Air Quality Assessment

June 2019

Phlorum

115 - 119 CAMDEN HIGH STREET

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Document Control:

Project no.	Project
8479.S	115 – 119 Camden High Street

Report No.	Ver/rev	Written By:	Checked by:	Authorised by:	Date
8479.S	Draft	M. Nichols	H. Parfitt	N. Jenkins	13/02/19
8479.S	Final	M. Nichols	H. Parfitt	N. Jenkins	11/06/19

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1. Introduction

1.1 Phlorum Ltd was commissioned by Jones Lang Lasalle (JLL) on behalf of Demar (BVI) Holdings Ltd to undertake an air quality assessment for the proposed redevelopment of 115 – 119 Camden High Street. The site is located on the corner of Camden High Street / Delancey Street, Camden, London NW1 7JS. The National Grid Reference for the site is 529004, 183676. A site location plan is included in Figure 1.

1.2 The proposal is to demolish the existing two-storey retail unit and erect a new part 4, part 5 storey mixed-use development, comprising an 80 bed 'Hub by Premier Inn' Hotel (Class C1), a retail unit on the ground floor (Class A1), and 3 affordable residential dwellings split across the first, second and third floors (Class C3).

1.3 The application site is located in Camden, central London. At this location, the surrounding area has a range of land uses. These include retail outlets, schools, residential dwellings and recreational grounds / parks. The primary land uses in the vicinity of the application site are retail and residential.

1.4 The main pollution sources in the vicinity of the application site originate from road traffic travelling along the local network, primarily Camden High Street and Delancey Street.

1.5 The London Borough of Camden (LBC) declared a borough wide Air Quality Management Area (AQMA) in 2000 due to exceedances of the UK Air Quality Standards (AQSs) for hourly mean and annual mean nitrogen dioxide (NO_2) and 24-hour mean Particulate Matter (PM_{10}) concentrations.

1.6 It should be noted that the application site is located in the 'Camden High Street, from Mornington Crescent to Chalk Farm and Camden Road, Air Quality Focus Area' (AQFA).

2. Policy Context

The UK Air Quality Strategy (UKAQS)

2.1 The UKAQS[1] sets a number of "standard" (AQS) concentrations for a number of key pollutants that are to be achieved at sensitive receptor locations across the UK by various "objective" dates. The sensitive locations at which the standards and objectives apply are places where the population is expected to be exposed to the various pollutants over the particular averaging period. Thus for those objectives to which an annual mean standard applies, the most common sensitive receptor locations used to measure concentrations against the set standards are areas of residential housing, since it is reasonable to expect that people living in their homes could be exposed to pollutants over such a period of time. Schools and children's playgrounds are also often used as sensitive locations for comparison with annual mean objectives due to the increased sensitivity of young people to the effects of pollution (regardless of whether or not their exposure to the pollution could be over an annual period). For shorter averaging periods of between 15 minutes, 1 hour or 1 day, the sensitive receptor location can be anywhere where the public could be exposed to the pollutant over these shorter periods of time. A summary of the AQSs relevant to this assessment are included in Table 2.1, below.

Table 2.1 UK Air Quality Standards

Pollutant	Averaging Period	Air quality standard (AQS) (μg.m^{-3})	Air quality objective	Objective: to achieve the standard by
Nitrogen dioxide (NO_2)	1 hour	200	200 μg.m^{-3} not to be exceeded more than 18 times a year	31 December 2005
	Annual	40	40 μg.m^{-3}	31 December 2005
Particulate Matter (PM_{10})	24 hour	50	50μg.m^{-3} not to be exceeded more than 35 times a year	31 December 2004
	Annual	40	40 μg.m^{-3}	31 December 2004
Particulate Matter ($PM_{2.5}$)*	Annual	25	25 μg.m^{-3}	2020

1 Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2) July 2007.

2.2 The objectives adopted in the UK are based on the Air Quality (England) Regulations 2000[2], as amended, for the purpose of Local Air Quality Management. These Air Quality Regulations have been adopted into UK law from the limit values required by European Union Daughter Directives on air quality.

2.3 Obligations under the Environment Act 1995 require local authorities to declare an AQMA at sensitive receptor locations where an objective concentration has been predicted to be exceeded. In setting an AQMA, the local authority must then formulate an Air Quality Action Plan (AQAP) to seek to reduce pollution concentrations to values below the objective levels.

London Local Air Quality Management

2.4 The London Local Air Quality Management (LLAQM) framework[3] is the statutory process used by London authorities to review and improve air quality within their areas. This new framework was designed to specifically meet London's needs.

2.5 The LLAQM framework provides London-specific policy and technical guidance (LLAQM.PG(16) and LLAQM.TG(16)) for the London boroughs. Although both are largely based on the updated national LAQM guidance (2016), it does incorporate London-specific elements of the LAQM system.

2.6 It is recognised that parts of Camden have some of the poorest air quality levels in London. Following the publication of several review and assessment reports under the Local Air Quality Management (LAQM) regime, informed by the requirements of the Environment Act 1995, the whole borough was declared an Air Quality Management Area (AQMA) 2000 due to exceedances of the UK Air Quality Standards (AQSs) for hourly mean and annual mean nitrogen dioxide (NO_2) and 24-hour mean Particulate Matter (PM_{10}) concentrations. The council is also working to assess emissions of $PM_{2.5}$.

2.7 Additionally, the application site is located in the 'Camden High Street, from Mornington Crescent to Chalk Farm and Camden Road AQFA'. AQFAs were designated due to exceedances of the EU annual mean limit value for NO_2 as well as being locations with highly sensitive human exposure.

2.8 The Mayor of London is developing the London Clean Air Action Plan. As part of this process and in addition to the existing Low Emission Zone (LEZ), the new central London Ultra-Low Emission Zone was introduced on 8th of April 2019, which replaces previous interim policy interventions to tackle air pollution, such as the London Emissions Surcharge (T-charge)[4].

2 The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No.3043.
3 London Local Air Quality Management (LLAQM) Framework. https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/working-london-boroughs.
4 Central London ULEZ: https://tfl.gov.uk/modes/driving/ultra-low-emission-zone

2.9 The site is within the current central London boundary of the ULEZ and the existing LEZ[5]. It should be noted that from 26th October 2020, LEZ standards will be tighter. Emissions standards, daily charges and penalties will change for lorries, buses, coaches, and other specialist vehicles over 3.5 tonnes being used within the LEZ. (Vehicles that comply with ULEZ will already meet the tighter emissions standards.)

National Planning Policy Framework (NPPF)

2.10 The NPPF[6], which was revised in February 2019, sets out the Government's planning policy for England. At its heart is an intention to promote more sustainable development. A core principle in the NPPF that relates to air quality effects from development is that planning should "contribute to conserve and enhance the natural and local environment". In achieving this, it states in paragraph 170 that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: [...]

preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability [...]".

2.11 With regard to assessing cumulative effects the NPPF states the following at paragraph 180:

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

2.12 Regarding compliance with relevant limit values and national objectives for pollutants the NPPF, paragraph 181 states:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic

5 London LEZ: https://tfl.gov.uk/modes/driving/low-emission-zone
6 Department for Communities and Local Government (DCLG), (2019), National Planning Policy Framework.

approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

2.13 The NPPF offers a broad framework but does not afford a detailed methodology for assessments. Specific guidance for air quality continues to be provided by organisations such as the Department for Environment, Food and Rural Affairs (Defra), Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM).

National Planning Practice Guidance (PPG)

2.14 Reference ID 32 (Air Quality) of the National Planning Practice Guidance (PPG)[7], which was updated in March 2014, provides guiding principles on how planning can take account of the impact of new development on air quality. The PPG summarises the importance of air quality in planning and the key legislation relating to it.

2.15 As well as describing the importance of International, National and Local Policies (detailed elsewhere in this report), it summarises the key sources of air quality information. It also explains when air quality is likely to be relevant to a planning decision:

"Whether or not air quality is relevant to a planning decision will depend on the Proposed Development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife) [...]

When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

- *Significantly affect traffic in the immediate vicinity of the Proposed Development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate Heavy Goods Vehicle flows over a period of a year or more.*

7 Planning Practice Guidance (PPG) 32. (2014). Air Quality. http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/.

- *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area.*

- *Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.*

- *Give rise to potentially unacceptable impact (such as dust) during construction for nearby sensitive locations.*

- *Affect biodiversity. In particular, this is likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site, and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites."*

2.16 Details are also provided of what should be included within an air quality assessment. Key considerations include:

- Baseline local air quality;
- Whether the proposed development could significantly affect local air quality during construction/operation; and
- Whether the development is likely to expose more people to poor air quality.

2.17 Examples of potential air quality mitigation measures are also provided in the PPG.

London Specific Planning Policy

2.18 The Mayor's Air Quality Strategy to tackle air quality across London as a whole was published in 2010. This is supported by the London Plan[8], which was adopted in 2016 includes all alterations made to the London Plan since it was first adopted in July 2011. Of particular importance is *'Policy 7.14: Improving Air Quality'*, which states:

"[...]B Development proposals should:

8 Greater London Authority. (2016). The London Plan: The Spatial Development Strategy for London Consolidated with Alterations Since 2011.

a) Minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans

b) Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'

c) Be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs)

d) Ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches

e) Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boilers are identified. [...]"

Local Planning Policy

2.19 On a local level, the Camden Local Plan[9] (2017) details policies to achieve the council's vision for strategic development. Policy CC4: Air Quality is particularly relevant to this assessment, which is focused on mitigating the impact of development on air quality and to ensure exposure to poor air quality is reduced in the borough. Specifically, it states:

"Where... 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 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

9 Camden Local Plan, 2017. https://www.camden.gov.uk/ccm/cms-service/stream/asset/?asset_id=3655163&

appropriate mitigation measures to be secured in a Construction Management Plan. Mitigation measures appropriate to the risk should be included.

