CIRCLE SUSTAINABILITY

Air Quality

9-12 New Collage Parade

Date: 30th July 2024

1 Summary

Circle Sustainability have been appointed to update the Air Quality Assessment for 9-12 New Collage Parade, based on changes made from the previous planning application.

No additional dispersal modelling has been carried out and this addendum does not replace the appended air quality report. Any changes to the appended air quality report are to suit the change and design, and are by means amendments to the report or the results of the report.

The proposed project consists of the demolition of parts of the existing building, the retention of the existing two-storey facades and erection of an Seven-storey building to provide a mixed-use development. This will deliver a 59-room boutique hotel, three apartments across the first floor and a restaurant on the ground and basement floors. Associated refuse and bicycle stores, amenity spaces and landscaping are also included within the proposed development.

Updated drawings showing the proposed changes have been included within the Appendix.

Air Quality Assessment
9-12 New College Parade

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Executive summary

Overview

Eight Versa has been commissioned to carry out an Air Quality Assessment (AQA) for the proposed development at 9-12 New College Parade, in the London Borough of Camden. The proposals consist of the demolition of the existing building for the construction of a seven-storey with basement building with the retention of the existing two-storey facade, to deliver 59 room hotel, retail units in the lower ground and ground floor and three residential flats with associated works.

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

The entire borough was declared as an Air Quality Management Area (AQMA) in 2002 for exceedances of the National Air Quality Objectives (NAQOs) for nitrogen dioxide (NO_2) and 24-hour mean exceedance for particulate matter (PM_{10}). Even though the NAQOs for PM_{10} and $PM_{2.5}$ are currently being met, it remains a pollutant of concern. The site is located in a NO_2 Focus Area.

A review of the latest monitoring data for NO_2 at the closest locations to the development indicates that the NAQO has been exceeded at site CD1 in the latest reporting year of 2021 but achieved at CA17. NAQO at CA17 monitoring site was consistently achieved for reporting years 2020-2022. Although the sites demonstrated some exceedances, there is a decreasing trend in NO_2 levels. Additionally, the NAQO for the hourly mean (for no more than 18 exceedances of the 200 µg/m^3 hourly mean) has been consistently achieved at the automatic monitoring station for the years 2018-2021. The LAEI 2016 modelled mean annual NO_2 concentrations were estimated at approximately 66 µg/m^3 at the site, exceeding both the NAQO and WHO guideline.

Nearby monitored mean annual PM_{10} concentrations and 24-hourly PM_{10} concentrations achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of PM_{10} at the site were estimated at approximately 30 µg/m^3, achieving the NAQO but exceeding the WHO guidelines.

Nearby monitored mean annual $PM_{2.5}$ concentrations achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are estimated as approximately 17 µg/m^3, achieving the NAQO but exceeding the WHO guideline.

Since the development is located in a NO_2 Focus Area, atmospheric dispersion modelling was carried out. The performance of the modelled receptors at the façade facing Finchley Road indicates the effects of NO_2 concentrations in the three different scenarios, 'Baseline 2019', '2025 no development' and '2025 with development' are substantial at the ground floor but PM_{10} and $PM_{2.5}$ concentrations in the three different scenarios, 'Baseline 2019', '2025 no development' and '2025 with development' are not significant. Even though, the NO_2 concentrations for the '2025 no development' and '2025 with development' scenarios are predicted to be above NAQO, it can be considered that future improvements like background concentrations and vehicle emissions will benefit the local air quality. Therefore, residents using the amenity spaces are not predicted to be exposed to high level of air pollution.

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

The design mitigation hierarchy has been applied to maximise air quality for occupants, where feasible. Measures include, provision of sustainable transport modes, such as cycling, integration of low carbon energy technologies, urban greening and a well-designed mechanical ventilation system.

Air Quality Assessment

9-12 New College Parade

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Introduction

Project Overview

Eight Versa has been commissioned to carry out an Air Quality Assessment (AQA) for the proposed development at 9-12 New College Parade, in the London Borough of Camden. The proposals consist of the demolition of the existing building for the construction of a seven-storey with basement building with the retention of the existing two-storey facade, to deliver 59 room hotel, retail units in the lower ground and ground floor and three residential flats with associated works.

The London Borough of Camden has declared an Air Quality Management Area (AQMA) for the whole Borough due to continued exceedances against National Air Quality Objectives (NAQOs) for the annual mean NO_2 and 24-hour mean exceedance for PM_{10}. Additionally, the western façade faces Finchley Road. Due to the proposed nature of the development, occupants will be exposed to poor air quality, an AQA has been undertaken to accompany the planning application.

Scope of Assessment

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

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

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

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

National	National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021)
	The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Department for Environment, Food & Rural Affairs, Defra, 2007)
	Land-Use Planning & Development Control: Planning for Air Quality (Environmental Protection UK (EPUK), Institute of Air Quality Management (IAQM), 2017)
	Clean Air Strategy (Department for Environment, Food & Rural Affairs, Defra, 2019)
	Air Quality Plan for Nitrogen dioxide (NO_2) in UK (Defra, 2017)
	Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014)
	Environment Act 2021 (Ministry of Housing, Communities & Local Government, 2021)
	A Guide to The Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020)
	The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ministry of Housing, Communities & Local Government, 2019)
	Local Air Quality Management: Technical guidance LAQM.TG (19) (Department for Environment, Food & Rural Affairs, Defra, 2021)
Regional	The London Plan 2021 (Mayor of London, 2021)
	Sustainable Design and Construction: Supplementary Planning guidance (Mayor of London, 2014)
	The Control of Dust and Emissions during Construction and Demolition: Supplementary Planning Guidance (Mayor of London, 2014)
	London Local Air Quality Management Technical Guidance LLAQM.TG (19) (Mayor of London, 2019)
	Clearing the Air - The Mayor's Air Quality Strategy (Mayor of London, 2010)
	Air Quality and Planning Guidance (London Councils, 2007)
Local	Camden Local Plan 2017 (London Borough of Camden, 2017)
	Camden Planning Guidance – Air Quality (London Borough of Camden, 2021)
	Clean Air Action Plan 2019-2022 (London Borough of Camden, 2018)

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Policy Review

National Legislation and Policy

The Air Quality Standards Regulations 2016 implements the requirements of EU Directive 2008/50/EC into UK legislation. Defra, on behalf of the UK Government, has produced a series of plans for the UK to meet the EU targets in the shortest possible time, the latest being the UK plan for tackling roadside NO_2 concentrations in July 2017 (NO_2 being identified as the primary pollutant for which the EU limit values are exceeded). An overview document has been produced, together with detailed plans for 37 zones where the objectives for NO_2 were not met in 2015.

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

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

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

Pollutants	UK Concentrations	WHO Concentrations	Measured as	Date to be achieved by (UK only)
Nitrogen dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times per year	25 µg/m^3	24-hour mean	31 December 2005
	40 µg/m^3	10 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	45 µg/m^3	24-hour mean	31 December 2004
	40 µg/m^3	15 µg/m^3	Annual mean	31 December 2004
Particles ($PM_{2.5}$)	-	15 µg/m^3	24-hour mean	-
	20 µg/m^3	5 µg/m^3	Annual mean	31 December 2010
Carbon monoxide (CO)	10 mg/m^3	-	Max. daily 8-hour mean	31 December 2003
Sulphur dioxide (SO_2)	266 µg/m^3 not to be exceeded more than 35 times per year	-	15-minute mean	31 December 2005
	350 µg/m^3 not to be exceeded more than 24 times per year	-	1 hour mean	31 December 2004
	125 µg/m^3 not to be exceeded more than 3 times per year	40 µg/m^3	24-hour mean	31 December 2004
Ozone (O_3)	100 µg/m^3 not to be exceeded more than 10 times per year	100 µg/m^3	8-hour mean	31 December 2005

1The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020. The full 2021 WHO can be viewed on WHO website.

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National Planning Policy Framework (Ministry of Housing, Communities & Local Government, 2021) The National Planning Policy Framework (NPPF) published in December 2023 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 statutory requirements. Specifically, in terms of air quality, it requires the planning system to prevent development from contributing to or being put at unacceptable risk from unacceptable levels of air pollution.

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

The NPPF is supported by a series of Planning Practice Guidance (PPG) documents. The guidance in relation to air quality (PGG – Air Quality, November 2019) provides guiding principles on how planning can take account of the impact of new development on air quality.

Environment Act 2021 (Ministry of Housing, Communities & Local Government, 2021)

The Secretary of State must by regulations set a target ("the $PM_{2.5}$ air quality target") in respect of the annual mean level of $PM_{2.5}$ in ambient air. The $PM_{2.5}$ air quality target may, but need not, be a long-term target. In this section "$PM_{2.5}$" means particulate matter with an aerodynamic diameter not exceeding 2.5 micrometres. Regulations setting the $PM_{2.5}$ air quality target may make provision defining "ambient air". The duty in subsection (1) is in addition to (and does not discharge) the duty in section 1(2) to set a long-term target in relation to air quality. Section 1(4) to (9) applies to the $PM_{2.5}$ air quality target and to regulations under this section as it applies to targets set under section 1 and to regulations under that section. In this Part "the $PM_{2.5}$ air quality target" means the target set under subsection.

National Air Quality Management

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

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

The 2007 Air Quality Strategy establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objectives (NAQOs) for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality Standards Regulations 2016 and the Air Quality (Amendment) (England) Regulations 2002. It should be noted that the EU limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and legal responsibility.

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

Clean Air Strategy (Defra, 2019)

Additionally, the Clean Air Strategy 2019 sets outs goals that will be more stringent than EU requirements with the aim of reducing human exposure to toxic pollutants by taking into account the World Health Organisation's guidelines. The policies in the Strategy aim to reduce $PM_{2.5}$ concentrations across the UK so that the number of people living in locations above the WHO annual mean guideline limit of 10 µg/m3 is reduced by 50% by 2025. Moreover, the Strategy will feed information to local authorities on how the cumulative impacts of nitrogen deposition in natural habitats should be assessed and mitigated through the planning system.

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Regional Policy and Guidance

The London Plan 2021 (Mayor of London, 2021)
Policy SI 1 in the Intended London Plan 'Improving air quality' states that:

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

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

1 Development proposals should not:

- lead to further deterioration of existing poor air quality
- create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits
- create unacceptable risk of high levels of exposure to poor air quality.

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

- development proposals must be at least Air Quality Neutral
- development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures
- major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1
- development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.

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

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

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

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

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

The Mayor of London produced an Air Quality Strategy in 2002 under the requirements of the Greater London Authority Act 1999, which was superseded by the subsequent Air Quality Strategy, published in 2016. The Air Quality Strategy sets out how the National Air Quality Strategy would be implemented in London as a whole.

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

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- Policy '6 - Reducing emissions from construction and demolition sites' which states that the Mayor will work with the London Council to review and update the Best Practice guidance for construction and demolition sites and create supplementary planning guidance to assist implementation;

- Policy '7 - Using the planning process to improve air quality - new developments in London as a minimum shall be 'air quality neutral' which states that the Mayor will encourage boroughs to require emissions assessments to be carried out alongside conventional air quality assessments. Where air quality impacts are predicted to arise from developments these will have to be offset by developer contributions and mitigation measures secured through planning conditions, section 106 agreements or the Community Infrastructure Levy;

- Policy '8 - Maximising the air quality benefits of low to zero carbon energy supply' which states that the Mayor will apply emission limits for both PM and 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.

London Local Air Quality Management Technical Guidance LLAQM.TG (19) (Mayor of London, 2019) This technical guidance - London Local Air Quality Management (LLAQM) Technical Guidance – has been prepared by the Greater London Authority (GLA) to support London boroughs in carrying out their duties under the Environment Act 1995 and connected regulations.

Local Policy and Guidance

Camden Local Plan (London Borough of Camden, adopted 2017)

The Camden Local Plan sets out the Council’s planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010)The Local Plan will cover the period from 2016-2031.The policies below relate directly to air quality and development:

Policy CC4 – Air Quality

- The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.
- The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council’s Air
- 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.

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

The whole of Camden is an Air Quality Management Area (AQMA) as it does not meet national air quality objectives for nitrogen dioxide (NO_2) and because it is widely accepted that there is no safe level for particulates (PM_{10} and smaller). Air quality is particularly severe along major roads through the borough, and in the south of borough which is characterised by high levels of traffic. Major roads are those either in the Transport for London Road Network or designated as a Major Road by Camden.

- All of Camden is a designated Air Quality Management Area due to the high concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}).
- All developments are to protect future occupants from exposure to poor air quality.
- All developments are to limit their impact on local air quality and be at least air quality neutral.

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

- Emissions: An inventory of the PM_{10} and NO_x emissions associated with the proposed development, including the type and quantity of emission concentrations, during the construction and operational phase. This shall cover transport, stationary and mobile emission sources.
- Modelling: The application of atmospheric dispersion modelling to predicted NO_2 and PM_{10} concentrations, both with and without the proposed development. Dispersion modelling shall be the carried out in accordance with Air Quality and Planning Guidance, London Councils (2007) and London Local Air Quality Management Plan Technical Guidance 2016. Modelling should not predict improvements to future years (future vehicle emissions or future background concentrations).

