	26.8	26.5	26.0	25.7	25.5	25.4	25.3
R0C-R6C	26.8	26.4	25.9	25.6	25.5	25.4	25.3
R0D-R6D	26.7	26.3	25.9	25.6	25.5	25.4	25.3
R0E-R6E	26.4	26.2	25.8	25.6	25.5	25.4	25.3
R0F-R6F	26.1	26.0	25.8	25.6	25.5	25.4	25.3
R0G-R6G	26.2	26.0	25.9	25.7	25.5	25.4	25.3

Table 24: Results of NO_2 concentrations for '2022 with development'.

Receptor ID	Ground (1.5m)	1st (4.0m)	2nd (6.5m)	3rd (9.0m)	4th (11.5m)	5th (14.0m)	6th (16.5m)
R0A-R6A	26.7	26.4	25.9	25.6	25.5	25.4	25.3
R0B-R6B	26.8	26.5	26.0	25.7	25.5	25.4	25.3
R0C-R6C	26.8	26.4	25.9	25.6	25.5	25.4	25.3
R0D-R6D	26.7	26.3	25.9	25.6	25.5	25.4	25.3
R0E-R6E	26.4	26.2	25.8	25.6	25.5	25.4	25.3
R0F-R6F	26.1	26.0	25.8	25.6	25.5	25.4	25.3
R0G-R6G	26.2	26.0	25.9	25.7	25.5	25.4	25.3

Table 25: Significance of effects for NO_2 concentrations for '2022 with development'.

Receptor ID	Ground (1.5m)	1st (4.0m)	2nd (6.5m)	3rd (9.0m)	4th (11.5m)	5th (14.0m)	6th (16.5m)
R0A-R6A	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0B-R6B	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0C-R6C	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0D-R6D	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0E-R6E	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0F-R6F	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0G-R6G	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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Results for nitrogen dioxide (NO_2)

NO_2 annual mean concentration

Tables 22, 23 and 24 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 highest for the '2018 baseline' scenario (Table 22), falling for the '2022 no development' and '2022 with development' scenarios. NO_2 concentrations for the '2018 baseline' are predicted to be below the NAQO (mean annual NO_2 concentration of 40 μg/m^3) at all the receptors.
- NO_2 concentrations for the '2018 baseline' scenario are predicted to be below the NAQO (and below 36 μg/m^3, accounting for a potential 10%margin for error) at all modelled receptors.
- The highest concentrations are predicted at ground level (1.5m height) at R0B and R0C (33.8 μg/m^3 and 33.9 μg/m^3, respectively).
- NO_2 concentrations for the '2022 no development' and '2022 with development' scenarios are predicted to be below the NAQO at all receptors.

NO_2 hourly mean NAQO exceedances

Research undertaken on behalf of DEFRA in 2003 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 '2022 no development' and '2022 with development' scenarios.

Significance of impacts

With reference to the EPUK and IAQM's (2017) guidance, the significance of effects from the proposed development on NO_2 concentrations is 'negligible' at all modelled receptors (see Table 25). As the percentage change in relation to NAQO never greater than, or equal to, 0.5%, the significance of effects at all receptors is defined as 'negligible'. The impact of the development on NO_2 concentrations is not deemed to be significant.

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Results for PM_{10}

Table 26: Results of PM_{10} concentrations for '2018 baseline'.

Receptor ID	Ground (1.5m)	1st (4.0m)	2nd (6.5m)	3rd (9.0m)	4th (11.5m)	5th (14.0m)	6th (16.5m)
R0A-R6A	18.7	18.6	18.5	18.4	18.3	18.3	18.3
R0B-R6B	18.8	18.7	18.5	18.4	18.3	18.3	18.3
R0C-R6C	18.8	18.6	18.5	18.4	18.3	18.3	18.3
R0D-R6D	18.7	18.6	18.5	18.4	18.3	18.3	18.3
R0E-R6E	18.6	18.6	18.5	18.4	18.3	18.3	18.3
R0F-R6F	18.5	18.5	18.4	18.4	18.3	18.3	18.3
R0G-R6G	18.6	18.5	18.5	18.4	18.3	18.3	18.3

Table 27: Results of PM_{10} concentrations for '2022 no development'.