Developments will also be expected to include measures to ensure that the exposure of occupants to air pollution is reduced to within acceptable levels. In addition to mitigation, major developments in these areas will be expected to address local problems of air quality which may include various design solutions and buffers."

2.20 Furthermore, Policy CC4 states:

"In order to help reduce air pollution and adhere to London planning policy, developments must demonstrate that they comply with Policy 7.14 of the London Plan (to be at least air quality neutral)."

2.21 It is also relevant to acknowledge Policy A1: Managing the impact of development. This policy is designed to protect the quality of life of occupiers and neighbours of developments. It states that planning permission will be granted unless it will result in unacceptable harm to amenity, where factors include transport impacts, dust, and the impacts of construction.

2.22 The Camden Local Plan (2017) replaces the Core Strategy and Development Policies planning documents (adopted in 2010) as the basis for planning decisions and future development in the borough. It is important to recognise that Policy CC4 states that where an air quality assessment shows that a development would cause harm to air quality, *"planning permission will be refused unless mitigation measures are adopted to reduce the impact to acceptable levels."* Therefore, this document has been taken into account throughout the completion of this report.

2.23 Also key is the Camden Clean Air Action Plan[10] (2019-2022), which outlines the actions that LBC will take to ensure that new developments do not have a negative impact on local air quality, and that public exposure to air pollutants is reduced in new developments in areas which breach the Government's air quality standards. It states:

"The construction of new developments can produce high concentrations of geographically specific PM and NO_2 emissions. The development control planning system plays a key role in managing the environmental impacts of new development and contributes to the protection and long term improvement of air quality. Camden's requirements for new developments are enshrined within a number of the Council's planning policies."

10 Camden's Clean Air Action Plan (2019 - 2022): https://www.camden.gov.uk/documents/20142/0/Clean+air+action+plan+2019-2022_final2.pdf/f7cd1a68-e707-0755-528a-59388adf0995

2.24 Furthermore, it states that:

> *"Camden's Clean Air Action Plan identifies initiatives, projects and policies to be implemented by Camden and our partners to reduce NO_2 and particulate matter emissions from the key emission sources in the borough – road transport, gas boilers, construction and new developments."*

3. Assessment Methodology

Guidance

3.1 The LBC Camden Planning Guidance for Air quality[11] (November 2018) was followed in carrying out this assessment. It is noted that section 2.7 states:

"Camden has adopted World Health Organisation (WHO) pollution levels for nitrogen dioxide of 38µg/m3 (as opposed to the EU limit value of 40µg/m3)."

3.2 Camden Planning Guidance CPG6: Amenity[12] and The London Councils Air Quality and Planning Guidance[13] were also followed in carrying out this assessment. Furthermore, reference is made to LLAQM Technical Guidance (LLAQM.TG(16)) and Defra LAQM Technical Guidance TG(16)[14].

3.3 Guidance published by the IAQM[15] on the *'Assessment of Dust from Demolition and Construction'* was used when assessing the construction phase of the proposed development. The Greater London Authority (GLA) Supplementary Planning Guidance[16] on the control of dust from construction has also been referred to, which is considered best practice guidance for the UK. It details a number of mitigation measures which should be ad opted to minimise adverse impacts from dusts and fine particles.

3.4 In addition, the latest Environmental Protection UK (EPUK) & IAQM guidance on *'Planning for Air Quality'*[17] has been referred to in the operational phase assessment.

Baseline

3.5 The baseline air quality conditions in the vicinity of the application site are established through the compilation and review of appropriately sourced background concentration estimates and local monitoring data.

11 Camden Planning Guidance for Air quality Draft November, 2018. https://www.camden.gov.uk/documents/20142/4823269/Air+quality+CPG.pdf/2660c2af-1782-7f0c-4e76-ab87adc4fdbb
12 Camden Planning Guidance CPG6: Amenity, 2018. https://beta.camden.gov.uk/documents/20142/4833316/CPG6+Amenity+updated+March+2018.pdf/45e0c4e5-e737-33f1-dcc9-7e440db7e3a2
13 London Councils Air Quality and Planning Guidance https://www.londoncouncils.gov.uk/node/25533
14 Defra. 2016. Part IV of the Environment Act 1995, Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management, Technical Guidance LAQM. TG(16). London: Defra.
15 IAQM. (2014). Guidance on the assessment of dust from demolition and construction.
16 Greater London Authority. (2014). The Control of Dust and Emissions During Construction and Demolition.
17 EPUK & IAQM. (2017). Land-Use Planning & Development Control: Planning For Air Quality.

3.6 Defra provides estimated background concentrations of the UKAQS pollutants at the UK Air Information Resource (UK-AIR) website[18]. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km^2 National Grid square locations across the UK. At the time of writing, the most recent background maps were from November 2017 and based on monitoring data from 2015.

3.7 Being background concentrations, the UK-AIR data are intended to represent a homogenous mixture of all emissions sources within the general area of a particular grid square location. Concentrations of pollutants at various sensitive receptor locations can, therefore, be calculated by modelling the emissions from a nearby pollution source, such as a busy road, and then adding this to the appropriate UK-AIR background datum.

3.8 LBC automatic and non-automatic monitoring data are also considered an appropriate source for establishing baseline air quality, and the most recent available data from LBC's 2017 annual status report[19] have been included and assessed.

Construction Phase

3.9 The construction phase of the proposed development will involve a number of activities that could potentially produce polluting emissions to air. Predominantly, these will be emissions of dust. However, they could also include releases of odours and/or more harmful gases and particles.

3.10 The IAQM's guidance to assess the impacts of construction on human and ecological receptors has been followed in carrying out this air quality assessment. The guidance suggests that where a receptor is located within 350m (50m for ecological receptors) of a site boundary and/or 50m of a route used by construction vehicles, up to 500m from the site entrance, a dust assessment should be undertaken. High sensitivity receptors are considered particularly sensitive when located within 20m of a works area. Figure 2 shows receptors that could be sensitive to dust that are located within 350m of the boundaries of the site.

3.11 An ecological receptor refers to any sensitive habitat with the potential to be affected by dust soiling. For locations with a statutory designation, such as Sites of Special Scientific Interest (SSSIs), consideration should be given as to whether the particular site is sensitive to dust, and this will depend on why it has been designated. According to IAQM guidance, SSSI designated locations with dust sensitive features should be classed as medium sensitivity ecological receptors, for example.

18 Defra: UK-AIR. www.uk-air.defra.gov.uk.
19 London Borough of Camden Air Quality Annual Status Report (2017). https://www.camden.gov.uk/documents/20142/1458280/Air+quality+status+report+2017.pdf/326282c9-7b97-58d6-75f9-577f86406259

3.12 Review of the Multi Agency Geographic Information for the Countryside (MAGIC) website[20], which incorporates Natural England's interactive maps, has identified no statutory ecological sensitive receptors near application site.

3.13 The IAQM guidance suggests that Demolition, Earthworks, Construction and Trackout should all be assessed individually to determine the overall significance of the construction phase.

Construction Significance

3.14 The IAQM guidance suggests that Demolition, Earthworks, Construction and Trackout should all be assessed individually to determine the overall significance of the construction phase.

3.15 In the IAQM dust guidance, the first step in assessing the risk of impacts is to define the potential dust emission magnitude. This can be considered 'Negligible', 'Small', 'Medium' or 'Large' for each of the construction stages. Whilst the IAQM provides examples of criteria that may be used to assess these magnitudes, the vast number of potential variables mean that every site is different and therefore professional judgement must be applied by what the IAQM refer to as a "technically competent assessor". The construction phase assessment therefore relies on the experience of the appraiser.

3.16 As such, attempts to define precisely what constitutes a negligible, small, medium or large dust emission magnitude should be treated with caution. Factors such as the scale of the work, both in terms of size and time, the construction materials and the plant to be used must be considered.

3.17 The second step is to define the sensitivity of the area around the construction site. As stated in the IAQM guidance:

"the sensitivity of the area takes into account a number of factors:

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

3.18 Based on these factors, the area is categorised as being of 'Low', 'Medium' or 'High' sensitivity.

20 Natural England and MAGIC partnership organisations. Multi Agency Geographic Information for the Countryside. http://www.magic.gov.uk/ (accessed January 2019).

3.19 When dust emission magnitudes for each stage and the sensitivity of the area have been defined, the risk of dust impacts can be determined. The IAQM provides a risk of impacts matrix for each construction stage. The overall significance for the construction phase can then be judged from the stages assessed. Again, this is subject to professional judgement.

3.20 Combustion exhaust gases from diesel-powered plant and construction vehicles accessing the application site will also be released. However, the volumes and periods over which these releases will occur are unlikely to result in any significant peaks in local air pollution concentrations and therefore this has been scoped out of the assessment.

Operational Phase

Vehicle Emissions

3.21 Vehicle emissions will arise from the combustion of fossil fuels in vehicle engines and their subsequent release to atmosphere via tailpipe exhausts. The most significant pollutants released by cars and other vehicles are oxides of nitrogen (NO_2/NO_x) and fine particulate matter (PM_{10} and $PM_{2.5}$). Releases of carbon monoxide (CO) and some volatile hydrocarbons (e.g. benzene and 1,3-butadiene) are of less significance and are not assessed further in this report.

ADMS-Roads Assessment

3.22 Table 6.2 of the EPUK & IAQM Air Quality planning guidance document outlines indicative screening criteria for requiring detailed assessment. Of relevance to this report, a change of Light Duty Vehicles (LDV) flows of >100 AADT and Heavy Duty Vehicles (HDV) flows of >25 AADT within or adjacent to an AQMA as a result of a development require detailed assessment.

3.23 The anticipated daily scheme generated traffic for both LDV and HDV flows (27 LDV, 6 HDV, provided by RGP, the traffic consultants for the project) are below the above screening thresholds. As such, it was not deemed necessary to model existing receptors as impacts would be negligible, which is not significant. The focus of the operational phase assessment therefore is to examine the extent to which the development will expose new receptors in an area of existing poor air quality.