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

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

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

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

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Site Overview

The development site at 9-12 New College Parade is on the east side of Finchley Road in the west of the London Borough of Camden. The OS grid reference for the site is X (Eastings) 526513, Y (Northings) 184513 and the postcode is NW3 5EX. It is bounded by residential buildings to the west and north, commercial units to the east, Finchley Road to the south, as illustrated in in Figure 1.

The total area of the site is approximately 440m^2 (0.044 ha). The building on site is a two storey building in use as commercial units.

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

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Development Overview

Description of Proposed Development

The proposals consist of the demolition of the existing building for the construction of a seven-storey with basement building with the retention of the existing two-storey facade, to deliver 59 room hotel, retail units in the lower ground and ground floor and three residential flats with associated works, including landscaping. Illustrations of the proposed ground floor plan, first floor plan and elevation of the development are shown in Figure 2, Figure 3 and Figure 4, respectively.

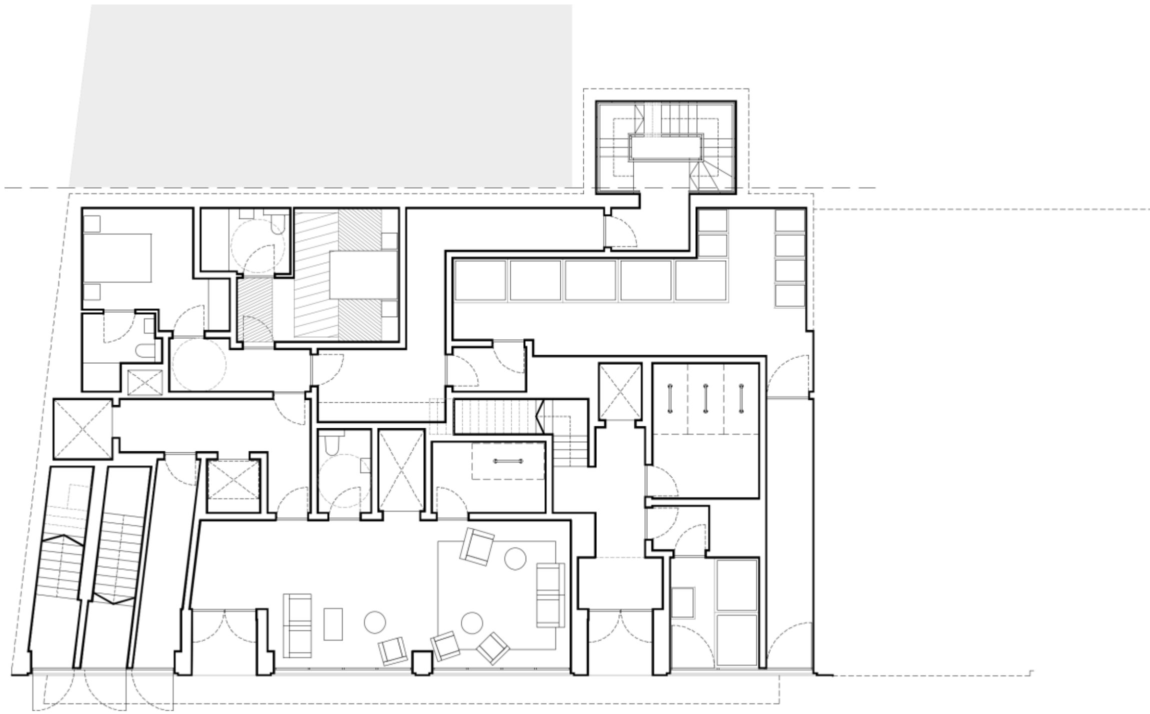

Figure 2: Proposed ground floor plan showing the commercial space, hotel ancillaries.

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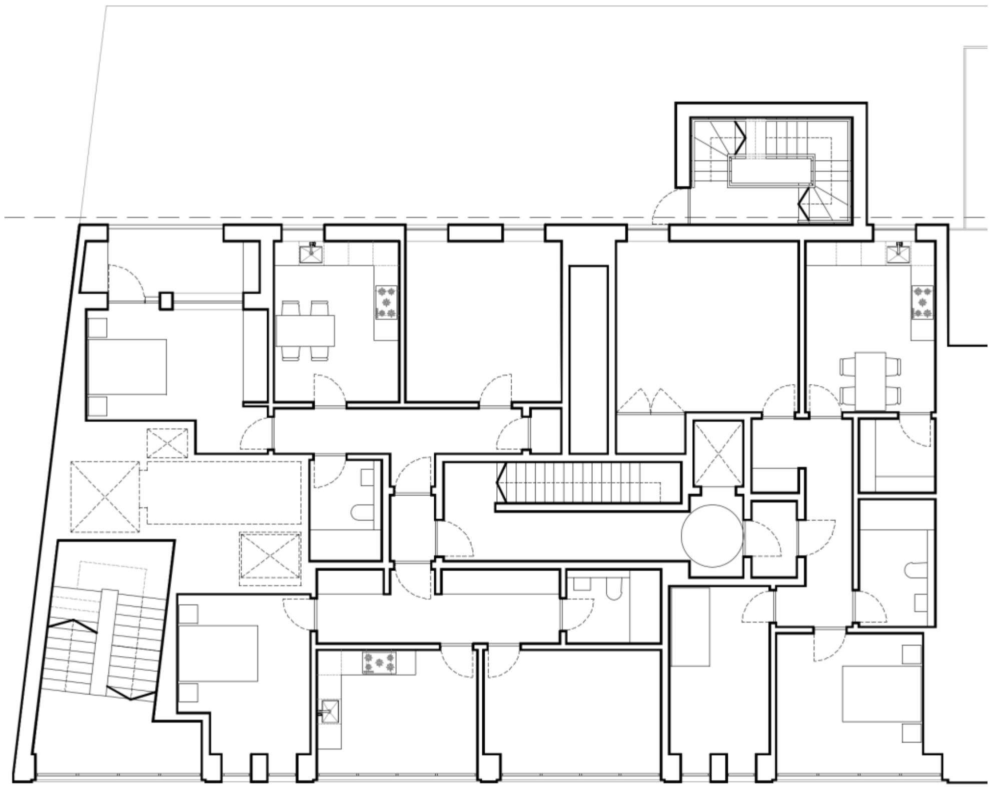

Figure 3: Proposed first floor plan illustrating the residential dwellings.

Figure 4: Elevation at Finchley Road.

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Local Receptors

Overview of Local Sensitive Receptors

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

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

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

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

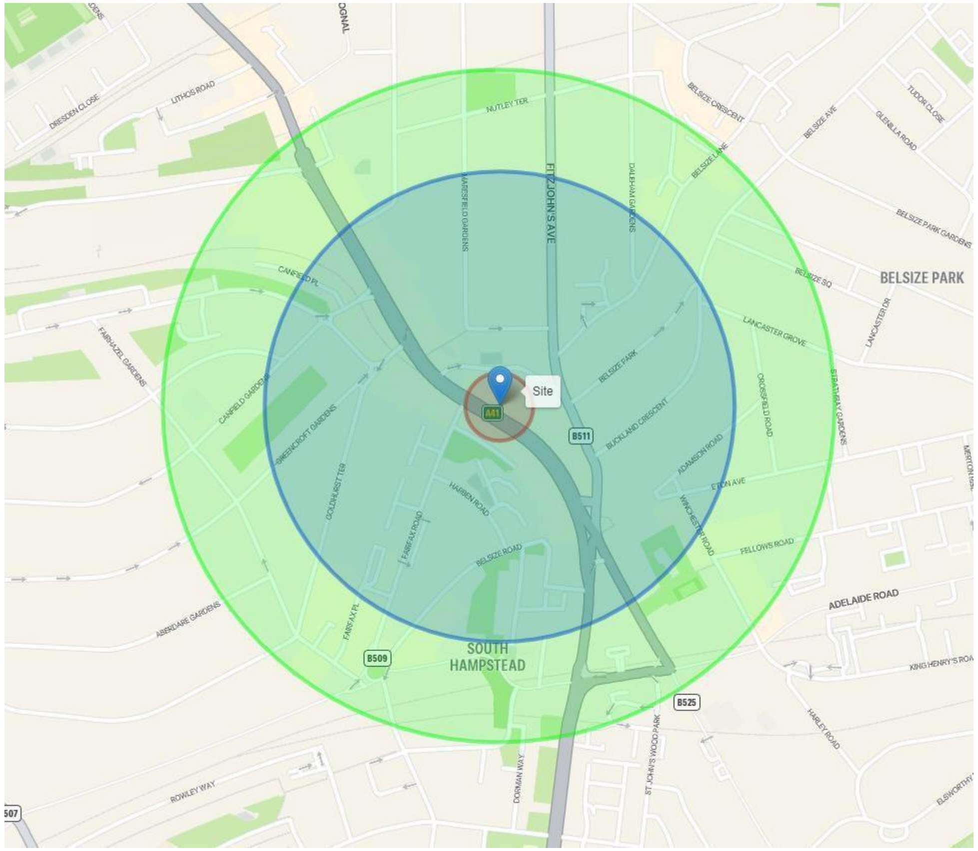

Figure 5: Map view showing a 500m radius (green), a 350m radius (blue) and a 50m radius (red) from the site.

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Human Receptors

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

The surrounding area consists predominantly of residential and retail spaces. Key human receptors are described below (all distances detailed are approximate).

Schools

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

- Holy Trinity C Of E Primary School – approximately 80m north.
- South Hampstead High School – approximately 80m north.
- Broadhurst School - approximately 300m west.
- The Hall School - approximately 340m east.
- South Hampstead Junior School - approximately 370m north.

Nurseries

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

- The Kindergarten Nursery School Hampstead – approximately 330m west.
- Hampstead Baby Care Nursery - approximately 340m north-west.
- North Bridge House - Nursery Hampstead - approximately 380m north.

Hospitals

The following hospitals have been identified within 350m of the development or within 500m of the trackout route.

- The Tavistock and Portman NHS Foundation Trust - approximately 180m north-east.

Doctors

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

- Daleham Gardens Surgery - approximately 280m north-east.
- Dr P Smith - Swiss Cottage Surgery - approximately 475m south-east.

Ecological Receptors

Potential sensitive ecological receptors have been determined using geographic information obtained from MAGIC's website, according to a Guide to the Assessment of Air Quality Impacts On Designated Nature Conservation Sites (IAQM, 2020) and the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (Ministry of Housing, Communities & Local Government, 2019).

The following statutory or non-statutory ecological sites have been identified within 50m of the development or within 500m of the trackout route:

- Source Protection Zone II Outer Protection Zone- approximately 140m east.

The following sites that could represent ecological receptors but not defined as either statutory or non-statutory ecological site, have been identified within 500m of the development site:

- Priority Habitat Inventory - Deciduous Woodland (England) - approximately 430m and 500m north.
- National Forest Inventory (GB) Woodland Broadleaved – approximately 430m and 500m north.

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Construction Phase Impacts

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

section 5 of the IAQM guidance.

Assessment of Construction Impacts

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

Table 3: Dust emission magnitudes for construction activities.

Activity	Dust emission magnitude	Justification
Demolition	Small	The total building volume to be demolished will be less than 20,000 m^3 and demolition activities will occur at no greater than 10 m above ground – approximately 1,900m^3.
Earthworks	Small	The total site area is less than 2,500 m^2. There would be less than 5 heavy earth moving vehicles active at any one time- approximately 420m^2.
Construction	Small	The total new building volume will be less than 25,000 m^3 – approximately 6,800m^3.
Trackout	Small	It is anticipated that there will be a minimal unpaved site area, which will be used for vehicle trackout. It is considered likely that there would be no more than approximately 8 outward vehicle movements of HDV (>3.5t) vehicles in any one day.

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

Table 4: Sensitivity of nearby receptors to dust impacts.

Sensitivity of people to dust soiling	Sensitivity of people to PM_{10} health impacts	Sensitivity to ecological effects
Medium More than 10 residential units have been identified within 50m of the site.	Low More than 100 residential units, and two nurseries are present within 350m of the development site. Nearby annual mean PM_{10} monitoring was 16 µg/m^3 in 2021.	Low No internationally or nationally designated ecological sites in proximity of the site. It is not established whether there are particularly important or vulnerable plant species in nearby green spaces, therefore precautionary principle is applied.

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

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

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

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

Effects of Mitigation Measures

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

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

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

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

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Existing Air Quality

Current Local Status

The London Borough of Camden was declared an AQMA for the entire borough in 2002. The AQMA has been declared due to annual mean exceedances of NO_2 and 24-hour mean exceedances of PM_{10}. Currently, the borough meets all the NAQOs except for NO_2. Even though the NAQOs for PM_{10} and $PM_{2.5}$ are being met, they remain pollutants of concern. These pollutants are primarily produced by road traffic. However, other contributors include construction, domestic gas use and industry.

The AQAP 2018-2023 identified four Focus Areas, based on modelling using the London Atmospheric Emissions Inventory (LAEI) 2013[2]. Table 7 and Figure 6 illustrate the Focus Areas as determined by LAEI 2016 modelling data. Focus Areas are locations designated as having high levels of pollution and human exposure. The site is located in the Focus Area.