Receptor ID	Ground (1.5m)	1st (4.0m)	2nd (6.5m)	3rd (9.0m)	4th (11.5m)	5th (14.0m)	6th (16.5m)
R0A-R6A	17.8	17.7	17.5	17.5	17.4	17.4	17.4
R0B-R6B	17.8	17.7	17.6	17.5	17.4	17.4	17.4
R0C-R6C	17.8	17.7	17.5	17.5	17.4	17.4	17.4
R0D-R6D	17.7	17.6	17.5	17.5	17.4	17.4	17.4
R0E-R6E	17.7	17.6	17.5	17.4	17.4	17.4	17.4
R0F-R6F	17.6	17.5	17.5	17.5	17.4	17.4	17.4
R0G-R6G	17.6	17.6	17.5	17.5	17.4	17.4	17.4

Table 28: Results of PM_{10} concentrations for '2022 with development'.

Receptor ID	Ground (1.5m)	1st (4.5m)	2nd (7.5m)	3rd (10.5m)	4th (13.5m)	5th (16.5m)	6th (19.5m)
R0A-R6A	17.8	17.7	17.5	17.5	17.4	17.4	17.4
R0B-R6B	17.8	17.7	17.6	17.5	17.4	17.4	17.4
R0C-R6C	17.8	17.7	17.5	17.5	17.4	17.4	17.4
R0D-R6D	17.7	17.6	17.5	17.5	17.4	17.4	17.4
R0E-R6E	17.7	17.6	17.5	17.4	17.4	17.4	17.4
R0F-R6F	17.6	17.5	17.5	17.5	17.4	17.4	17.4
R0G-R6G	17.6	17.6	17.5	17.5	17.4	17.4	17.4

Table 29: Significance of effects for PM_{10} concentrations for '2022 with development'.

Receptor ID	Ground (1.5m)	1st (4.5m)	2nd (7.5m)	3rd (10.5m)	4th (13.5m)	5th (16.5m)	6th (19.5m)
R0A-R6A	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0B-R6B	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0C-R6C	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0D-R6D	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0E-R6E	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0F-R6F	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R0G-R6G	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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Results for PM_{10}

PM_{10} annual mean concentration

Tables 26, 27 and 28 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 highest for the '2018 baseline' scenario (Table 26), falling for the '2022 no development' and '2022 with development' scenarios.
- PM_{10} concentrations are predicted to be below the NAQO (mean annual NO_2 concentration of 40 µg/m^3), and and below 36 µg/m^3, accounting for a potential 10% margin for error, for the '2018 baseline', '2022 no development', or '2022 with development' scenarios.

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 of any receptor for the '2018 baseline' scenario (18.8 µg/m^3) results in an estimated number of annual occurrences of the 24-hourly mean above 200 µg/m^3 of 2.09 (less than the NAQO). It is therefore concluded that this NAQO would be achieved at the site.

Significance of impacts

The significance of effects from the proposed development on PM_{10} concentrations is deemed to be 'negligible' at all (see Table 29). The impact of the development on PM_{10} concentrations is not deemed to be significant.

Operational Impacts: Mitigation Measures

Air Quality Assessment

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Pollution mitigation hierarchy

The development passes the AQN test for transport and building emissions. As a result of this, no additional mitigation or off-setting measures for the operational phase of the development will be required. However, the proposals will introduce new residential, hotel, and retail uses to an area that is likely to have poor existing air quality (most notably for NO_2), therefore mitigation measures should be incorporated to reduce the exposure of future building users and occupants (particularly residential occupants, who will typically be occupying the site for the most amount of time).

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.