3.24 In order to determine the potential exposure of proposed new receptors in 2021; the anticipated opening year of the development, emissions from local roads have been assessed using a detailed air dispersion model. The model used was ADMS-Roads (version 4.1), which is produced by CERC and has been validated and approved by Defra for use as an assessment tool for calculating the dispersion of pollutants from traffic on UK roads. Model inputs are included in Appendix A

3.25 Detailed, hourly sequential, meteorological data are used by the model to determine pollutant transportation and levels of dilution by the wind and vertical air movements. Meteorological data used in the model were obtained from London City Airport as it was considered to provide the most representative data of similar conditions to the application site. The meteorological data used for this assessment were from 2016 for which monitoring data were also available. The surface roughness applied to the model for the site was 1.5m, as is typically used for large, urban areas. A factor of 1.0m was applied to the meteorological site, to reflect its more open location.

3.26 In order to reflect the urban topography of local roads more accurately, road links were modelled as simple 'street canyons'. This was done to ensure the model results were more representative of the inhibiting influence on pollutant dispersion caused by buildings in Inner London urban locations such as Camden. Canyon heights were based on professional judgement, after reviewing the roads included in the model using google earth.

3.27 Modelled receptor locations are indicated on Figures 3, 4, 5 and 6. Discrete model receptors were positioned at the façades of the proposed development closest to the main pollution sources. On the ground floor, receptors were positioned according to the latest available plans to represent retail, hotel and residential land-uses. On the first, second and third floor, which are planned to be a mix of hotel and residential use, receptors were positioned along the façades facing Camden High Street and Delancey Street. These are considered worst-case locations, as pollutant concentrations would be expected to reduce further inside the building with increased distance from the roads, and with height.

3.28 Details of the proposed receptors are included in Table 3.1, below. All receptors were modelled at "breathing height", which is by convention 1.5m above ground level plus the relevant floor height.

3.29 Second and Third floor receptors were modelled with the same X and Y coordinates as the First floor receptors, plus the relevant floor height (7.5m and 10.5m respectively).

Table 3.1: Modelled Receptors.

Receptor	Modelled Height (m)	UK Grid Reference	
		X	Y
G1	1.5	528999	183681
G2	1.5	528996	183669
G3	1.5	528980	183660
G4	1.5	528964	183651

Receptor	Modelled Height (m)	UK Grid Reference	
		X	Y
F1	4.5	528994	183688
F2	4.5	528998	183681
F3	4.5	529001	183676
F4	4.5	529000	183671
F5	4.5	528993	183667
F6	4.5	528987	183664
F7	4.5	528980	183660
F8	4.5	528974	183656
F9	4.5	528967	183653
F10*	4.5	528961	183649

Note: "G" = Ground floor receptor, "F" = First floor receptor. Grid references are indicative as the model layout is based on Ordnance Survey based mapping which does not accurately portray the width or position of roads. * = location of proposed residential dwellings.

3.30 To illustrate NO_2 concentrations across the proposed development, contour plots are presented in Figures 4, 5 and 6. The contour plots are based on a receptor grid, originating at the grid reference 528911, 183616. These grid points are made up of 41 × 41 receptor points (2.5m spacing) to generate a contour plot of annual mean NO_2 concentrations at ground, first and second floor levels across the application site.

3.31 Traffic data used in the assessment were sourced from 2017 Department for Transport (DfT) flows[21] and projected forward to 2021 using the DfT TEMPro growth factor for this period (1.0541). The predicted traffic flows generated by the proposed development, and the DfT TEMPro growth factor were provided by RGP. All modelled road links are shown in Figure 3, with model inputs included in Appendix A.

3.32 The following traffic scenarios were modelled:

[21] https://www.dft.gov.uk/traffic-counts/cp.php?la=Camden

- 2016 Model Verification;
- 2017 Baseline, and
- 2021 With Development.

Model Verification

3.33 It is recommended, following guidance set out in LAQM.TG(16), that the model results be compared with measured data to determine whether they need adjusting to more accurately reflect local air quality. This process is known as verification and reduces the uncertainty associated with local effects on pollution dispersion and allows the model results to be more site-specific.

3.34 A verification study has been undertaken using local authority monitoring data from 2016. Full details of this study are included in Appendix B. The model was found to be under-predicting concentrations, which is not unusual, and therefore an adjustment factor of **3.02** was applied to the model results.

Model Uncertainty

3.35 There are number of inherent uncertainties associated with the modelling process, including:

- Model uncertainty – due to model formulations;
- Data uncertainty – due to errors in input data, including emissions estimates, background estimates and meteorology; and
- Variability – randomness of measurements used.

3.36 Using a validated air quality model such as ADMS Roads, as well as undertaking the model verification takes into account much of the uncertainty. In addition, the most detailed available input data is used and is reviewed to ensure the accuracy of these data.

Air Quality Neutral Assessment

3.37 For some time, the standard approach to air quality assessment was to predict the change in pollution concentrations through the use of a screening or detailed dispersion model and, where the potential for a significant impact was identified, recommend mitigation measures so that the significance of effect can be kept to an acceptable level. However, this type of assessment does little to consider the overall emissions from a development and its contribution to broader background concentrations, which can gradually increase due to incremental changes from successive developments, particularly in a large city such as London.

3.38 As a result of these effects, an air quality neutral policy was included in the London Plan. It aims to ensure that developments are air quality neutral or better, particularly in areas where any AQSs are being breached.

3.39 Since the publication of the London Plan, there has been considerable debate as to how the concept should be assessed and implemented. The GLA guidance[22] was produced in order to further develop the policy and discuss assessment options. The two principal options for the application of the policy were to compare the emissions of a Proposed Development with the site's previous use, or to establish benchmarks for acceptable emissions for particular planning uses. A combination of these two approaches would also be possible.

3.40 It was decided that a purely benchmarking route should be taken, rather than working on a site-by-site basis, as it would provide a means of ensuring that developments across London as a whole remain air quality neutral. It also allows for the development of long-derelict sites and does not permit large pollution-headroom for former industrial sites, which would be a key problem with the alternative method. The guidance provides building emissions benchmarks for NO_X and also states that PM_{10} benchmarking need not be considered where natural gas is the only fuel used on site.

3.41 It was also concluded that emissions from buildings and transport should be treated separately, with the intent that each should attain air quality neutrality.

Energy Centre

3.42 It is understood that the energy centre will include 1 Air Source Heat Pump (Mitsi Ecodan) rated at 42.6 KW for preheating demand up to 40°C , and 3 Gas Fired Water Heaters (65/300 HIflo EVO) for hot water generation. The annual energy demand for the development was estimated by PSH, the energy consultants for the project, as 392 KWh/m^2 according to BSRIA figures.

3.43 The table below summarises the NO_X rating and the emission standard for the Gas Fired Water Heaters.

Table 3.2 Plant NO_X rating and Emission standards

Name	Number	NO_X rating	Emission Standard	Source
HIflo EVO 65/300	3	17.6mg/KWh	40mg/KWh	Sustainable Design and Construction SPG Chapter 4. Emission standards for combustion Plant: 4.3.21. Camden Planning Guidance. Gas Boilers: 4.15.

3.44 The data in Table 3.2 shows that the choice of HIflo EVO 65/300meets the required NO_X rating.

Consultation

3.45 Details of the development and proposed scope of assessment were sent to Ana Ventura (Senior Sustainability Officer for Air Quality, Camden Council) on 02 January 2019 with a request for comment / guidance. On 03 January 2019, Katherine Frost (Senior Sustainability Officer for Planning, Camden Council) responded, signposting to planning documents within the Camden Local Plan, and planning guidance CPG6 Amenity which have been referred to throughout this assessment.

4. Baseline Assessment

4.1 This chapter is intended to establish prevailing air quality conditions in the vicinity of the application site.

UK-AIR Background Pollution

4.2 The UK-AIR predicted background pollution concentrations for NO_2, PM_{10} and $PM_{2.5}$ for 2016 to 2021 are presented in Table 4.1. These data were taken from the central grid square location closest to the application site (i.e. grid reference: 529500, 183500).

Table 4.1: 2016 to 2021 background concentrations of pollutants at the application site.

Pollutant	Predicted background concentration (μg.m^{-3})						Averaging Period	Air quality standard concentration (μg.m^{-3})
	2016	2017	2018	2019	2020	2021		
NO_2	36.7	35.1	33.4	31.6	29.5	28.3	annual mean	40
PM_{10}	20.2	19.9	19.7	19.5	19.3	19.2	annual mean	40
$PM_{2.5}$	12.8	12.6	12.4	12.1	11.9	11.9	annual mean	25

4.3 The data in Table 4.1 show that annual mean background concentrations of NO_2, PM_{10} and $PM_{2.5}$, in the vicinity of the application site between 2016 and 2021, were predicted to be below their respective AQSs. The data show that in 2017, NO_2, PM_{10} and $PM_{2.5}$ concentrations were predicted to be below their respective AQSs by 12.3%, 50.3% and 49.6% respectively.

4.4 Concentrations of all pollutants were predicted to decline each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles but also due to fore-mentioned London policy interventions and strategies, such as the LEZ and ULEZ, in addition to UK national and international plans to reduce emissions across all sectors. It is noted that such improvements have not been universally realised.

Local Sources of Monitoring Data

4.5 Monitoring at background locations is considered an appropriate source of data for the purposes of describing baseline air quality.

Automatic Monitoring

4.6 LBC currently undertakes automatic (continuous) monitoring of NO_2 at three sites across the borough. The most recent data available from these monitoring sites, which are within 2.5km of the proposed development, are included in Table 4.2.

Table 4.2: NO_2 data from LBC automatic monitors

Monitor	Type	Distance from the application site (km)	NO_2 annual mean concentration ($\mu g.m^{-3}$)		
			2015	2016	2017
Euston Road	R	1.4	**90**	**88**	**83**
London Bloomsbury	UB	2.0	**48**	**42**	38
Swiss Cottage	K	2.5	**61**	**66**	**53**

Note: "UB" = urban background; "R" = roadside; "K" = kerbside. **Bold** denotes exceedance of the AQS.