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

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

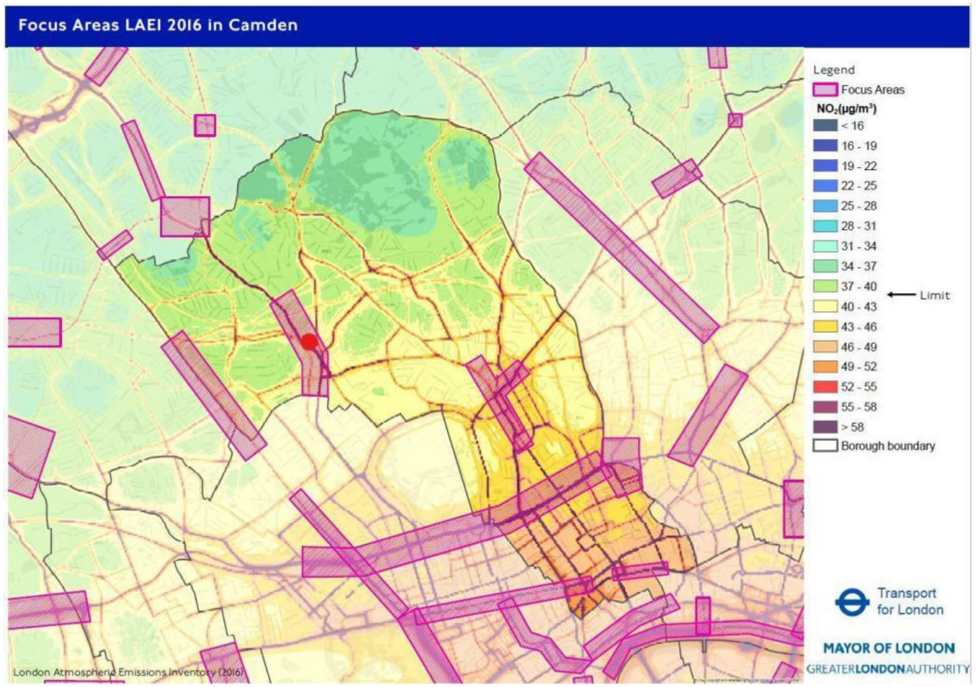

Figure 6: Focus Areas in Camden based on LAEI 2016. The red dot illustrates the approximate location of the development site.

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

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Local Monitoring Stations

Five automatic monitoring sites and 31 non-automatic monitoring sites have been identified in the London Borough of Camden Air Quality Annual Status Report 2021. Based on their proximity to the development site, completeness of data and relevance to the site, the following monitoring sites are reviewed in Table 8. One automatic monitoring station and two non-automatic monitoring sites have been identified that are considered to be representative of the surroundings of the site.

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

Site ID	Site name and type	Pollutants monitored	X (Eastings)	Y (Northings)	Inlet height (m)	Distance from site (m)
CA15	Swiss Cottage, diffusion tube, kerbside	NO_2	526633	184392	2.5	170
CD1	Swiss Cottage, automatic, kerbside	NO_2,PM_{10} and $PM_{2.5}$	526629	184391	3	170
CA17	47 Fitzjohn’s Road, diffusion tube, roadside	NO_2	526547	185125	2	610

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

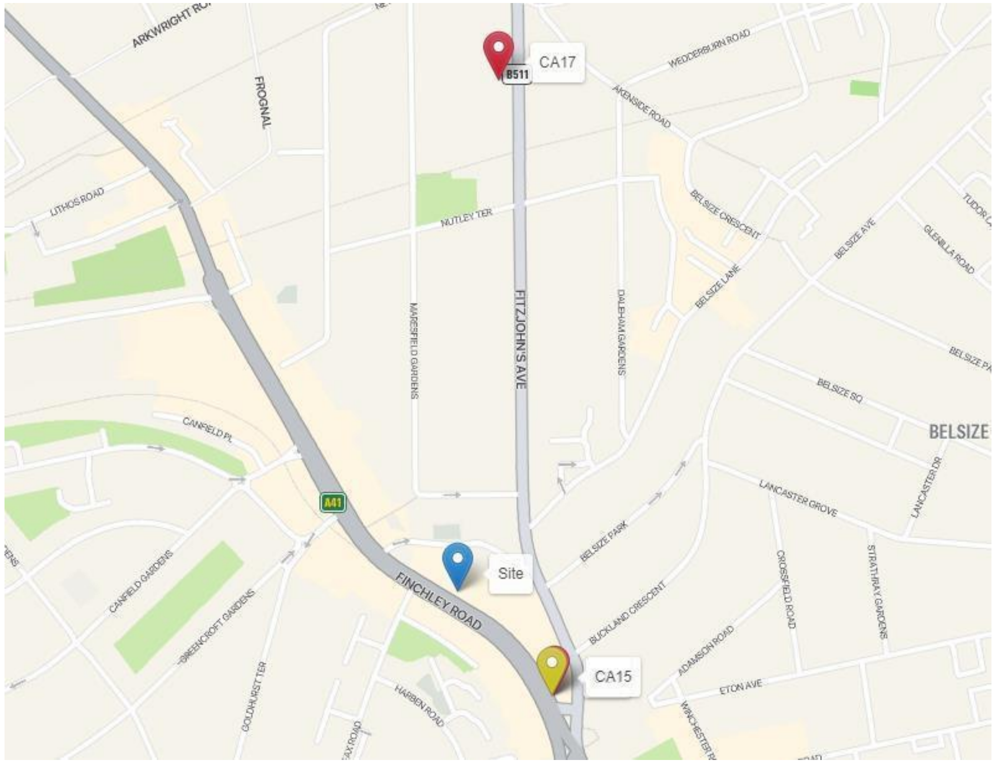

Figure 7: Map showing location of development site (shown in blue) in relation to nearby automatic monitoring stations (shown in yellow) and NO_2 diffusion tubes (shown in red). Diffusion tube CA15 and automatic monitoring station CD1 are overlapping each other.

Monitored Nitrogen Dioxide (NO_2)

A summary of the latest monitoring results for NO_2 annual mean concentrations at the closest monitoring stations to the development site is given in Table 9. Exceedances of the NO_2 annual mean AQO of 40µg/m^3 are shown in bold. NO_2 annual means in excess of 60µg/m^3, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in bold and underlined.

The data show that the NAQO for mean annual NO_2 concentration (for the mean annual concentration to be no more than 40 µg/m^3) closest to the development site, has been exceeded at all sites between the reporting years of 2018-2019. NAQO at monitoring site CD1 was exceeded in 2021. NAQO at monitoring site CA17 was achieved during the latest reporting years 2020-2021 Although the sites demonstrated some exceedances, there is a decreasing trend in NO_2 levels. There is an increase in annual mean concentration at monitoring site CD1 from 2020 to 2021 due to a reduced traffic in 2020. Additionally, air quality is predicted to improve in the future with actions such as the introduction of electric vehicles.

Table 9: 2017-2020 NO_2 annual mean concentrations near the site.[3]

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2021	2020	2019	2018
CA15	Non-automatic, kerbside (1 m from kerb)	170	-	-	50.89	62.30
CD1	Automatic, kerbside (7m from kerb)	170	44	33	43	54
CA17	Non-automatic, roadside (5 m from kerb)	610	29.95	34.47	43.51	48.13

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 10. The NAQO (for no more than 18 exceedances of the 200 µg/m^3 hourly mean) has been consistently achieved at automatic monitoring station CD1 for the years 2018-2021, where relevant.

Table 10: 2017-2020 NO_2 annual exceedances of hourly mean of 200 µg/m^3 near the site.

Site ID	Monitoring station type	Distance from site (m)	Count of annual exceedances of hourly mean of 200 µg/m^3			
			2021	2020	2019	2018
CD1	Automatic, kerbside (7m from kerb)	170	2	0	1	2

[3] Data are obtained from the London Borough of Camden Air Quality Annual Status Report 2021. A National Bias Adjustment Factor of 0.83 is applied to diffusion tubes data for 2021. PM_{10} monitoring does not require correction.

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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 11. The NAQO (for the mean annual concentration to be no more than 40 µg/m^3) has consistently been met at the automatic monitoring site CD1 for the years 2018-2021, where relevant.

Table 11: 2018-2021PM_{10} annual mean concentrations near the site.[3]

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2021	2020	2019	2018
CD1	Automatic, kerbside (7m from kerb)	170	16	16	19	21

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 12. The NAQO (for no more than 35 exceedances of the 50 µg/m^3 daily mean) has been consistently met at the automatic monitoring site CD1 for the years 2018-2021, where relevant.

Table 12: 2018-2021 PM_{10} annual exceedances of daily mean of 50 µg/m^3 near the site.

Site ID	Monitoring station type	Distance from site (m)	Count of annual exceedances of daily mean of 50 µg/m^3			
			2021	2020	2019	2018
CD1	Automatic, kerbside (7m from kerb)	170	0	3	8	4

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 13. The NAQO (for the mean annual concentration to be no more than 20 µg/m^3) has consistently been met at the automatic monitoring site CD1 for the years 2018-2021, where relevant.

Table 13: 2018-2021 $PM_{2.5}$ annual mean concentrations near the site.[3]

Site ID	Monitoring station type	Distance from site (m)	Annual mean concentration (µg/m^3)			
			2021	2020	2019	2018
CD1	Automatic, kerbside (7m from kerb)	170	9	10	11	11

There was no summary of the latest monitoring results for the annual exceedances of the $PM_{2.5}$ daily mean concentration of 50 µg/m^3 has been provided in the London Borough of Camden Air Quality Annual Status Report 2021

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LAEI 2016 modelled mean annual concentrations of NO_2, PM_{10} and $PM_{2.5}$

The London Atmospheric Emissions Inventory (LAEI)[4] 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 Table 14. Mean annual NO_2 concentrations were estimated at approximately 66 µg/m^3 at the site for 2016. The modelled data indicate that the NAQO (mean annual concentration no greater than 40 µg/m^3) was exceed and WHO guidelines (mean annual concentration no greater than 10 µg/m^3) was exceeded at the site during 2016.

The LAEI 2016 modelled mean annual concentrations of PM_{10} are shown in Table 14. Mean annual PM_{10} concentrations at the site were estimated at approximately 30 µg/m^3 for 2016. The modelled data indicate that the NAQO (mean annual concentration no greater than 40 µg/m^3) was achieved at the site for 2016 but the WHO guideline (mean annual concentration no greater than 15 µg/m^3) was exceeded.

The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are shown in Table 14.Mean annual $PM_{2.5}$ concentrations at the site were estimated at approximately 17 µg/m^3 for 2016. The modelled data indicate that the NAQO (mean annual concentration no greater than 20 µg/m^3) for 2016 was achieved at the site, but the WHO guideline (mean annual concentration no greater than 5 µg/m^3) was exceeded.

Table 14: 2016 modelled annual mean concentrations at the site.

Site name, address	X (Eastings)	Y (Northings)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
9-12 New College Parade, NW3 5EX, London	526513	184513	66	30	17

4 London Atmospheric Emissions Inventory (LAEI) 2016, Greater London Authority.

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Modelled Background Concentrations

Defra provides modelled background concentrations for key pollutants across the UK. The 2019-2025 modelled background concentrations for NO_2, PM_{10} and $PM_{2.5}$ for the area surrounding the site are given in Table 15. The background concentrations for NO_2, PM_{10} and $PM_{2.5}$ consistently achieve the NAQOs and unfailingly decrease between the modelled years of 2019-2025.

Table 15: 2019-2025 modelled background concentrations near the site.[5]

Pollutant/particulate matter	Background concentration (µg/m^3)						
	2025	2024	2023	2022	2021	2020	2019
NO_2	24.8	25.4	26.2	26.8	27.6	28.4	30.3
PM_{10}	17.6	17.8	18.0	18.3	18.5	18.7	19.2
$PM_{2.5}$	11.3	11.4	11.5	11.7	11.8	12.0	12.3

Existing Air Quality Conclusions

Nitrogen Dioxide (NO_2)

A total of two NO_2 diffusion tubes and one automatic monitoring station, monitoring mean annual NO_2 concentrations, have been identified close to the development site. The data show that the NAQO for mean annual NO_2 concentration (for the mean annual concentration to be no more than 40 µg/m^3) closest to the development site, has been exceeded at site CD1 in the latest reporting year of 2021 but achieved at CA17. Although the remaining sites demonstrated some exceedances, there is a decreasing trend in NO_2 levels.

Additionally, the NAQO for the hourly mean (for no more than 18 exceedances of the 200 µg/m^3 hourly mean) has been consistently achieved at automatic monitoring stations CD1 for the years 2018-2021, where relevant. The LAEI 2016 modelled mean annual NO_2 concentrations were estimated at approximately 66 µg/m^3 at the site, exceeding both the NAQO and WHO guideline. The Defra modelled background concentration of NO_2 is 30.3 µg/m^3 for 2019, decreasing to 24.8 µg/m^3 by 2025. It is likely that mean annual NO_2 concentrations currently achieve the NAQO but exceed the WHO guidelines at the development site.