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

The Transport Statement concludes that there are likely to be a negligible number of car trips associated with the proposed development. The site is well connected for public transport with a Public Transport Accessibility Level (PTAL) of 6a. The nearest London Underground Station to the site is Chalk Farm Station, located adjacent to the site. Chalk Farm Station is served by the Northern Line. The site is located on a number of bus routes (31, N28, N31, 168, 393, N5) providing buses to Camden Town, Wandsworth, Clapham Junction Station, White City, Belsize Park, Old Kent Road and Whitehall with the nearest stop located in front of Chalk Farm Station. Cycling will be promoted further by the inclusion of cycle storage, including on-street visitor cycle parking available to all users of the proposed development, particularly customers and visitors

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:

ASHP

A highly efficient VRF heat pump system is specified for space heating and cooling, along with a separate heat pump system for hot water generation. No further mitigation measures are required at the source.

Reduction and minimisation: Mitigation measures that act on the pathway

It is likely that the primary local source of emissions, including NO_2, PM_{10} and $PM_{2.5}$, is the local road network, most notably Haverstock Hill to the north and Adelaide Road to the south. Pollutant concentrations are likely to be highest at ground level (typically decreasing with height from the ground).

Building form

The site is relatively constrained, and the development proposals will utilise the entire site area for the new building, following the form of the existing 5-17 Haverstock Hill building and neighbouring buildings. Within current development proposals it will not be possible to set the building back further from Haverstock Hill or Adelaide Road to increase the distance from pollution sources. However, the design team has proposed mechanical ventilation (with heat recovery) as the ventilation strategy for the scheme. Therefore, the fresh air intakes should be located as far away from the primary sources of pollution as possible (see 'Ventilation and filtration' section below).

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Reduction and minimisation: Mitigation measures at or close to the point of receptor exposure

Ventilation and filtration

The ventilation strategy for the development is based primarily on the use of mechanical ventilation, although windows may also be openable. Intakes for the mechanical ventilation system should be located as far as possible from the primary sources of pollution (Haverstock Hill, Adelaide Road and exhaust flues from the proposed boilers). 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 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 facilities team will provide records of air filtration maintenance, 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.

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.

Mitigation measures have been proposed for the development, 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

Eight Associates has been commissioned to carry out an Air Quality Assessment (AQA) for the proposed development at 5–17 Haverstock Hill, in the London Borough of Camden. The site (0.207 hectares) is located directly to the north of Chalk Farm underground station (Grade II listed), at the junction of Chalk Farm Road, Adelaide Road and Haverstock Hill within an area of more limited change and predominantly occupied by a 6 storey brick building, known as 'Eton Garage', built up to the boundary of the underground station with street elevations facing onto Adelaide Road and Haverstock Hill. There are 6 ground floor retail units along the Adelaide Road frontage which fall within a designated neighbourhood parade. An element of hard standing is located to the rear of the site, with vehicle entrances provided from Adelaide Road and Haverstock Hill.

The following are proposed on the site:

- 118–room hotel with ancillary ground floor restaurant and cafe
- 17 affordable housing units
- 17 private housing units
- Café and retail

5–17 Haverstock Hill is located in an Air Quality Management Area (AQMA), which has been declared for exceedances of the annual mean objective for NO_2 and PM_{10}. A review of the latest monitoring data for particulate matter confirms that NAQOs for PM_{10} and $PM_{2.5}$ are currently being achieved, while the NAQO for NO_2 is currently being exceeded.

Due to the location of the development within an AQMA, and the development proposals introducing new sensitive receptors into an area with poor existing air quality, an Air Quality Assessment (AQA) has been undertaken to accompany the planning application for the scheme. 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 meets the requirements for AQN.