4.7 The data in Table 4.2 show that annual mean concentrations of NO_2 at the urban background monitor, London Bloomsbury, have declined to fall 5% below the AQS in 2017. The concentration of 38$\mu g.m^{-3}$ in 2017 was above UK-AIR predictions for the application site by 8.3%, which is comparable.

4.8 The closest automatic roadside monitor to the application site is Euston Road, 1.4km away. In 2017, this monitor recorded an annual mean NO_2 concentration of 88$\mu g.m^{-3}$, which is 108% above the AQS and 136% above UK-AIR predictions for background conditions at the application site.

4.9 Euston Road is part of the London Inner Ring Road and within an AQFA. As such, monitored concentrations here are not considered representative of background conditions at the application site.

4.10 The kerbside monitor, Swiss Cottage, is located at Finchley Road A41. In 2017, this monitor recorded an annual mean NO_2 concentration of 53$\mu g.m^{-3}$, which is 32.5% above the AQS and 50% above UK-AIR predictions for background conditions at the application site. However, kerbside monitors are not considered representative of background air quality.

4.11 LBC undertakes automatic (continuous) monitoring of PM_{10} at four sites across the borough. The most recent data available from these monitoring sites, which are within 3km of the proposed development, are included in Table 4.3.

Table 4.3: PM_{10} data from LBC automatic monitors

Monitor	Type	Distance from the application site (km)	PM_{10} annual mean concentration ($\mu g.m^{-3}$)		
			2015	2016	2017
Euston Road	R	1.4	18	24	20
London Bloomsbury	UB	2.0	22	20	19
Shaftesbury Avenue*	R	2.5	22	18	-
Swiss Cottage	K	2.5	20	21	20

Note: "UB" = urban background; "R" = roadside. *Shaftesbury Avenue ceased collecting PM_{10} data in 2017 due to a technical fault.

4.12 According to LBC's 2017 annual status report, monitoring at Shaftesbury Avenue ceased due to a technical fault. As such, there is no data for 2017. In 2016 however, this monitor recorded the lowest PM_{10} concentration, which was below the AQS by 55%, and below UK-AIR predictions for the same year by 10%.

4.13 In 2017, annual mean concentrations of PM_{10} at London Bloomsbury, the Urban Background monitor, were below the AQS by 52.5%. At both the roadside and kerbside monitors, concentrations were below the AQS by 50%.

4.14 PM_{10} concentrations recorded by all three of the operating automatic monitors in 2017 were comparable to UK-AIR predictions for the same year.

4.15 LBC undertakes automatic (continuous) monitoring of $PM_{2.5}$ at three sites across the borough. The most recent data available from these monitoring sites, which are within 3km of the proposed development, are included in Table 4.4, overleaf.

Table 4.4: $PM_{2.5}$ data from LBC automatic monitors

Monitor	Type	Distance from the application site (km)	$PM_{2.5}$ annual mean concentration ($\mu g.m^{-3}$)		
			2015	2016	2017
Euston Road	R	1.4	17	17	14
London Bloomsbury	UB	2.0	11	12	13
Swiss Cottage	K	2.5	12	15	16

Note: "UB" = urban background; "R" = roadside. **Bold** denotes exceedance of the AQS.

4.16 In 2017, annual mean concentrations of $PM_{2.5}$ at all 3 sites were below the AQS for $PM_{2.5}$ by between 36% and 48%.

4.17 Monitored $PM_{2.5}$ concentrations are comparable to UK-AIR predictions, particularly at London Bloomsbury, the urban background monitor.

Non-Automatic Monitoring

4.18 LBC operates a non-automatic, NO_2 diffusion tube monitoring network across the borough. The most recent available monitoring data for diffusion tubes located within 3km of the application site are included in Table 4.5.

Table 4.5: Monitoring data from LBC NO_2 diffusion tubes

Monitor	Type	Distance from the application site (km)	NO_2 annual mean concentration (μg.m^{-3})		
			2015	2016	2017
CA23 (Camden Road)	R	0.5	**63.3**	**61.7**	**75.4**
CA20 (Brill Place)	R	1.1	**48.9**	**47.5**	**57.3**
CA4 (Euston Road)	R	1.4	**86.8**	**82.7**	**92.5**
CA16 (Kentish Town Road)	R	1.5	**63.6**	**58.7**	**74.9**
CA10 (Tavistock Garden)	UB	1.6	**44.6**	39.7	-
CA6 (Wakefield Gardens)	UB	1.9	35.8	31.3	-
CA11 (Tottenham Court Road)	K	2.1	**85.6**	**83.6**	-
CA21 (Bloomsbury Street)	R	2.2	**71.4**	**72.2**	**80.7**
CA24 (Chetwynd Road)	R	2.3	**46.5**	**42.0**	**55.0**
CA15 (Swiss Cottage)	K	2.4	**69.3**	**73.9**	-
CA17 (47 Fitzjohn's Road)	R	2.9	**55.8**	**56.4**	-

Note: "R" = roadside, "UB" = urban background; "K" = kerbside. **Bold** denotes exceedance of the AQS.

4.19 No annual mean concentrations were available for the two Urban Background monitors in 2017. In 2016, the monitors at CA10 Tavistock Garden and CA6 Wakefield Gardens measured annual mean concentrations of NO_2 which were below the AQS by 0.8% & 21.8% respectively.

4.20 The highest concentrations were monitored at CA4 Euston Road in 2017. The annual mean concentration of NO_2 was 92.5μg.m^{-3} which is 131.3% above the annual AQS. As mentioned in 1.11, Euston Road is part of the London Inner Ring Road and monitored concentrations here are not considered representative of background conditions at the application site. Euston Road is within an AQFA.

4.21 In 2017, the lowest concentration was recorded at CA24 Chetwynd Road. Concentrations here were above the annual AQS by 37.5%. However, roadside monitoring is not considered representative of background air quality.

4.22 Of the 6 diffusion tube monitors in Table 4.5 which recorded annual mean concentrations in 2017, 4 recorded concentrations above 60μg.m^{-3}. With regard to the hourly AQS for NO_2 presented in Table 2.1 (i.e. 200μg.m^{-3} not to be exceeded more than 18 times a year), LLAQM.TG(16)[23] states that if the annual mean is below 60μg.m^{-3} then this AQS should be met. However, the concentrations at these monitoring sites indicate that exceedances of the hourly AQS are likely.

Summary of Data used in Assessment

4.23 To ensure conservative predictions of pollutant concentrations, no reduction has been applied to the annual mean background NO_2, PM_{10} and $PM_{2.5}$ concentrations used in this assessment for future years.

4.24 It was decided that UK-AIR predictions for background concentrations at the application site would be used in the assessment. While the monitored concentrations from London Bloomsbury are comparable, the monitoring station is approximately 2.0km from the application site, and are not seen as representative, based on separation distance.

4.25 The background concentrations used in this air quality assessment are included in Table 4.6, below.

Table 4.6: Background annual mean concentrations used in this assessment

Pollutant	Concentration (μg.m^{-3})	Data Source
NO_2	35.1	UK-AIR (2017)
PM_{10}	19.9	UK-AIR (2017)
$PM_{2.5}$	12.6	UK-AIR (2017)

23 London LAQM Technical Guidance (LLAQM.TG(16)). https://www.london.gov.uk/sites/default/files/llaqm_technical_guidance_llaqm.tg_16.pdf.

5. Construction Phase Impacts

5.1 The construction phase of the proposed development will involve a number of activities that could produce polluting emissions to air. Predominantly, these will be emissions of dust.

5.2 The estimates for the dust emission magnitude for demolition, earthworks, construction and trackout below are, where appropriate, based on the construction information provided by the client and professional experience of Phlorum staff.

Dust Emission Magnitude

Demolition

5.3 During the demolition phase the total volume of building(s) being demolished across the total site is approximately 4,000m^3, which falls into the IAQM's '*Small*' dust emission category.

5.4 As such the overall dust emission magnitude for demolition is considered to be *Small.*

Earthworks

5.5 The total site has an area of approximately 826m^2. This is considered 'Small' with reference to the IAQM guidance.

5.6 The amount of earth proposed to be moved during the earthworks is <10,000 tonnes. This is expected to be carried out by <5 heavy earth moving vehicles. These are both considered '*Small*' by IAQM.

5.7 Given the total area of the site, the overall dust emission magnitude for the earthworks stage is considered to be *Small*.

Construction

5.8 During construction, activities that have the potential to cause emissions of dust may include concrete batching, sandblasting and piling; it is understood that piling – as a worst case - may be undertaken on site during construction and this has been taken into account in determining the dust impact during construction. Localised use of cement powder and general handling of construction materials will also have the potential to generate dust. Furthermore, wind-blow from stockpiles of friable materials also has the potential to cause dust emissions.

5.9 The primary construction materials will be concrete slabs / foundations, a steel superstructure and brick facades, which have a moderate potential for dust emissions.

5.10 The total building volume across the whole site will be <25,000m^3 which falls into the IAQM's '*Small*'' dust emission category. However, considering the moderate potential for dust emissions from the primary construction materials, and to ensure a conservative approach, the overall dust emission magnitude for the construction stage is considered to be *Medium.*

Trackout

5.11 Construction traffic, when travelling over soiled road surfaces, has the potential to generate dust emissions and to also add soil to the local road network. During dry weather, soiled roads can lead to dust being emitted due to physical and turbulent effects of vehicles. It is not thought, at this stage, that any unpaved road surfaces will be utilised during construction. The main entrance to the site will be via the one way system from Camden High Street into Delancey Street.

5.12 As well as the type of road surface, the number of daily heavy duty vehicles (HDVs) accessing the site is used to determine dust emission magnitude during construction: <10 Small; 10-50 Medium; and >50 Large. The number of HDVs accessing the site is expected to be <10, falling into the 'Small' IAQM category. Overall the dust emission magnitude for the trackout phase is considered to be *Small*.