Coarse particulate matter (PM_{10})

Nearby monitored mean annual PM_{10} concentrations and 24-hourly PM_{10} concentrations at CD1 consistently achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of PM_{10} at the site were estimated at approximately 30 µg/m^3, achieving the NAQO but exceeding the WHO guidelines. The Defra modelled background concentration of PM_{10} is 19.2 µg/m^3 for 2019, decreasing to 17.6 µg/m^3 by 2025. It is likely that the mean annual PM_{10} concentrations at the development site currently achieve the NAQO but exceed the WHO guideline at the site.

Fine particulate matter ($PM_{2.5}$)

Nearby monitored mean annual $PM_{2.5}$ concentrations at CD1 consistently achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are estimated as approximately 17 µg/m^3, achieving the NAQO but exceeding the WHO guideline. The Defra modelled background concentration of $PM_{2.5}$ is 12.3 µg/m^3 for 2019, decreasing to 11.3 µg/m ^{3} by 2025. It is likely that mean annual $PM_{2.5}$ concentrations at the development site currently achieve the NAQO but exceed the WHO guidelines.

5Defra Local Air Quality Management – Background Maps. Data are obtained for the London Borough of Camden for the nearest grid square (X coordinate 526500, Y coordinate 184500) for years 2019-2025 (from 2018 baseline).

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Dispersion Modelling

Operational Impacts: Dispersion Modelling

A detailed assessment, of the feasibility of openable windows and balconies facing Finchley Road and of effects of the development onto existing sensitive receptors, has been undertaken using the atmospheric dispersion modelling software, ADMS-Roads Extra[6].

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

Model Inputs

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

Modelled scenarios

Three scenarios are modelled as part of the assessment:

- '2019 baseline' – existing baseline traffic flows, 2019 meteorological data and emissions factors.
- '2025 no development' – projected 2025 traffic flows, 2019 meteorological data and 2019 emissions factors.
- '2025 with development' – projected 2025 traffic flows and additional traffic from the proposed 9-12 New College Parade development, 2019 meteorological data and 2019 emissions factors.

Emissions sources

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

Traffic flow data

An overview of all traffic flow data is given in Appendix C. Baseline traffic flow data for the average annual daily traffic flow (AADF) for the local road network has been obtained from the Department for Transport (DfT) website[7]. The latest DfT reporting year, 2019, has been selected for the '2019 baseline' scenario.

6ADMS-Roads Extra version 5 (Cambridge Environmental Research Consultants (CERC)). Further details can be found on the website.

7Department for Transport (DfT) Road Traffic Statistics. Accessed from the website.

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Traffic flow data for 2025, the projected opening year of the development, has been obtained using the English and Welsh Regional Traffic Growth and Speed Forecasts (RTFs) and the local TEMPRO factor[8], as illustrated in Table 16.

- Final Growth Factor = RTF factor x (Local TEMPRO factor / Regional TEMPRO factor)[9]

Table 16: Traffic growth factor values for the period of 2019-2025.

Growth Factor	Value
RTF 2025	1.0797
TEMPRO Growth Factor for Inner London (2019-2025)	1.0627
TEMPRO Growth Factor for London Borough of Camden (2019-2025)	1.0481
Final Growth Factor for 2025	1.0649

The final growth factor can then be used to predict the AADF in 2025 in the 'no development' scenario.

The scheme can be considered to be car-free, except for the provision of deliveries and other services. The following trips for deliveries have been assumed:

- 26 LDVs AADT
- 39 HDVs AADT

Thus, the final growth factor and the additional trips above are used in the '2025 with development' scenario.

Traffic speeds

Traffic speeds have been estimated based on-site observations and national speed limits. As such, an average traffic speed of 20 miles/hour is applied to all the road sections. Furthermore, it is assumed that the average traffic speeds on the local road network are the same for the opening year of 2025, as they are for the baseline year of 2019. See Appendix C for the full traffic flow data used for each modelling scenario and Appendix D for the layout of roads used in the model.

Street canyon effect

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

8The TEMPRO factor is obtained from Trip End Model Presentation Program (TEMPro) (Department for Transport).

9The methodology is obtained from LAQM.

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Modelled pollutants

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been modelled. Note that NO_2 concentrations have been modelled as NO_x and converted to NO_2, using the Defra NO_x to NO_2 Calculator[10], in accordance with Local Air Quality Management: Technical Guidance (TG19) (Defra, 2021).

Meteorological data

Hourly meteorological data from the London City Airport meteorological station, as the closest and most applicable station, has been used. Wind speed and direction data from London City Airport meteorological station has been plotted as a wind rose in Figure 8. Most frequent wind is from south-west with most frequent wind speed 5.1-8.2 m/s

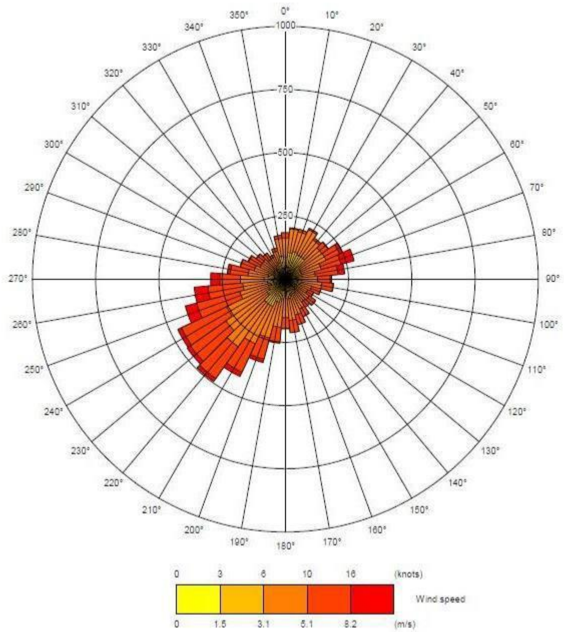

Figure 8: Wind rose for London City Airport (2018).

10 Defra (2020) NO_x to NO_2 Calculator v8.1. Accessed from the website.

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Background concentrations

Background concentrations of pollutants and particulate matter have been obtained from Defra as listed in Table 15. Defra provides a breakdown of the contribution of background concentrations from specific source types for most pollutants. The background concentration contributed by road transport from within the local area has been removed, to isolate the modelled effects of the road transport emissions on concentrations.

2019 background concentrations are used for the '2019 baseline' scenario and 2019 background concentrations are used for the '2025 no development' and '2025 with development' scenarios.

Model Outputs

Dispersion models cannot predict short-term concentrations as accurately as mean annual concentrations. Furthermore, model verification for short-term concentrations is challenging, particularly with limited monitoring stations capable of recording short-term concentrations. As such, only mean annual concentrations of NO_2 and PM_{10} and $PM_{2.5}$ will be modelled. TG19 (Defra, 2021) provides guidance on estimating NO_2 hourly NAQO and PM_{10} 24-hourly NAQO exceedances, where it is not possible to model the hourly and 24-hourly impacts, respectively. See the sections 'Results for NO_2' and 'Results for PM_{10}' for further details.

Model Verification

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

Verification of the dispersion model has been undertaken, by comparing modelled pollutant concentrations to monitored pollutant concentrations for the baseline year. Model verification is used to determine the performance of the model against 'real-world' monitored pollutant concentrations and has been undertaken in accordance with the Local Air Quality Management: Technical Guidance (TG19) (Defra, 2021).

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

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

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

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Model refinement

Initially, the dispersion model was run using all the receptors identified in Table 8. The roads identified was A41. Several refinements were carried out and the final model consisted only of monitoring sites CD1 and CA15.

Comparison

Mean annual NO_2 concentrations have been used for model verification. A comparison of monitored and modelled concentrations is given in Table 17.

Table 17: Comparison of modelled and monitored concentrations for NO_x and NO_2 ($\mu g/m^3$).

Site ID	2019 monitored NO_2	2019 monitored road contribution NO_x	2019 modelled road contribution NO_x	Ratio of monitored to modelled road contribution NO_x
CA15	50.9	53.38	6.65	8.03
CD1	43.0	32.45	7.36	4.41

The mathematical relationship between monitored and modelled road contribution NO_x is given in Figure 9, with a trendline passing through zero and its derived equation.

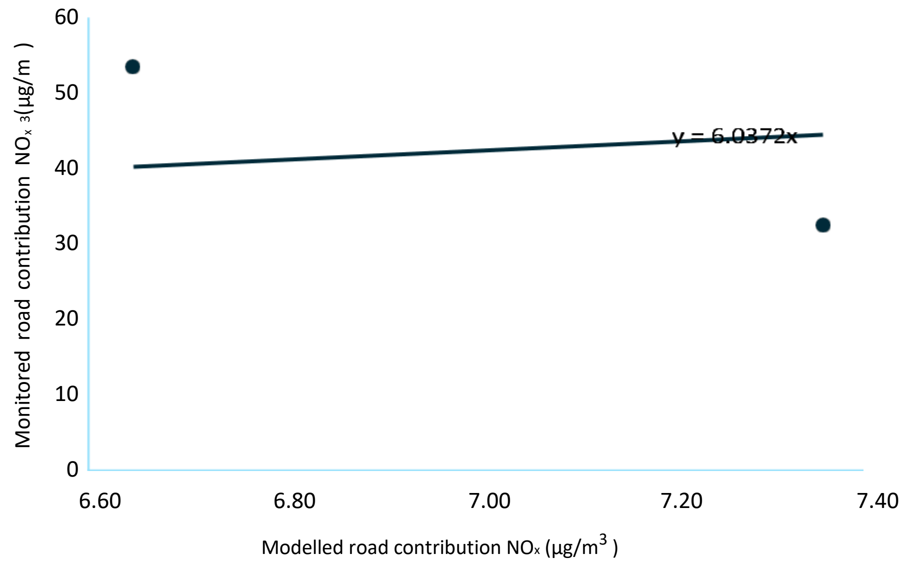

Figure 9: Comparison of monitored and modelled road contribution of NO_x at monitoring sites.

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Adjustment

The adjustment factor derived from Figure 9 (6.0372) 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 18).

Table 18: Model verification results for NO_x and NO_2 (µg/m^3).

Site ID	Road contribution NO_x adjustment factor	Adjusted 2019 modelled road contribution NO_x	2019 modelled total NO_2	2019 monitored NO_2	% difference modelled to monitored NO_2
CA15	6.0372	40.1	45.99	50.9	10.7%
CD1	6.0372	44.4	47.61	43.0	-9.7%

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 TG19 (Defra, 2021). This demonstrates that the adjusted model predictions are in line with the 'real-world' monitoring concentrations.

The NO_x adjustment process and derived road contribution NO_x adjustment factor has subsequently been applied to predicted concentrations at receptors for the '2019 baseline', '2025 no development' and '2025 with development' scenarios. The road contribution NO_x adjustment factor (6.0372) has subsequently been applied to all predicted concentrations of PM_{10} and $PM_{2.5}$, in accordance with TG19 (Defra, 2021).

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Modelled Receptors

Dispersion modelling determines the concentrations of pollutants at specified receptors. Receptors have been modelled at the façade facing Finchley Road and at existing sensitive receptors but at different heights as detailed in Table 19. A plan of the modelled receptor locations is given in Figure 10.

Table 19: Summary of modelled receptors.

Receptor ID	X coordinate	Y coordinate	Description	Height (m)
RA1	526513	184513	Façade facing Finchley Road, ground floor	2.5
RA2	526513	184513	Façade facing Finchley Road, first floor	5.5
RA3	526513	184513	Façade facing Finchley Road, second floor	8.5
RA4	526513	184513	Façade facing Finchley Road, fourth floor	14.5
RA5	526513	184513	Façade facing Finchley Road, sixth floor	20.5
RB1	526521	184527	Façade facing College Crescent, ground floor	2.5
RB2	526521	184527	Façade facing College Crescent, first floor	5.5
RB3	526521	184527	Façade facing College Crescent, second floor	8.5
RB4	526521	184527	Façade facing College Crescent, fourth floor	14.5
RB5	526521	184527	Façade facing College Crescent, sixth floor	20.5
EA1	526542	184543	Existing sensitive receptor, 40 Palmers Lodge, ground floor	2.5
EA2	526542	184543	Existing sensitive receptor, 40 Palmers Lodge, first floor	5.5
EA3	526542	184543	Existing sensitive receptor, 40 Palmers Lodge, second floor	8.5
EB1	526447	184636	Existing sensitive receptor, 5 Maresfield Gardens, ground floor	2.5
EB2	526447	184636	Existing sensitive receptor, 5 Maresfield Gardens, first floor	5.5
EB3	526447	184636	Existing sensitive receptor, 5 Maresfield Gardens, second floor	8.5

Figure 10: Plan of modelled receptors at the 9-12 New College Parade development and existing sensitive receptors.

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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 20.

The significance of effects is a measure of both the pre-development concentration at a receptor (for the '2025 no development' scenario), and the change from the pre-development concentration to post-development ('2025 with development' scenario), against the relevant Air Quality Assessment Level (AQAL). In this case, the AQAL is the respective National Air Quality Objective (NAQO) for NO_2, PM_{10} and $PM_{2.5}$. Note that changes of 0% or less (i.e. less than 0.5%) are described as 'negligible'.