Dispersion modelling has been undertaken to predict the concentrations of NO_2 and PM_{10} at the development site. The dispersion modelling predicts that mean annual concentrations of PM_{10} are currently below 40 µg/m^3 (the '2018 baseline' scenario) and would be below 40 µg/m^3 for the opening year of the development (the '2022 no development' and '2022 with development' scenarios). The dispersion modelling predicts that mean annual concentrations of NO_2 are likely to be below 40 µg/m^3 at all the receptors for the '2018 baseline' scenario. These receptors represent the proposed ground to 6th floor levels. The proposed development is likely to result in exposure of future building users at these receptors, therefore the recommended mitigation measures relating to the ventilation strategy should be incorporated to reduce human exposure.

The unmitigated risk to local sensitive receptors from emissions of dust and pollution from construction is deemed to be medium risk. 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. The most notable mitigation measure being NO_2 filters on inlets.

Opportunities to incorporate green infrastructure in development proposals have been reviewed and evaluated for their benefits for air quality and the mitigation of exposure to poor air quality for building users.

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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 A1: 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.
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 the 5-17 Haverstock Hill 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.

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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.

It is recommended that these measures 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.	Required
2) Develop a Dust Management Plan.	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 logbook	Required
10) Hold regular liaison meetings with other high-risk construction sites within 500m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.	Not required

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Measures relevant for demolition, earthworks, construction and trackout (continued)

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.	Required
14) Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.	Required
15) Avoid site runoff of water and mud.	Required
16) Keep site fencing, barriers and scaffolding clean using wet methods.	Required
17) Remove materials from site as soon as possible.	Required
18) Cover, seed or fence stockpiles to prevent wind whipping.	Required
19) Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.	Recommended
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.	Required
22) Where possible, commence baseline monitoring at least three months before phase begins.	Required
23) Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.	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
29) Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Required
30) Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	Recommended

Appendix A: Air Quality & Dust Management Plan

Air Quality Assessment

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Measures relevant for demolition, earthworks, construction and trackout (continued)

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.	Required

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

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

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

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Measures specific to construction

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.	Required
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.	Recommended
48) For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	Recommended

Measures specific to trackout

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.	Required
50) Avoid dry sweeping of large areas.	Required
51) Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.	Required
52) Record all inspections of haul routes and any subsequent action in a site logbook.	Required
53) Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned.	Required
54) Inspect haul routes for integrity and instigate necessary repairs to the surface, as soon as reasonably practicable.	Required
55) Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Required
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.	Required
57) Access gates to be located at least 10m from receptors, where possible.	Required
58) Apply dust suppressants to locations where a large volume of vehicles enters and exit the construction site.	Not required

Appendix B: Dispersion Model Inputs

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Dispersion model inputs

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.	*London City 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 not included, and model defaults used for all 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. Road widths for road links with street canyons specified set as the street canyon width.
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.	No time varied emissions data available so time varied emissions inputs not used.
Road type	Setting to allow the effect of different types of roads to be assessed.	*London (central)* 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, otherwise defaulted to *48km/hr* where not known, and *20km/hr* for 100m approach to major junctions to reflect slowing of traffic.
Street canyon modelling	Settings to enable both 'basic' and 'advanced' street canyon modelling of road links.	*Basic street canyon modelling* applied by including average canyon heights for road links based on data obtained from OS map data.
Road source emissions	Settings to input road source emissions based on road traffic emission calculation method.	UK Emissions Factor Toolkit (EFT) version 8.0 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.

Appendix C: Dispersion Model Traffic Inputs

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Traffic flow data used in dispersion model

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.

Link ID	Road name	Speed (km/hr)	2018 baseline		2022 no development		2022 with development	
			AADT	% HDV	AADT	% HDV	AADT	% HDV
37264	A502	10	14,706	5%	15,378	5%	15,382	4.8%
17170	B509	20	8,100	8%	8,470	8%	8,474	7.8%
990139	B511	10	17,653	2%	18,460	2%	18,464	2.1%
16434	A41	10	42,988	6%	44,953	6%	44,957	5.6%
47249	A503	48	26,341	6%	27,545	6%	27,549	5.6%
17007	A400	48	14,169	15%	14,817	15%	14,821	14.8%

Appendix D: Dispersion Model Area

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Dispersion model area plan

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