Emission Magnitude Summary

5.13 A summary of the dust emission magnitude as a result of the activities of Demolition, Earthworks, Construction and Trackout as specified in the IAQM guidance, and discussed above, are listed in Table 5.1 below. Overall, the dust emission magnitude is considered to be *Medium.*

Table 5.1: Dust Emission Magnitude for the construction activities, based on the IAQM's guidance.

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

Sensitivity of the Area

5.14 Having established the emission magnitude for dust above, the sensitivity of the area must be considered to establish the significance of effects. The effect of dust emissions depends on the sensitivity of each receptor. High sensitivity human receptors include residential dwellings, schools and hospitals.

5.15 The impacts of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20m of the site boundary there is a high risk of dust impacts, regardless of the prevailing wind direction. Up to 100m from the construction site, there may still be a high risk, particularly if the receptor is downwind of the dust source.

5.16 With the exponential decline in dust with distance from dust generating activities, it is considered that for receptors more than 350m from the site boundary, the risk is negligible. Furthermore, the risks at over 100m only have the potential to be significant in certain weather conditions, e.g. downwind of the source during dry periods.

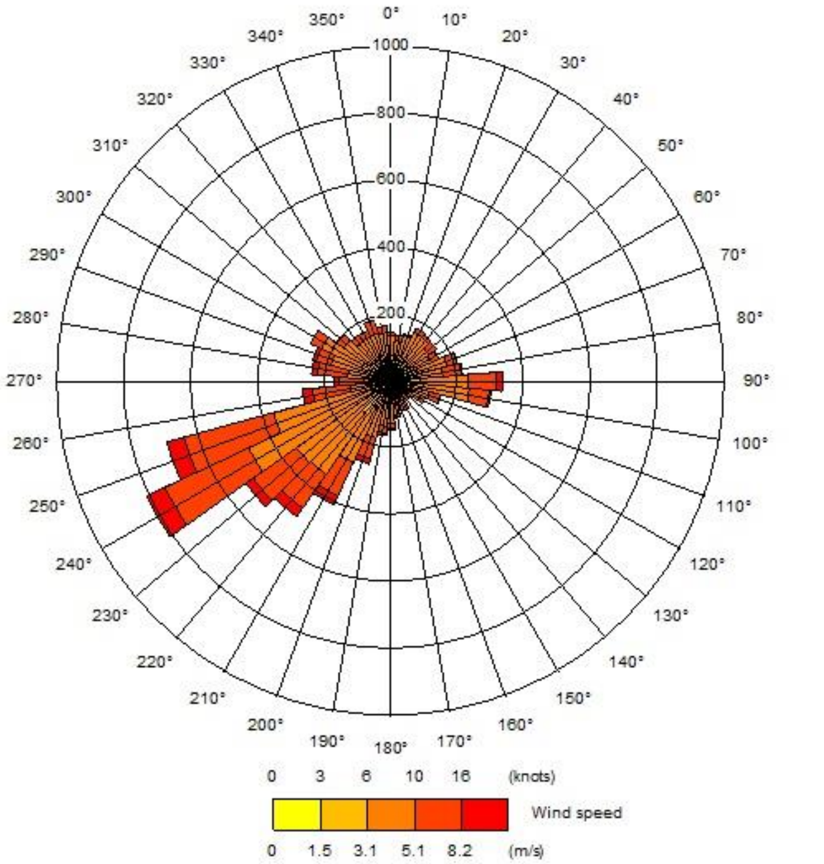
5.17 The approximate number of high sensitivity human receptors in the vicinity of the application site is detailed in Table 5.2 below and shown in Figure 2.

Table 5.2: Approximate number of High Sensitivity Human Receptors close to the application site.

Distance to site (m)	Approximate number of receptors	Receptor Details
<20	20	Residential dwellings
20-100	700*	Residential dwellings, London Camden College and Saturday Arabic School
100-350	>2000*	Residential dwellings, London Camden College, Saturday Arabic School, Our Lady's Catholic Primary School, St Michael's CE Primary School, Cavendish School, North Bridge House Preparatory School

Note: * Includes pupils at local education institutions.

Plate 5.1: Wind Rose for London City, 2016



5.18 Plate 5.1 shows that the prevailing wind is from the west / south-west. As shown in Figure 2, there are a number of highly sensitive receptors to the east / north-east (downwind) of the application site. These include residential dwellings, 1 college, 3 schools, 1 preparatory school and 1 Saturday school. As such, the sensitivity of the area to dust soiling impacts is defined as *High*.

5.19 UK-AIR predicted annual mean concentrations of PM_{10} are below 24µg.m^{-3} at the site. This provides a good indication that PM_{10} concentrations for both annual mean and daily mean concentrations are likely to be below the respective AQSs at the site and adjacent uses. Therefore, the sensitivity of the area to human health impacts is defined as *Low*.

Risk of Impacts

5.20 Having established the likely dust emission magnitudes and sensitivity of the area, the risk of impacts can be determined in accordance with the IAQM guidance. These are summarised in Table 5.3.

Table 5.3: Summary of Impact Risk by Construction Stage based on the IAQM's dust guidance.

Stage	Impact Risk		
	Nuisance Dust	Ecology	PM_{10}
Demolition	Medium	Negligible	Negligible
Earthworks	Low	Negligible	Negligible
Construction	Medium	Negligible	Low
Trackout	Low	Negligible	Negligible

5.21 Overall, the development is considered to be *Medium Risk* for nuisance dust soiling effects, *Low* for PM_{10} health effects and to be *Negligible* for ecology, in the absence of mitigation.

Site Specific Mitigation

5.22 The GLA guidance suggests a number of mitigation measures that should be adopted in order to minimise impacts from dusts and fine particles. Appropriate measures that could be included in the construction of the proposed development include:

- ideally cutting, grinding and sawing should not be conducted on-site and pre-fabricated material and modules should be brought in where possible;
- where such work must take place, water suppression should be used to reduce the amount of dust generated;
- skips, chutes and conveyors should be completely covered and, if necessary, enclosed to ensure that dust does not escape;
- no burning of any materials should be permitted on site;
- any excess material should be reused or recycled on-site in accordance with appropriate legislation;
- developers should produce a waste or recycling plan;
- following earthworks, exposed areas and soil stockpiles should be re-vegetated to stabilise surfaces, or otherwise covered with hessian or mulches;
- stockpiles should be stored in enclosed or bunded containers or silos and kept damp where necessary;
- hard surfaces should be used for haul routes where possible;
- haul routes should be swept/washed regularly;

- vehicle wheels should be washed on leaving the site;
- all vehicles carrying dusty materials should be securely covered; and
- delivery areas, stockpiles and particularly dusty items of construction plant should be kept as far away from neighbouring properties as possible.

5.23 In addition, the IAQM lists recommended mitigation measures for low, medium and high Dust Impact Risks. The highly recommended mitigation measures for Medium Risk sites are included in Appendix C of this report.

5.24 Where dust generation cannot be avoided in areas close to neighbouring properties, additional mitigation measures should be put in place, such as: windbreaks, sprinklers, and/or time/weather condition limits on the operation of some items of plant or the carrying out of activities that are likely to generate a particularly significant amount of dust.

Residual Effects

5.25 After the implementation of the mitigation measures listed above and in Appendix C, the significance of each phase of the construction programme will be reduced and the residual significance of impact for the construction phase is expected to be *Negligible*.

6. Operational Phase Impacts

6.1 A comparison of modelled and monitored data, as laid out in LLAQM TG(16), has been undertaken. Full details of this are provided in Appendix B. This ensures that the assessment provides a more conservative estimate of pollution concentrations than using unadjusted modelling results. As the model was found to be under-predicting concentrations, road contributions of both NO_x, PM_{10} and $PM_{2.5}$ were adjusted by a factor of **3.02.**

6.2 Results from the ADMS-Roads assessment of the proposed development are presented below. Modelled road links and receptor points are displayed in Figures 3, 4, 5 and 6. Figures 4, 5 and 6 are overlain with the most recent available ground, first and second floor plans, respectively.

6.3 Results from Table 6.1 are presented in the context the UK AQS of 40μg.m^{-3} as the baseline year of 2017 used in this assessment predates LBC's adoption of the 38μg.m^{-3} WHO limit value (2018).

6.4 Results from Table 6.2 are presented in the context of two Air Quality Objectives (AQOs); the UK AQS and the WHO limit value, in line with LBC planning guidance.

Existing Receptors

6.5 As stated previously, the anticipated scheme generated traffic for both LDV and HDV flows (27 LDV, 6 HDV) are below EPUK & IAQM guidance screening thresholds for detailed assessment within an AQMA. As such, existing receptors were not modelled, and the focus of this chapter is to examine the extent to which the development will expose new receptors into an area of existing poor air quality.

Proposed New Receptors

6.6 New receptors (divided between land use classes A1 (retail), class C1 (hotel) and class C3 (residential dwellings) land uses) are to be introduced when the development is expected to be occupied in 2021.

6.7 Table 6.1, overleaf, shows model predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations, respectively, at proposed new receptor locations in 2017, for context.

Table 6.1: 2017 predicted Annual Mean Concentrations of NO_2, PM_{10} and $PM_{2.5}$.