Table 20: Significance of effects matrix.

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

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Results for NO_2

Table 21: Results of NO_2 annual mean concentrations (μg/m^3) and significance of effects from NO_2 concentrations for '2019 baseline', '2025 no development' and '2025 with development'.

Receptor ID	2019 baseline	2025 no development	2025 with development	Significance for '2025 with development'
RA1	42.3	42.9	43.0	Substantial
RA2	39.3	39.9	39.9	Negligible
RA3	35.8	36.2	36.3	Negligible
RA4	30.9	31.1	31.1	Negligible
RA5	28.9	29.0	29.0	Negligible
RB1	37.8	38.3	38.3	Negligible
RB2	36.4	36.9	36.9	Negligible
RB3	34.6	35.0	35.0	Negligible
RB4	31.1	31.4	31.4	Negligible
RB5	29.2	29.3	29.3	Negligible
EA1	34.4	34.8	34.9	Negligible
EA2	33.9	34.2	34.2	Negligible
EA3	33.0	33.3	33.3	Negligible
EB1	33.2	33.5	33.5	Negligible
EB2	32.8	33.1	33.1	Negligible
EB3	32.2	32.5	32.5	Negligible

NO_2 annual mean concentration

Table 21 provides an overview of the predicted mean annual NO_2 concentrations for all modelled receptors at the development site:

- NO_2 concentrations for the '2019 baseline' were above the NAQO (mean annual NO_2 concentration of 40 μg/m^3) and above 36 μg/m^3, accounting for a potential 10% margin for error, at receptors at ground and first floor of the development.
- NO_2 concentrations for the '2025 no development' and '2025 with development' scenarios are predicted to be above the NAQO at ground of the development. The WHO limit (mean annual NO_2 concentration of 10 μg/m^3) is exceeded at all receptors.
- Even though, the NO_2 concentrations for the '2025 no development' and '2025 with development' scenarios are predicted to be above NAQO, it can be considered that future improvements like background concentrations and vehicle emissions will benefit the local air quality. Therefore, residents using the amenity spaces are not predicted to be exposed to high level of NO_2 annual mean concentrations.
- Existing sensitive receptors are predicted not to be exposed to high level of NO_2 annual mean concentrations.

NO_2 hourly mean NAQO exceedances

Research undertaken on behalf of Defra in 2003[11] 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 TG19 (Defra, 2021), 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 '2025 no development' and '2025 with development' scenarios.

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

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Significance of impacts

With reference to the EPUK and IAQM's (2017) guidance, the significance of effects from NO_2 concentrations on the proposed development is 'Substantial' at ground and first floor of the development, as shown in Table 21. The overall impact of NO_2 concentrations on the development and existing sensitive receptors is deemed to be negligible.

Results for PM_{10}

Table 22: Results of PM_{10} annual mean concentrations (µg/m^3) and significance of effects from PM_{10} concentrations for '2019 baseline', '2025 no development' and '2025 with development'.

Receptor ID	2019 baseline	2025 no development	2025 with development	Significance for '2025 with development'
RA1	23.6	23.9	23.9	Negligible
RA2	22.6	22.9	22.9	Negligible
RA3	21.5	21.7	21.7	Negligible
RA4	20.0	20.1	20.1	Negligible
RA5	19.5	19.5	19.5	Negligible
RB1	22.1	22.3	22.3	Negligible
RB2	21.7	21.9	21.9	Negligible
RB3	21.1	21.3	21.3	Negligible
RB4	20.1	20.2	20.2	Negligible
RB5	19.5	19.6	19.6	Negligible
EA1	21.1	21.2	21.2	Negligible
EA2	20.9	21.0	21.1	Negligible
EA3	20.7	20.8	20.8	Negligible
EB1	20.7	20.8	20.8	Negligible
EB2	20.6	20.7	20.7	Negligible
EB3	20.4	20.5	20.5	Negligible

PM_{10} annual mean concentration

Table 22 provides an overview of the predicted mean annual PM_{10} concentrations for all modelled receptors at the development site:

- PM_{10} concentrations for the '2019 baseline' were significantly below the NAQO (mean annual PM_{10} concentration of 40 µg/m^3) and below 36 µg/m^3, accounting for a potential 10% margin for error at all receptors. The WHO guideline (mean annual PM_{10} concentration of 15 µg/m^3) was exceeded at all receptors.
- PM_{10} concentrations are predicted to be well below the NAQO (mean annual PM_{10} concentration of 40 µg/m^3) and below 36 µg/m^3, accounting for a potential 10% margin for error, for the '2025 no development' and '2025 with development' scenarios at all receptors. The WHO limit (mean annual PM_{10} concentration of 15 µg/m^3) is exceeded at all receptors.
- Residents using the amenity spaces and existing sensitive receptors are predicted not to be exposed to high level of PM_{10} annual mean concentrations.

PM_{10} 24-hour mean NAQO exceedances

TG19 (Defra, 2021) provides a methodology to estimate the likely 24-hourly concentrations for PM_{10} from annual mean concentrations as shown in the equation below. The highest PM_{10} concentration for the '2025 no development' scenario (23.9 µg/m^3) results in an estimated number of annual occurrences of the 24-hourly mean above 200 µg/m^3 of 9.9 (below than the NAQO of 18). It is therefore concluded that this NAQO would be achieved at the site.

$$24h \quad 10 \quad = -18.5 + 0.00145 \times \quad 3 +$$

Significance of impacts

The significance of effects of PM_{10} concentrations on the proposed development and existing sensitive receptors is deemed to be 'negligible' at all receptors, as demonstrated in Table 22.

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Results for $PM_{2.5}$

Table 23: Results of $PM_{2.5}$ annual mean concentrations (µg/m^3) and significance of effects from $PM_{2.5}$ concentrations for ‘2019 baseline’, ‘2025 no development’ and ‘2025 with development’.

Receptor ID	2019 baseline	2025 no development	2025 with development	Significance for ‘2025 with development’
RA1	14.8	15.0	15.0	Negligible
RA2	12.8	14.4	14.4	Negligible
RA3	12.1	13.7	13.7	Negligible
RA4	11.3	12.8	12.8	Negligible
RA5	10.9	12.5	12.5	Negligible
RB1	12.5	14.1	14.1	Negligible
RB2	12.3	13.8	13.8	Negligible
RB3	11.9	13.5	13.5	Negligible
RB4	11.3	12.9	12.9	Negligible
RB5	11.0	12.5	12.5	Negligible
EA1	11.9	13.5	13.5	Negligible
EA2	11.8	13.4	13.4	Negligible
EA3	11.6	13.2	13.2	Negligible
EB1	11.7	13.2	13.2	Negligible
EB2	11.6	13.2	13.2	Negligible
EB3	11.5	13.0	13.0	Negligible

$PM_{2.5}$ annual mean concentration

Table 23 provides an overview of the predicted mean annual $PM_{2.5}$ concentrations for all modelled receptors at the development site:

- $PM_{2.5}$ concentrations for the ‘2019 baseline’ were significantly below the NAQO (mean annual $PM_{2.5}$ concentration of 20 µg/m^3) and below 18 µg/m^3, accounting for a potential 10% margin for error at all receptors. However, the WHO guideline was not achieved.
- $PM_{2.5}$ concentrations are predicted to be well below the NAQO (mean annual $PM_{2.5}$ concentration of 20 µg/m^3) and below 18 µg/m^3, accounting for a potential 10% margin for error for 2025 no development’ and ‘2025 with development’ scenarios at all receptors. The WHO limits (mean annual $PM_{2.5}$ concentration of 5 µg/m^3) are exceeded at all modelled receptors.
- Residents using the amenity spaces and existing sensitive receptors are predicted not to be exposed to high level of $PM_{2.5}$ annual mean concentrations.

Significance of impacts

The significance of effects from $PM_{2.5}$ concentrations on the proposed development and existing sensitive receptors is deemed to be ‘negligible’ at all receptors, as demonstrated in Table 23.

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Air Quality Neutral

Operational Impacts: Air Quality Neutral

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

Air Quality Neutral: Transport Emissions

The AQN guidance provides a methodology for calculating the Transport Emissions Benchmark (TEB) for specific land use types. The TEB has been calculated for the development (Table 24) using the factors for Class C3 (residential) and Class E (commercial space).

The scheme can be considered to be car-free, except for the provision of deliveries and other services. These are considered within the transport emissions calculations. The following trips for deliveries have been assumed:

- 26 LDVs AADT
- 39 HDVs AADT

Table 24: Transport Emissions Benchmark (TEB).

Development metric	Residential	Commercial	Total
Applicable planning use class for TEB	Dwelling Houses (C3)	Commercial (E)	-
Gross Internal Area (m^2)	2,136.0	179.0	2,315.0
Number of dwellings – residential only	6	0	6
Location (CAZ/inner/outer)	Inner	Inner	-
NO_x TEB factor ($g/m^2/year$) – non-residential	0.0	11.4	11.4
NO_x TEB factor (g/dwelling/year) - residential	558.0	0.0	-
Total NO_x TEB (kg/year)	3.3	2.0	5.4
PM_{10} TEB factor ($g/m^2/year$) – non-residential	0.0	2.1	-
PM_{10} TEB factor (g/dwelling/year) - residential	100.0	0.0	-
Total PM_{10} TEB (kg/year)	0.6	0.4	1.0

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Table 25: Comparison of calculated transport emissions against TEBs.

Development metric	Residential	Commercial	Total
Applicable planning use class for TEB	Dwelling Houses (C3)	Commercial (E)	-
Daily trips by car	0	0	0
Annual car trips by car	26	39	65
Location (CAZ/inner/outer)	Inner	Inner	-
Average distance travelled per car trip (km)	3.7	7.7	11
Annual distance travelled by car (km/year)	96.2	300.3	96.2
NO_x emissions factor (g/km)	0.370	0.370	-
Total NO_x emissions (kg/year)	0.0	0.1	0
Difference from NO_x TEB to actual	-3.3	-1.9	-5.2
Transport NO_x AQN result	Pass	Pass	Pass
PM_{10} emissions factor (g/km)	0.0665	0.0665	-
Total PM_{10} emissions (kg/year)	0.0	0.0	0
Difference from PM_{10} TEB to actual	-0.6	-0.3	-0.9
Transport PM_{10} AQN result	Pass	Pass	Pass

The development passes the AQN test for transport emissions based on the proposed trip generations (Table 25).

Air Quality Neutral: Building Emissions

The AQN guidance provides a methodology for calculating the Building Emissions Benchmark (BEB) for specific land use types. The BEB has been calculated for the development (Table 26) using the factors for Class C3 and Class E.

Table 26: Building Emissions Benchmark (BEB).

Development metric	Residential	Commercial	Total
Applicable planning use class for BEB	Dwelling Houses (C3)	Commercial (E)	-
Gross internal area (m^2)	2,136.0	179.0	2,315.0
NO_x BEB factor ($g/m^2/year$)	26.2	75.2	101.4
Total NO_x BEB (kg/year)	56.0	13.5	69.4
PM_{10} BEB factor ($g/m^2/year$)	2.28	1.77	4.05
Total PM_{10} BEB (kg/year)	4.9	0.3	5.2

An Energy Assessment prepared by Eight Versa in November 2022 is based on a strategy to reduce energy demand as far as practically and economically possible, by implementing energy efficiency measures before applying low carbon and renewable energy technologies. The use of biomass, combined heat and power (CHP) and gas boilers have been excluded from the scheme. The residential units are served by a communal air source heat pump to provide heating and hot water. It is proposed to use an air source heat pump to provide heating to the commercial spaces. Hot water is provided by electric instant point of use.

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Since the energy consumption will all be electricity-based, the development, therefore, passes the AQN test for building emissions (Table 27).

Table 27: Comparison of calculated building emissions against BEBs.

Development metric	Residential	Commercial	Total
Applicable planning use class for BEB	Dwelling Houses (C3)	Commercial (E)	-
Total annual gas consumption from boilers (mg/kWh)	0	0	0
Boilers NO_x emissions factor (mg/kWh)	38	38	-
Total NO_x emissions from boilers (kg/year)	0.0	0.0	0
Total annual gas consumption from CHP (kWh/year)	0.0	0.0	0
CHP NO_x emissions factor (mg/kWh)	0.0	0.0	-
Total NO_x emissions from CHP (kg/year)	0.0	0.0	0
Total NO_x emissions (kg/year)	0.0	0.0	0
Difference from NO_x BEB to actual	-56.0	-13.5	-69.4
Building NO_x AQN result	Pass	Pass	Pass
Total annual oil or solid fuel consumption (kWh/year)	0.0	0.0	0
PM_{10} emissions factor (mg/kWh)	0.0	0.0	-
Total PM_{10} emissions (kg/year)	0.0	0.0	0
Difference from PM_{10} BEB to actual	-4.9	-0.3	-5.2
Building PM_{10} AQN result	Pass	Pass	Pass

Air Quality Neutral Statement

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

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

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Mitigation Measures

Pollution Mitigation Hierarchy

The development passes the AQN test for transport and building emissions. Additionally, the impact of NO_2, PM_{10} and $PM_{2.5}$ concentrations on the development are deemed to be significant at the façade facing Finchley Road as per the air dispersion modelling. PM_{10} and $PM_{2.5}$ concentrations on the development are deemed to be insignificant at the façade facing Finchley Road as per the air dispersion modelling. Therefore, additional mitigation or offsetting measures for the operational phase of the development will be required.

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

1. Prevention and Avoidance

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

Cycle storage

Cycling will be promoted by the inclusion of cycle storage for a total of20 spaces, which will be provided using a covered and secure system.

Sustainable energy technologies

The Energy Assessment prepared by Eight Versa in November 2022 is excluded any use of biomass, combined heat and power (CHP) and gas-fired boilers for the scheme. The residential units are served by a communal air source heat pump to provide heating and hot water. It is proposed to use an air source heat pump to provide heating to the commercial spaces. Hot water is provided by electric instant point of use

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

Reduction and minimisation of exposure/impacts should next be considered, once all options for prevention/avoidance have been implemented so far as is reasonably practicable (both technically and economically).

No mitigation measures are proposed.

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

Urban greening

The proposed development will include soft landscaping at the front of the development and within the communal amenity. These strategies of urban greening will help alleviate pollution, benefitting the air quality of the development. In addition, it will introduce a new biodiversity to the development, contributing to the ecology of the area.

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

Ventilation strategy

The ventilation strategy for the development will use mechanical ventilation with heat recovery. Intakes for the mechanical ventilation system should be located as far as possible from the primary sources of pollution. In accordance with the latest BREEAM New Construction 2018 Hea 02 Ventilation guidance, fresh air intakes should preferably be at least 10m away from all external pollution sources, as well as at least 10m away from ventilation exhausts (to prevent recirculation of air).

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

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

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

3. Off-setting

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

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

Air Quality Assessment
9-12 New College Parade

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Conclusion

Conclusions

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

The entire borough was declared as an Air Quality Management Area (AQMA) in 2002 for exceedances of the National Air Quality Objectives (NAQOs) for nitrogen dioxide (NO_2) and 24-hour mean exceedance for particulate matter (PM_{10}). Even though the NAQOs for PM_{10} and $PM_{2.5}$ are currently being met, it remains a pollutant of concern. The site is located in a NO_2 Focus Area.

A review of the latest monitoring data for NO_2 at the closest locations to the development indicates that the NAQO has been exceeded at site CD1 in the latest reporting year of 2021 but achieved at CA17. NAQO at CA17 monitoring site was consistently achieved for reporting years 2020-2022. Although the sites demonstrated some exceedances, there is a decreasing trend in NO_2 levels. Additionally, the NAQO for the hourly mean (for no more than 18 exceedances of the 200 µg/m^3 hourly mean) has been consistently achieved at the automatic monitoring station for the years 2018-2021. The LAEI 2016 modelled mean annual NO_2 concentrations were estimated at approximately 66 µg/m^3 at the site, exceeding both the NAQO and WHO guideline.

Nearby monitored mean annual PM_{10} concentrations and 24-hourly PM_{10} concentrations achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of PM_{10} at the site were estimated at approximately 30 µg/m^3, achieving the NAQO but exceeding the WHO guidelines.

Nearby monitored mean annual $PM_{2.5}$ concentrations achieved the NAQOs. The LAEI 2016 modelled mean annual concentrations of $PM_{2.5}$ are estimated as approximately 17 µg/m^3, achieving the NAQO but exceeding the WHO guideline.

Since the development is located in a NO_2 Focus Area, atmospheric dispersion modelling was carried out. The performance of the modelled receptors at the façade facing Finchley Road indicates the effects of NO_2 concentrations in the three different scenarios, 'Baseline 2019', '2025 no development' and '2025 with development' are substantial at the ground floor but PM_{10} and $PM_{2.5}$ concentrations in the three different scenarios, 'Baseline 2019', '2025 no development' and '2025 with development' are not significant. Even though, the NO_2 concentrations for the '2025 no development' and '2025 with development' scenarios are predicted to be above NAQO, it can be considered that future improvements like background concentrations and vehicle emissions will benefit the local air quality. Therefore, residents using the amenity spaces are not predicted to be exposed to high level of air pollution.

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

The design mitigation hierarchy has been applied to maximise air quality for occupants, where feasible. Measures include, provision of sustainable transport modes, such as cycling, integration of low carbon energy technologies, urban greening and a well-designed mechanical ventilation system.

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Appendix A

Air Quality & Dust Management Plan: Roles and Responsibilities

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

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

Table A-1: Schedule of AQDMP responsibilities.

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

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

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

Hours of Work

Normal working hours for 9-12 New College Parade construction site will be as follows:

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

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

Measures Relevant for Demolition, Earthworks, Construction and Trackout

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

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

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

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

Mitigation for all sites: Communications	
Mitigation measure	Compliance requirements
1) Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	Not required
2) Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	Highly recommended
3) Display the head or regional office contact information	Highly recommended

Mitigation for all sites: Dust Management	
Mitigation measure	Compliance requirements
4) Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.	Desirable
Site Management	
5) Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Highly recommended
6) Make the complaints log available to the local authority when asked.	Highly recommended
7) Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	Highly recommended
8) 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. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	Not required
Monitoring	
9) Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	Desired
10) Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	Highly recommended
11) Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Highly recommended
12) Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	Not required
Preparing and maintaining the site	
13) Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Highly recommended
14) Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Highly recommended
15) Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period	Desired
16) Avoid site runoff of water or mud.	Highly recommended
17). Keep site fencing, barriers and scaffolding clean using wet methods.	Desired
18) Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	Desired
19) Cover, seed or fence stockpiles to prevent wind whipping.	Desired
Operating vehicle/machinery and sustainable travel	
20) Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable	Highly recommended

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21) Ensure all vehicles switch off engines when stationary – no idling vehicles.	Highly recommended
22) Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Highly recommended
23) Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads 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)	Desired
24) Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Not required
25) Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	Not required
Operations	
26) 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.	Highly recommended
27) Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate.	Highly recommended
28) Use enclosed chutes and conveyors and covered skips.	Highly recommended
29. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly recommended
30) 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.	Desired
Waste management	
31) Avoid bonfires and burning of waste materials.	Highly recommended

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

Measures specific to demolition	
Mitigation measure	Compliance requirements
32) Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Desired
33) Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly recommended
34) Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly recommended
35) Bag and remove any biological debris or damp down such material before demolition.	Highly recommended

Measures specific to earthworks	
Mitigation measure	Compliance requirements
36) Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	Not required
37) Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable	Not required
38) Only remove the cover in small areas during work and not all at once	Not required

Measures specific to construction	
Mitigation measure	Compliance requirements
39) Avoid scabbling (roughening of concrete surfaces) if possible	Desired
40) 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.	Desired
41) Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Not required
42) For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.	Not required

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

Measures specific to trackout	
Mitigation measure	Compliance requirements
43) Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Desired
44) Avoid dry sweeping of large areas.	Desired
45) Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Desired
46) Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Not required
47) Record all inspections of haul routes and any subsequent action in a site log book.	Desired
48) Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	Not required
49) Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Desired
50) Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Not required
51) Access gates to be located at least 10m from receptors where possible.	Not required

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Appendix B

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 5.0.1.3	-
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 included for Minimum Monin-Obukhov length, and model defaults used for all other parameters.
Elevation of roads	Setting to allow the height of road links above ground level to be specified.	All road links set to ground level at *0m*.
Road width	Setting to allow the width of the road links to be specified.	Road widths selected for individual road links based on data obtained from OS map data.
Topography	Setting to allow complex terrain data to be included within the model in order to account for topographical effects on turbulence and plume spread.	No regional topographical data files available to complex terrain data inputs not used.
Time varied emissions	Setting to enable daily, weekly or monthly variations in emissions to be applied to emissions sources.	Time varied emissions data inputs are not used.
Road type	Setting to allow the effect of different types of roads to be assessed.	London (inner) road type selected.
Road speeds	Setting to accommodate the effects of road speeds on different roads on emissions sources.	Individual road speeds based on national speed limits and observations from street images.

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

Parameter	Description	Input value
Street canyon modelling	Settings to enable both 'basic' and 'advanced' street canyon modelling of road links.	Street canyon modelling is not relevant for this site.
Road source emissions	Settings to input road source emissions based on road traffic emission calculation method.	UK Emissions Factor Toolkit (EFT) version 11.0 selected for the respective baseline and proposed operational years of the development.
Point source emissions	Settings to input point sources, for example from industrial sources and energy centres.	No point source emissions included.

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Appendix C

Dispersion Model Traffic Inputs

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

Road name	Speed (km/h)	2019 baseline		2025 no development		2025 with development	
		AADT	% HDV	AADT	% HDV	AADT	% HDV
A41_1	32	40,586	6%	43,220	6%	43,246	6%
A41_2	32	20,227	11%	21,540	11%	21,566	11%