Receptor No	Floor	Annual Mean Concentration (µg.m^{-3})		
		NO_2	PM_{10}	$PM_{2.5}$
G1	Ground	**67.9**	24.8	15.7
G2	Ground	**64.6**	22.7	14.4
G3	Ground	**49.6**	22.0	13.9
G4	Ground	**47.1**	21.7	13.7
F1	First	**61.8**	23.7	15.0
F2	First	**62.6**	23.9	15.1
F3	First	**63.7**	24.1	15.2
F4	First	**50.6**	2.0	13.9
F5	First	**48.3**	21.7	13.7
F6	First	**46.9**	21.5	13.6
F7	First	**45.8**	21.4	13.5
F8	First	**45.0**	21.3	13.5
F9	First	**44.4**	21.2	13.4
F10*	First	**43.9**	21.2	13.4
S1	Second	**58.0**	23.1	14.6
S2	Second	**58.5**	23.2	14.7
S3	Second	**59.0**	23.2	14.7
S4	Second	**42.8**	20.9	13.2
S5	Second	**42.6**	20.8	13.2
S6	Second	**42.1**	20.8	13.2
S7	Second	**41.7**	20.8	13.2
S8	Second	**41.3**	20.7	13.1
S9	Second	**41.0**	20.7	13.1
S10*	Second	**40.7**	20.7	13.1

Receptor No	Floor	Annual Mean Concentration ($\mu g.m^{-3}$)		
		NO_2	PM_{10}	$PM_{2.5}$
T1	Third	38.6	20.4	12.9
T2	Third	38.8	20.4	12.9
T3	Third	39.0	20.4	12.9
T4	Third	39.1	20.4	12.9
T5	Third	39.3	20.5	12.9
T6	Third	39.3	20.5	12.9
T7	Third	39.2	20.4	12.9
T8	Third	39.1	20.4	12.9
T9	Third	38.9	20.4	12.9
T10*	Third	38.8	20.4	12.9

Note: "G" = Ground floor receptor, "F" = First floor receptor. **Bold** denotes exceedance of 40µg.m^{-3} AQS for NO_2. Underlined values denote exceedance of WHO 38µg.m^{-3} limit value. * = location of proposed residential land use.

6.8 The data in Table 6.1 show that annual mean concentrations of NO_2 exceeded the long-term 40µg.m^{-3} AQS at all receptor locations at the ground, first and second floor levels, and the WHO limit value at all receptor locations on the third floor in the baseline year of 2017.

6.9 With reference to the short term EU AQS, LLAQM.TG(16) states that where the annual mean concentration is below 60µg.m^{-3}, exceedances of the 1-hour mean objective (200µg.m^{-3} not to be exceeded more than 18 times per year) are unlikely.

6.10 There were 2 exceedances of this indicative threshold on the ground floor at receptors G1 and G2, and 3 exceedances on the first floor at receptors F1, F2 and F3. All of these exceedances occurred at the Camden High Street façade of the proposed development, but the receptors are not representative of Hotel or Residential land use.

6.11 The data in Table 6.1 show that annual mean concentrations of PM_{10} are predicted to be well below the 40µg.m^{-3} AQS at all receptors and on all floors. PM_{10} concentrations are predicted to be 38% or more below the 40µg.m^{-3} AQS.

6.12 In addition, the data in Table 6.1 show that annual mean $PM_{2.5}$ concentrations in 2017 are predicted to be 37.2% or more below the 25µg.m^{-3} AQS. The highest predicted concentration of $PM_{2.5}$ was 15.7µg.m^{-3} at G1.

6.13 Table 6.2, below, shows model predicted annual mean concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the proposed opening year of 2021, plus the number of PM_{10} exceedance days predicted for each receptor.

Table 6.2: 2021 predicted Annual Mean Concentrations of NO_2, PM_{10} and $PM_{2.5}$.

Receptor No	Floor	Annual Mean Concentration (µg.m-3)			50µg.m-3 mean exceedance days
		NO2	PM10	PM2.5	PM10
G1	Ground	**50.5**	24.1	14.9	10.4
G2	Ground	**44.4**	22.3	13.9	6.8
G3	Ground	**42.0**	21.7	13.6	5.8
G4	Ground	**40.9**	21.4	13.4	5.4
F1	First	**47.4**	23.2	14.4	8.5
F2	First	**47.8**	23.3	14.5	8.7
F3	First	**48.4**	23.5	14.6	9.0
F4	First	**42.2**	21.7	13.6	5.9
F5	First	**41.2**	21.5	13.5	5.4
F6	First	**40.6**	21.3	13.4	5.2
F7	First	**40.1**	21.2	13.2	5.0
F8	First	<u>39.8</u>	21.1	13.2	4.9
F9	First	<u>39.5</u>	21.0	13.2	4.8
F10*	First	<u>39.3</u>	21.0	13.2	4.7
S1	Second	**45.5**	22.6	14.1	7.4
S2	Second	**45.7**	22.7	14.2	7.6
S3	Second	**46.0**	22.8	14.2	7.7
S4	Second	<u>38.5</u>	20.8	13.1	4.4
S5	Second	<u>38.4</u>	20.8	13.1	4.4
S6	Second	<u>38.3</u>	20.7	13.1	4.3
S7	Second	<u>38.1</u>	20.7	13.0	4.3
S8	Second	37.9	20.6	13.0	4.2

Receptor No	Floor	Annual Mean Concentration (µg.m-3)			50µg.m-3 mean exceedance days
		NO2	PM10	PM2.5	PM10
S9	Second	37.8	20.6	13.0	4.2
S10*	Second	37.7	20.6	13.0	4.1
T1	Third	36.7	20.3	12.8	3.8
T2	Third	36.8	20.3	12.8	3.8
T3	Third	36.8	20.3	12.8	3.8
T4	Third	36.9	20.4	12.9	3.9
T5	Third	36.9	20.4	12.9	3.9
T6	Third	36.9	20.4	12.9	3.9
T7	Third	36.9	20.4	12.9	3.9
T8	Third	36.9	20.4	12.9	3.9
T9	Third	36.8	20.3	12.9	3.8
T10*	Third	36.8	20.3	12.9	3.8

Note: **Bold** denotes exceedance of EU 40µg.m^{-3} AQS for NO_2; Underlined values denote exceedance of WHO 38µg.m^{-3} limit value. * = location of proposed residential land use.

6.14 The data in Table 6.2 show that annual mean concentrations of NO_2 are predicted to decrease with height, with the highest concentrations predicted at ground floor receptors.

6.15 With reference to the short term AQS, i.e. where annual mean concentrations are below 60µg.m^{-3}, exceedances of the 1-hour mean objective (200µg.m^{-3} not to be exceeded more than 18 times per year) are unlikely. There are no exceedances of this indicative threshold at any of the proposed receptors on any floor, therefore proposed receptors are not anticipated to be exposed to unacceptable levels of NO_2 in the short term.

6.16 It should be noted that, with reference to LAQM TG(16), the long-term AQOs only apply at locations where members of the public might be regularly exposed over long averaging times (i.e. annually). Within the proposed development only the residential land-use (i.e. receptors F10, S10 and T10) are sensitive in the context of long-term AQOs. It is not considered likely that hotel guests would be present over an averaging time period of a year.

6.17 According to the results in Table 6.2, there were exceedances of the WHO limit value at 7 modelled receptors. However, it is important to note that, of these 7, only one receptor is sensitive to exceedances in the context of long-term exposure (i.e. F10, where residential land use is proposed). It is reasonable to state that the other exceedances, which represent hotel land-use, are only sensitive in the context of the short term AQS, for which there were no exceedances.

6.18 Receptor F10, on the first floor, which represents residential land-use, was positioned on the Delancey Street façade. Annual mean NO_2 concentrations were predicted to be marginally below the UK AQS, and 3.4% above the WHO limit value. The predicted concentration at F10 was 39.3µg.m^{-3}.

6.19 No exceedances of either the UK AQS (40µg.m^{-3}) or the WHO limit value (38µg.m^{-3}) were predicted at S10, which represents residential land-use on the Delancey Street façade. Furthermore, there were no predicted exceedances of either the UK AQS or the WHO limit value at any of the receptors on the third floor. As such, it can be reasonably concluded that concentrations would be below these values across the entirety of the application site at the higher floors of the proposed development.

6.20 Contour plots of the annual mean NO_2 concentrations presented in Table 6.2, at ground, first and second floor levels; the locations of likely highest exposure as discussed, are show in Figures 4, 5 and 6 respectively. The figures are overlain with the proposed development plans for each relevant floor.

6.21 The data in Table 6.2 show that annual mean concentrations of PM_{10} are predicted to be well below the 40µg.m^{-3} AQS at all receptors and on all floors. PM_{10} concentrations are predicted to be 39.8% or more below the 40µg.m^{-3} AQS.

6.22 For PM_{10}, the following equation can be used to derive the number of days that the daily mean AQS limit of 50µg.m^{-3} (with reference to Table 2.1) is likely to be exceeded:

$$\text{No. 24 hour exceedances} = -18.5 + 0.00145 \times \text{annual mean}^3 + \left(\frac{206}{\text{annual mean}}\right)$$

6.23 The data in Table 6.2 show that the highest annual mean PM_{10} concentration predicted in the model for 2021 was 24.1µg.m^{-3} at receptor G1 on the ground floor of the Camden High Street façade. Based on the above formula, this would lead to 10.4 exceedance days, which is 70% below the 35-day limit. Therefore, proposed receptors are not expected to be exposed to unacceptable short term concentrations of PM_{10}.

6.24 The data in Table 6.2 also show that annual mean $PM_{2.5}$ concentrations in 2021 are predicted to be 40% or more below the 25µg.m^{-3} AQS. The highest predicted concentration of $PM_{2.5}$ was 14.9µg.m^{-3} at G1.

6.25 Comparison between Table 6.1 and Table 6.2 shows that, while exceedances remain present at lower floors as shown, predicted concentrations of all key pollutants are expected to decline from the 2017 baseline to 2021, the year of expected opening.

Air Quality Neutral Assessment

Transport Emissions

6.26 The Air Quality Neutral Assessment for transport emissions compares the expected emissions from traffic generation with benchmarked emissions derived from the Air Quality Neutral Planning Support Update.

6.27 The development is proposed to be mixed-use, comprising of residential Hotel (C1), residential (C3) and retail (A1) land uses.

6.28 An estimated 33 additional daily trips (27LDV, 6HDV) were assessed by the project's Transport Consultants, RGP, as being generated by the proposed development.

6.29 Class C1 does not, at present, have a Transport Emissions Benchmark. According to the GLA guidance, where a TEB has not been derived, it will be possible to demonstrate that a development would meet the benchmark if the scheme-generated trip rate is below the benchmark trip rate, derived from TRAVL (Trip Rate Assessment Valid for London). The TRAVL Benchmark Trip Rate for class C1 is provided in Appendix D.