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Appendix D

Dispersion Model Area

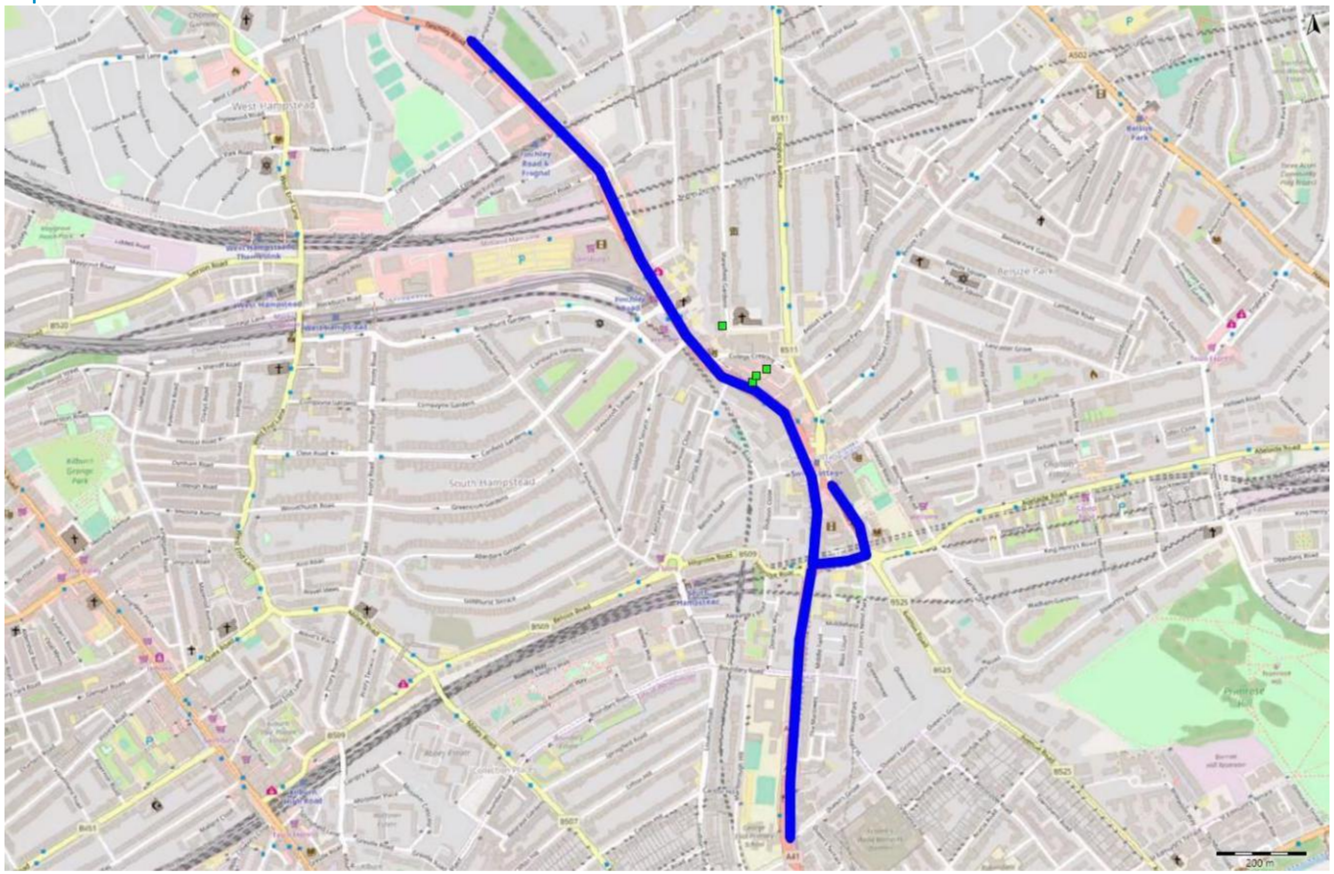
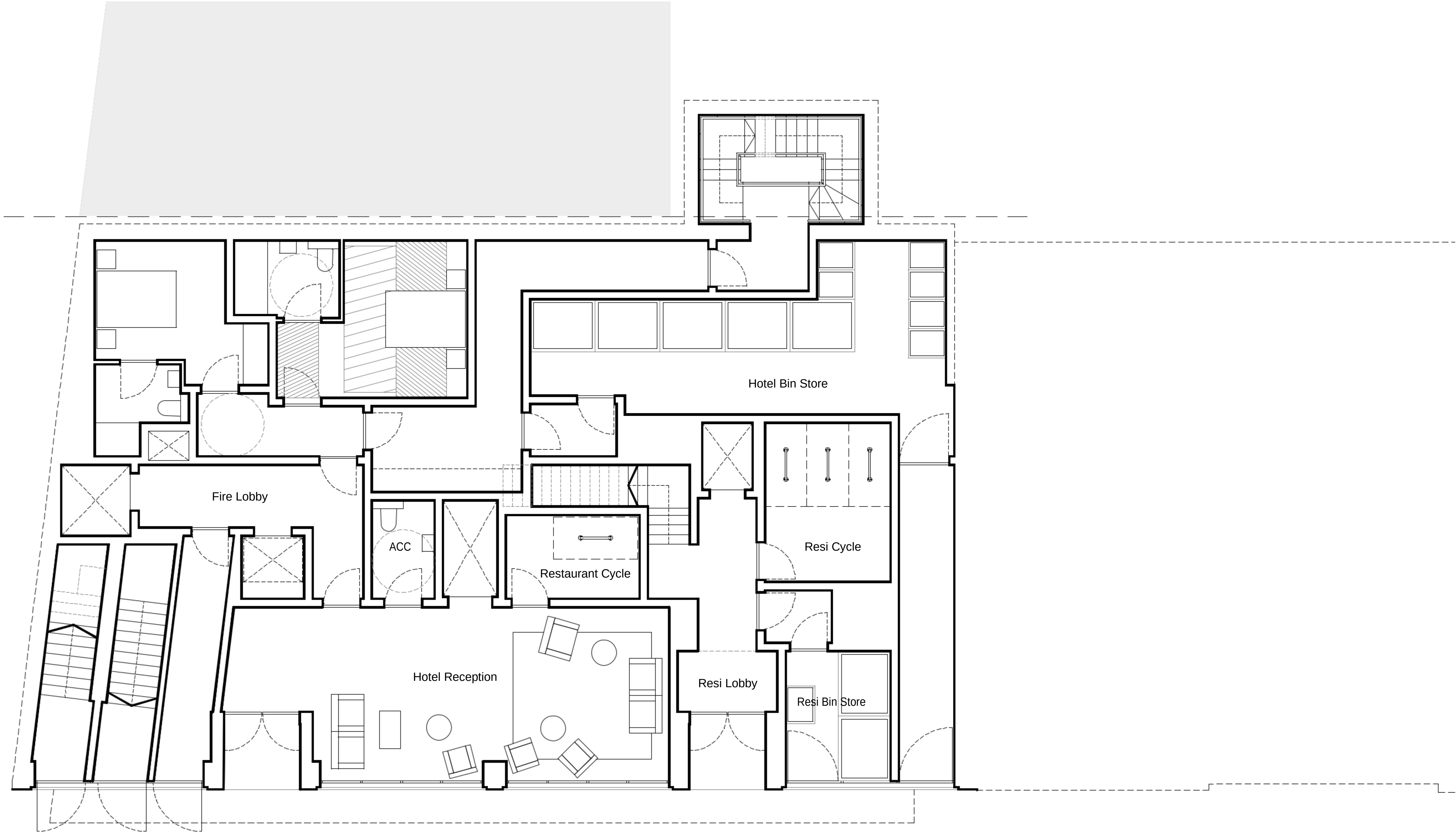
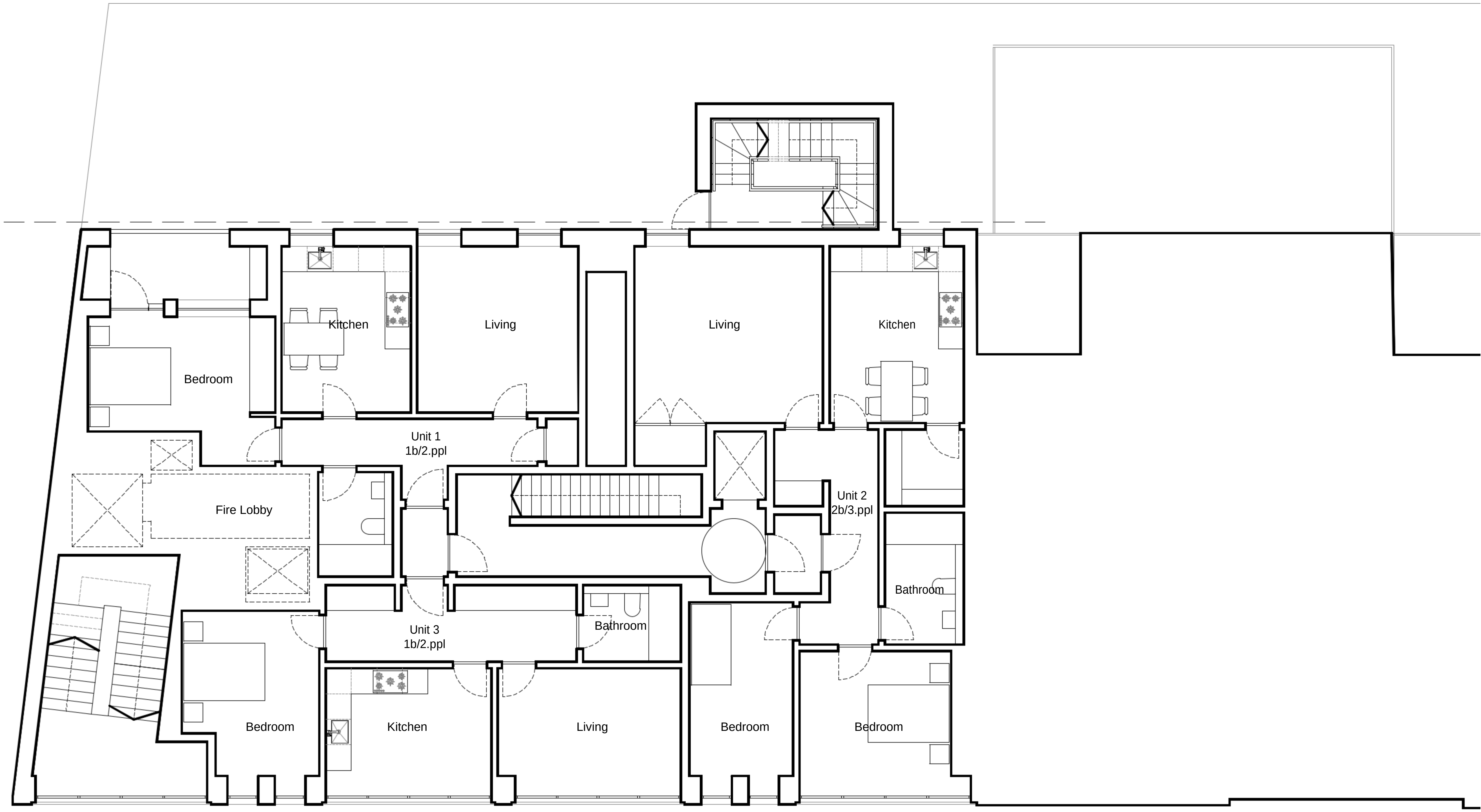


Figure D- 1: Dispersion model area, showing road emissions sources (in blue) and modelled receptors around the development (in green).

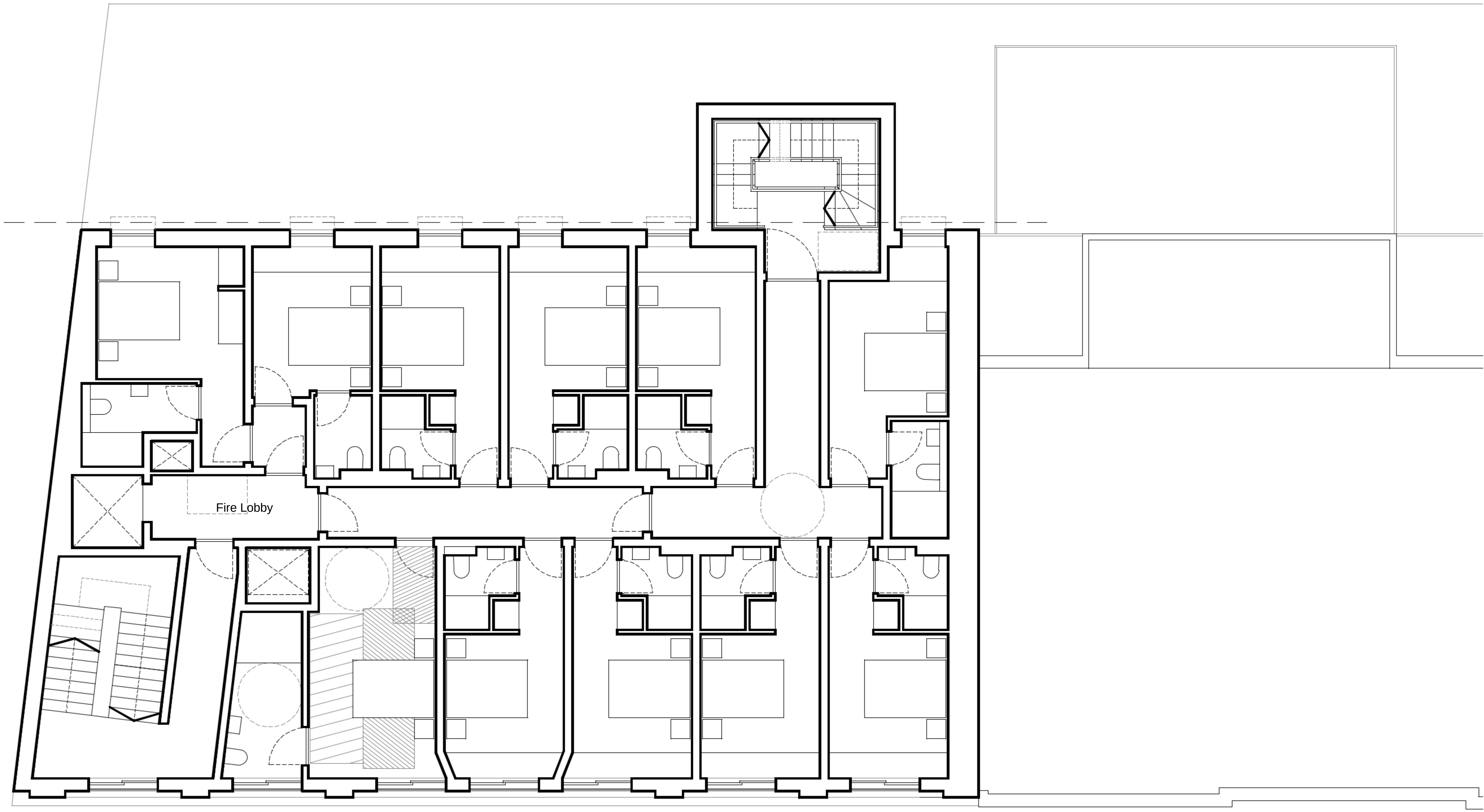
BASEMENT PLAN



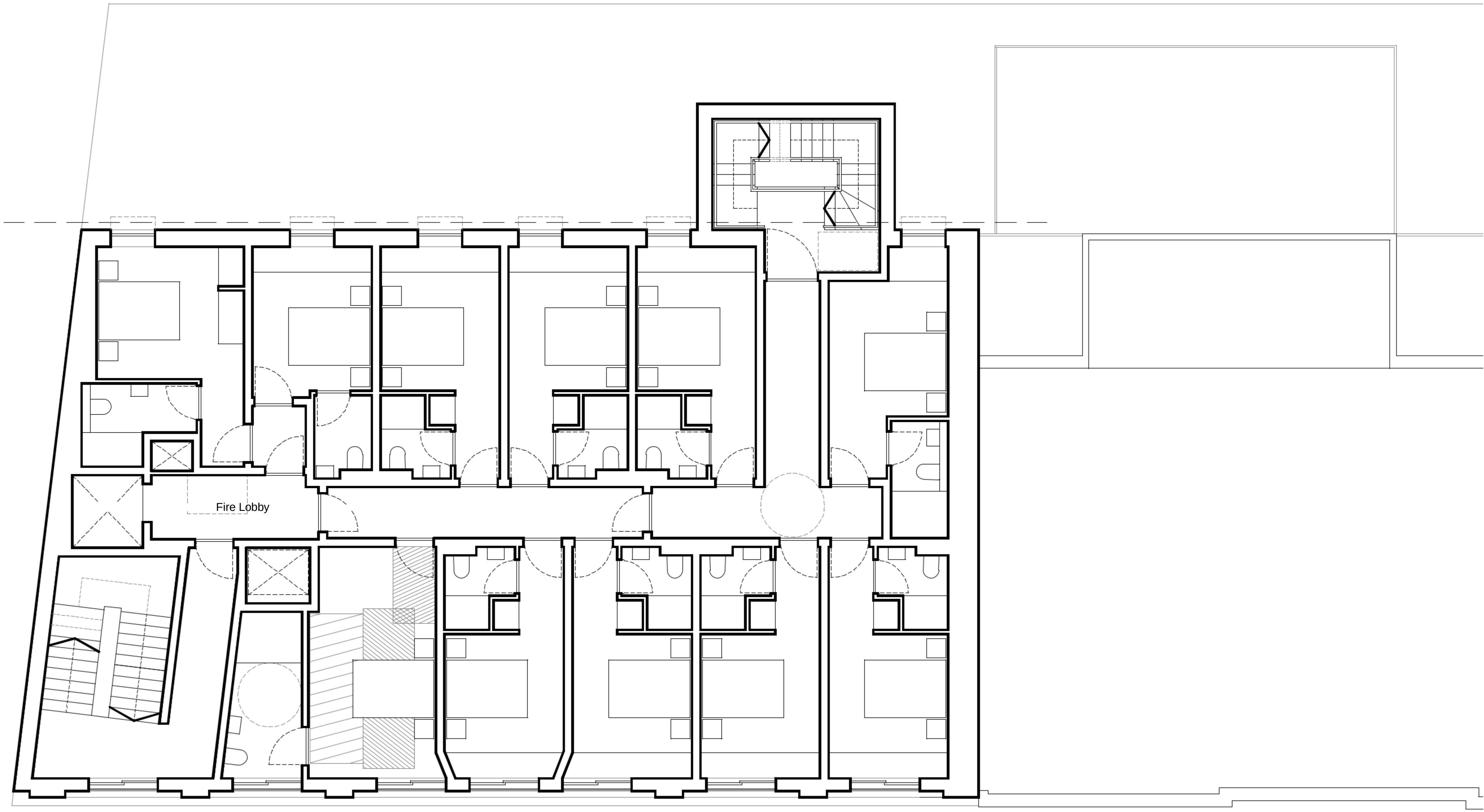
GROUND FLOOR PLAN



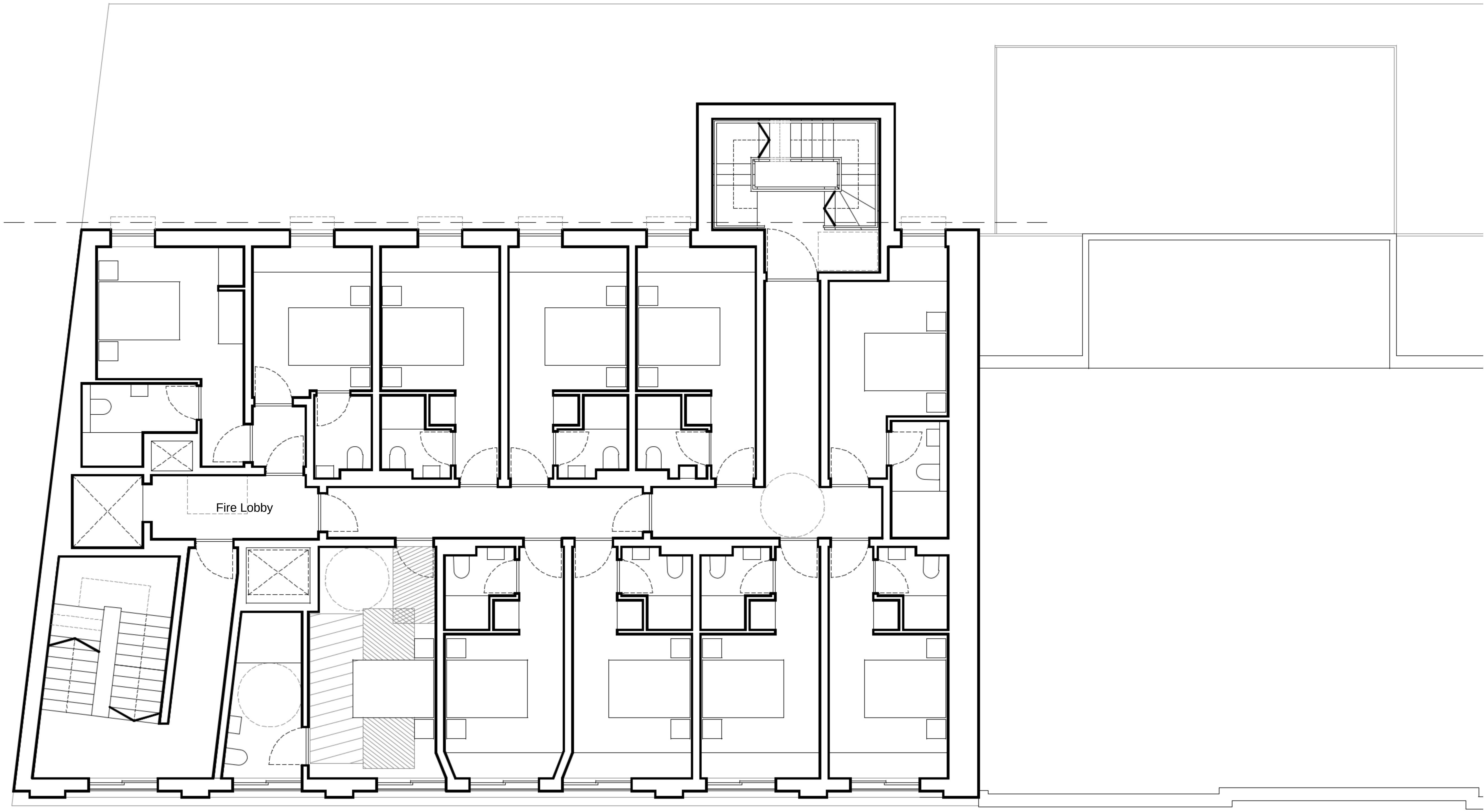
First Floor Plan



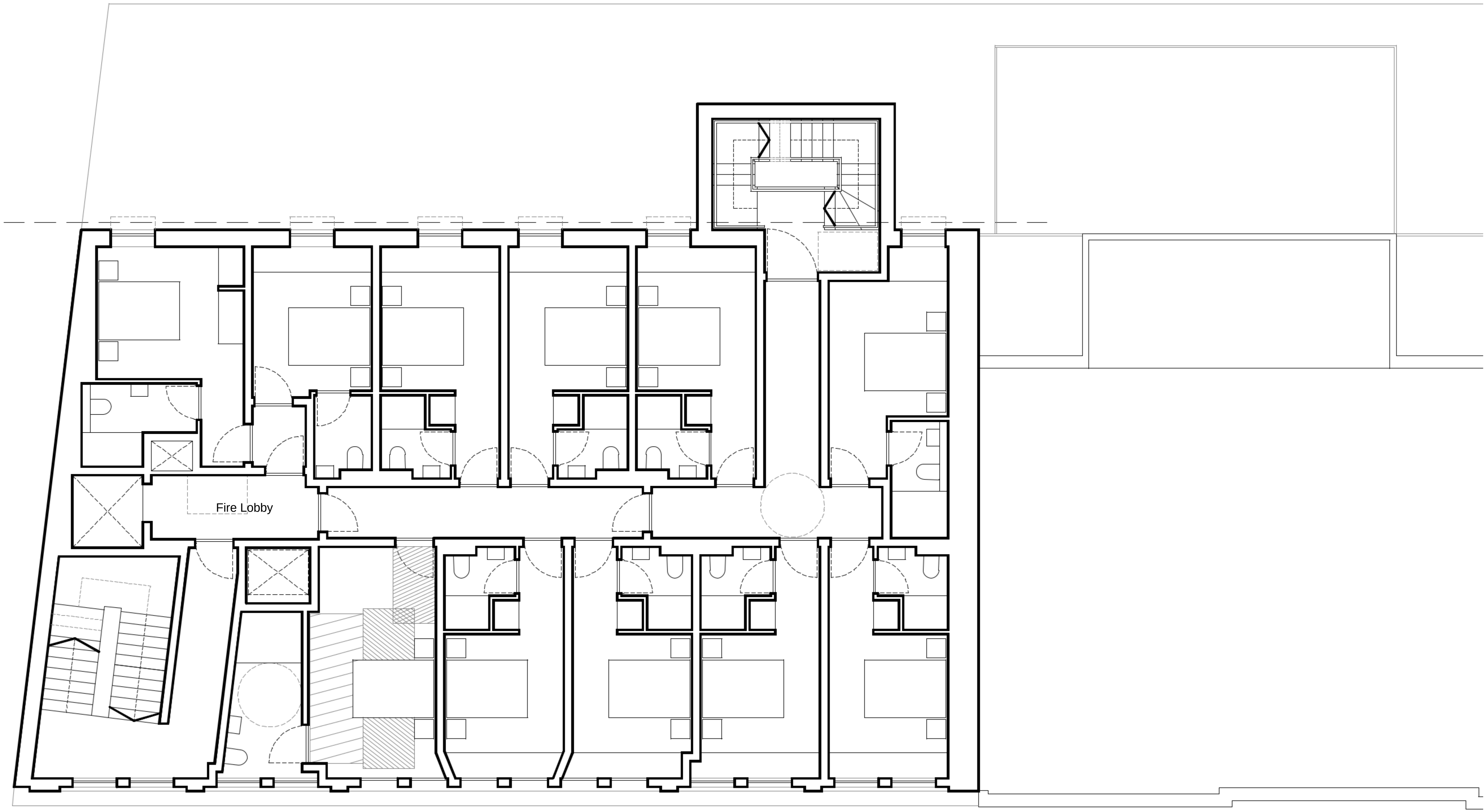
Second Floor Plan



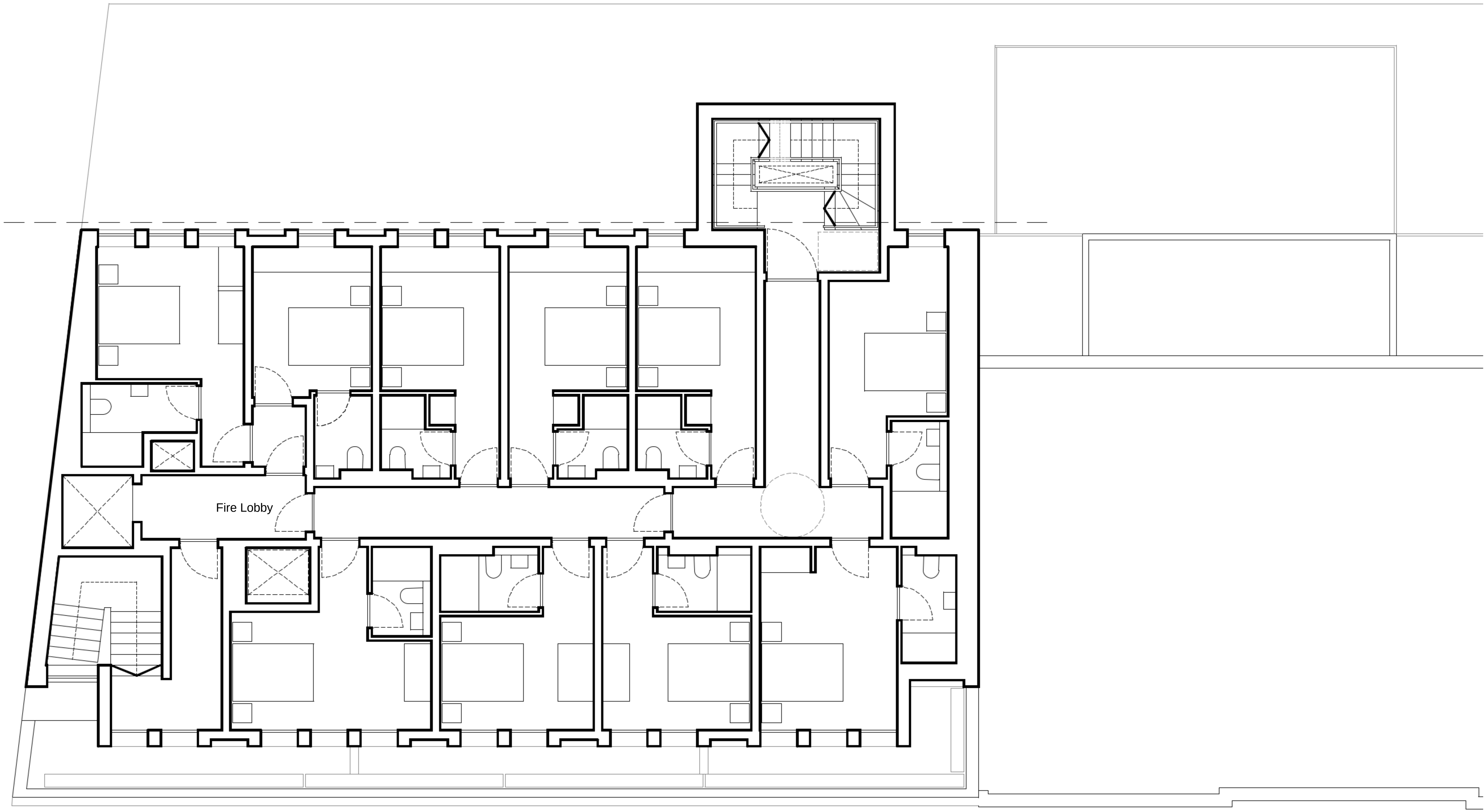
Third Floor Plan



Fourth Floor Plan



Fifth Floor Plan



Sixth Floor Plan