6.30 The calculation to arrive at the average number of trips per year, required for comparison to the TRAVL benchmark for the hotel land use (C1), is:

$$\frac{(Trip\ generation\ \times\ number\ of\ operational\ days)}{gross\ internal\ floor\ area}$$

6.31 According to RGP, the estimated daily trip generation assigned to C1 use is 28 vehicles. The GIA for class C1 is anticipated to be 2323m². Thus, by assuming a full year of operation the calculation for the 'scheme generated' traffic is:

$$\frac{(28\ \times\ 365)}{2323}\ =\ \mathbf{4.4\ (trips/m^2/annum)}.$$

6.32 The TRAVL benchmark for land-use category C1 is **5.0 trips/m²/annum** within Inner London. The scheme generated traffic is below this benchmark by 12%.

6.33 As detailed in Appendix D, combined Transport Emission Benchmarks (TEB) of 35.9kgNO_x.annum^{-1} and 6.4kgPM_{10}.annum^{-1} were calculated for class C3 and A1.

6.34 Based on the estimated additional daily trips assigned to C3 and A1 use, the emissions generated by the proposed development have been calculated as 3.1kgNO_x.annum^{-1} and 0.6kgPM_{10}.annum^{-1}.

6.35 The difference between TEB and calculated total transport emissions = -32.8 for NO_x and -5.9 for $PM_{10.}$ As per GLA guidance, where the outcome is negative, emissions are within the benchmark.

6.36 Based on the above, it is anticipated that the proposed development is expected to meet the requirements of the London Plan and *"meet or exceed"* Air Quality Neutral standards for transport emissions.

Building Emissions

6.37 The energy centre is anticipated to include 3 Gas Fired Water Heaters (HIflo EVO 65/300). Being gas-fired, these units do not use solid fuel or oil as a fuel source; as such, PM_{10} building emissions do not need to be considered.

6.38 As detailed in Appendix D, a total Building Emission Benchmark (BEB) of $1177.2kgNO_x.annum^{-1}$ was calculated for the proposed development.

6.39 The total annual building NO_X emissions from the development have been calculated from Energy Centre data, based on stated operational load and emissions rate in the HIflo EVO 65/300 technical specification sheet, as provided by PSH. The total annual NO_X emission from the proposed development has been calculated at $19.5kgNO_X.annum^{-1}$. Calculation inputs are available in Appendix D.

6.40 The total building NO_X emissions of $19.5kgNO_X.annum^{-1}$ is far smaller than the Total Benchmarked Building Emissions of $165.9kgNO_X.annum^{-1}$. As such, it is anticipated that the proposed development will achieve air quality neutral standards for building emissions.

Site Specific Mitigation

6.41 Air quality impacts associated with traffic generation were predicted to be negligible, which is not significant. Furthermore, it has been shown that the proposed development is expected to 'meet or exceed' Air Quality Neutral standards.

6.42 However, it has been shown that the proposed development is predicted to expose new residential receptors to annual mean concentrations of NO_2 which marginally exceed the $38\mu g.m^{-3}$ WHO limit value at the first floor of the Delancey street façade. Therefore, mitigation is proposed to ensure the amenity of future residents is not adversely impacted by poor air quality.

6.43 Following correspondence with PSH, the mechanical engineers for the project, the following mitigation is proposed to protect the health and amenity of future occupiers of the residential dwellings:

- First floor (where a marginal exceedance of the WHO limit value was predicted) – MVHR providing daily mechanical supply and extract ventilation, complete with carbon filter on the fresh air intake. Purge ventilation via openable windows;
- Second floor – mechanical extract ventilation with fresh air make-up via trickle vents in the windows. Purge ventilation via openable windows; and

- Third Floor – mechanical extract ventilation with fresh air make-up via trickle vents in the windows. Purge ventilation via openable windows.

6.44 It should be noted that the proposed development does not include any car parking spaces, and is proposing a total of 10 cycle parking spaces to promote / encourage modal shift toward active travel. It is understood that 6 cycle parking spaces will be designated for residential use, with an additional 2 for hotel use and 2 for retail use.

7. Discussion

7.1 In 2000, LBC declared a borough-wide AQMA due to exceedances of the UK Air Quality Standards (AQSs) for hourly mean and annual mean nitrogen dioxide (NO_2) and 24-hour mean Particulate Matter (PM_{10}) concentrations. The site is also located in the 'Camden High Street, from Mornington Crescent to Chalk Farm and Camden Road' Air Quality Focus Area.

7.2 Pollution concentrations adjacent to Camden's busiest roads can be very high; however, data from the UK-AIR suggest that background concentrations in the vicinity of the application site are below the key AQSs for NO_2, PM_{10} and $PM_{2.5}$. Furthermore, concentrations of all pollutants were predicted to decline each year. These reductions are principally due to the forecast effect of the roll out of cleaner vehicles, but also reflect London policy interventions and strategies to improve air quality, such as the LEZ and ULEZ.

7.3 An air quality assessment was required to assess the suitability of the site, in air quality terms, for the proposed introduction of new sensitive receptors into an area of existing poor air quality.

7.4 The demolition and construction phases of the proposed development could give rise to emissions that may cause some dust soiling effects on adjacent uses. However, by adopting appropriate mitigation measures to reduce emissions and their potential impact, there should be no significant residual effects, in line with the requirements of the NPPF and PPG.

7.5 A detailed dispersion model has been used to predict pollutant concentrations at the locations of highest likely exposure for new occupiers of the proposed development. Namely, the façades facing Camden High Street and Delancey Street, from the ground floor and increasing with height to the point of no exceedances of appropriate AQOs. Annual mean concentrations of PM_{10} and $PM_{2.5}$ are predicted to be below the 40$\mu g.m^{-3}$ AQS at all receptors, in all scenarios.

7.6 It has been shown that in 2021, predicted annual mean concentrations of NO_2 marginally exceed the 38$\mu g.m^{-3}$ WHO limit value at one sensitive location (i.e. the location of the proposed residential dwelling on the first floor). Therefore, mitigation has been proposed to ensure that the amenity of future residents is not adversely impacted by poor air quality.

7.7 The proposed development is predicted to meet / exceed Air Quality Neutral standards for both Building and Transport emissions in line with the requirements of the London Plan and Camden Air Quality Planning guidance.

7.8 Where appropriate mitigation measures are put in place during construction and operation, the proposed development is considered to comply with the requirements of the NPPF, London Plan and LBC Policy CC4, as exposure of new occupiers and users of the proposed development will be reduced to acceptable levels.

8. Conclusions

8.1 JLL appointed Phlorum Ltd on behalf of Demar (BVI) Holdings Ltd to undertake an air quality assessment for the proposed demolition of an existing 2 storey retail unit on the corner of Camden High Street and Delancey Street, and the erection of a part 4-, part 5-storey mixed-use development comprising an 80 bed 'Hub' by Premier Inn hotel, a retail unit on the ground floor, and 3 affordable residential units.

8.2 UK-AIR background concentrations and local air quality monitoring results from the wider area suggest that whilst air quality adjacent to busy roads is often poor, background pollution concentrations across the application site are below the relevant UK Air Quality Strategy Standard concentrations. In addition, the declining trend in future predictions reflects the forecast effect of cleaner vehicles and London policy interventions and strategies to improve air quality, such as the LEZ and ULEZ.

8.3 Concentrations across the site in 2021, the year of anticipated opening, are predicted to be below the relevant Air Quality Standards for PM_{10} and $PM_{2.5}$. However, in the context of long term AQOs, there was one marginal exceedance of the 38$\mu g.m^{-3}$ WHO limit value at the location of the proposed first floor residential dwelling. As such, mitigation has been proposed to mitigate the impact of exposure.

8.4 It is anticipated that the proposed development will achieve air quality neutral standards, in line with the requirements of the London Plan.

8.5 During construction, adopting appropriate mitigation measures should prevent any significant air quality effects on the surrounding area.

8.6 With mitigation in place to protect the amenity and health of future users / occupiers, the proposed development is expected to comply with all relevant air quality policy. As such, air quality should not pose any significant obstacles to the planning process.

Figures and Appendices

Figure 1: Site Location Plan

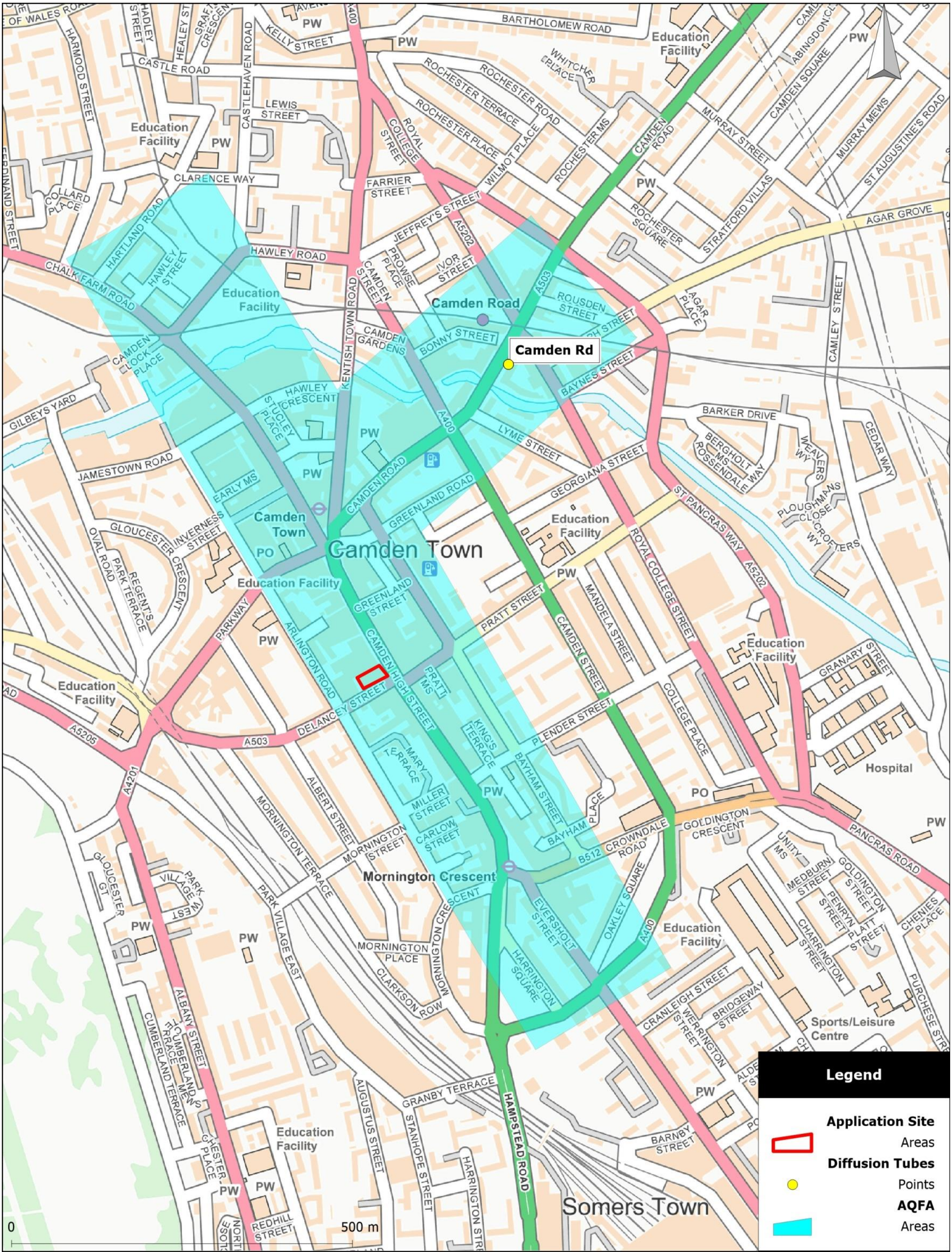


Figure 1: Site Location Plan

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Figure 2: Construction Phase Receptors

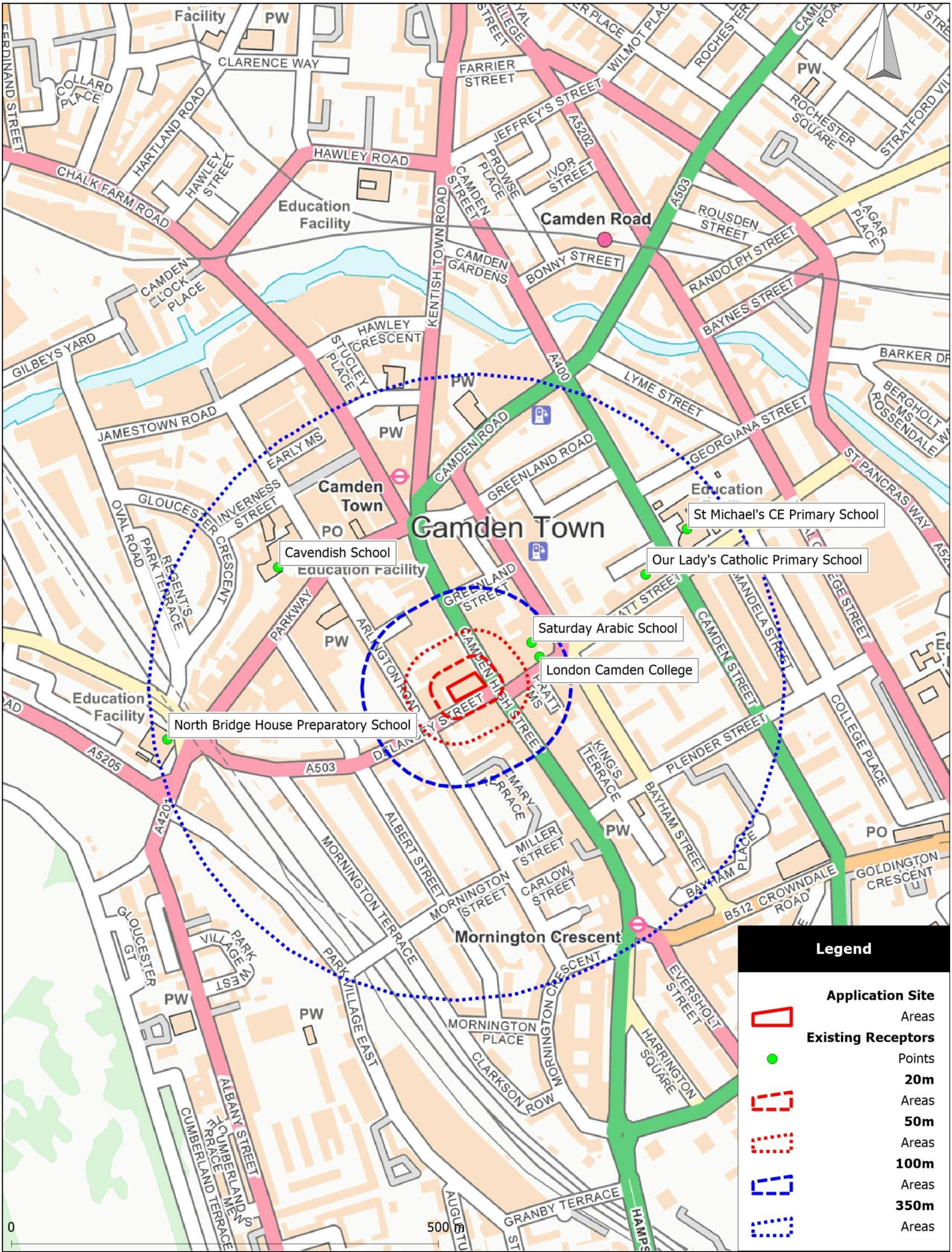

Figure 2: Construction Phase Receptors

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Figure 3: Operational Phase Receptors

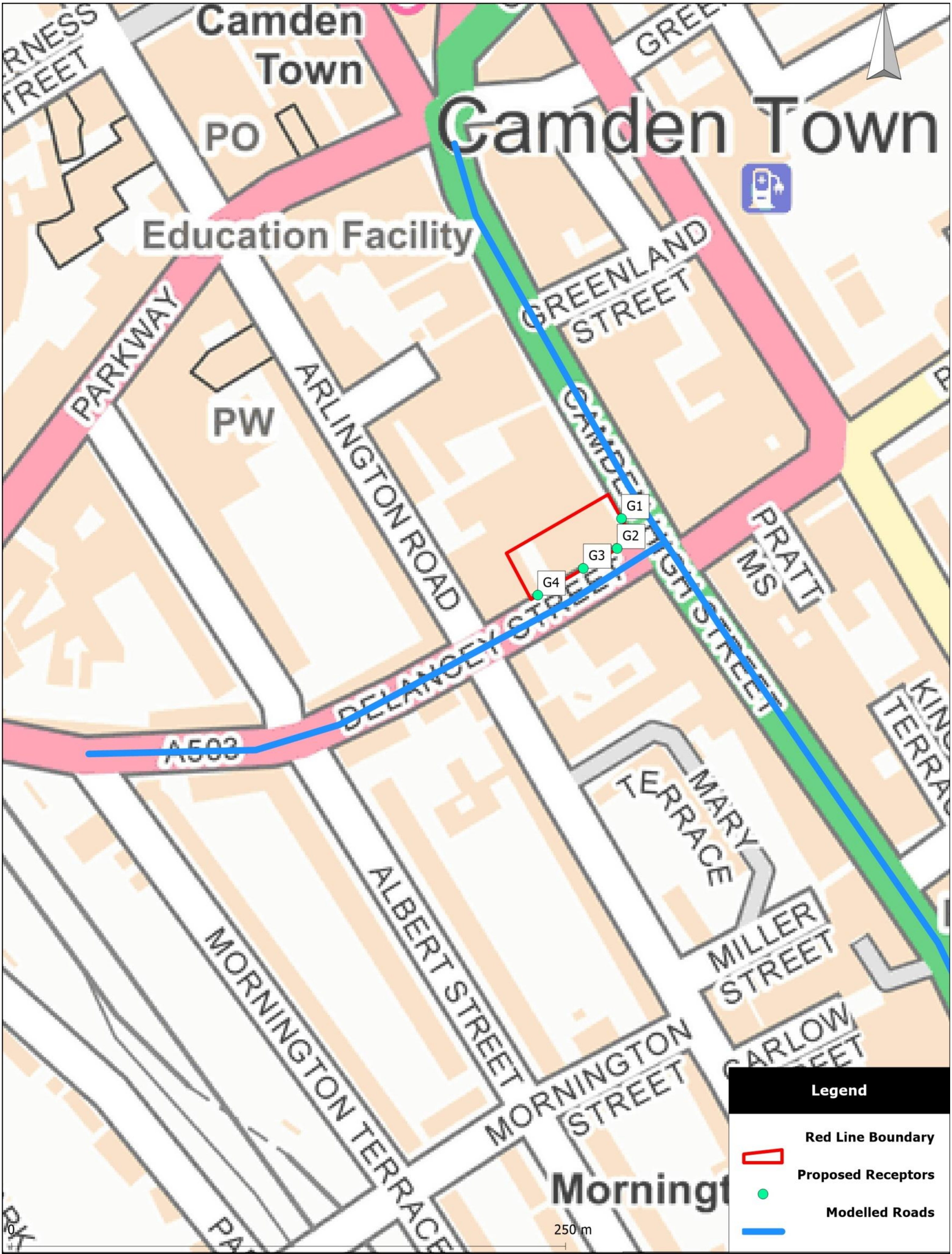

Figure 3: Operational Phase Receptors

Job No.: 8479.S
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Figure 4: Ground Floor Annual Mean NO_2 Contours

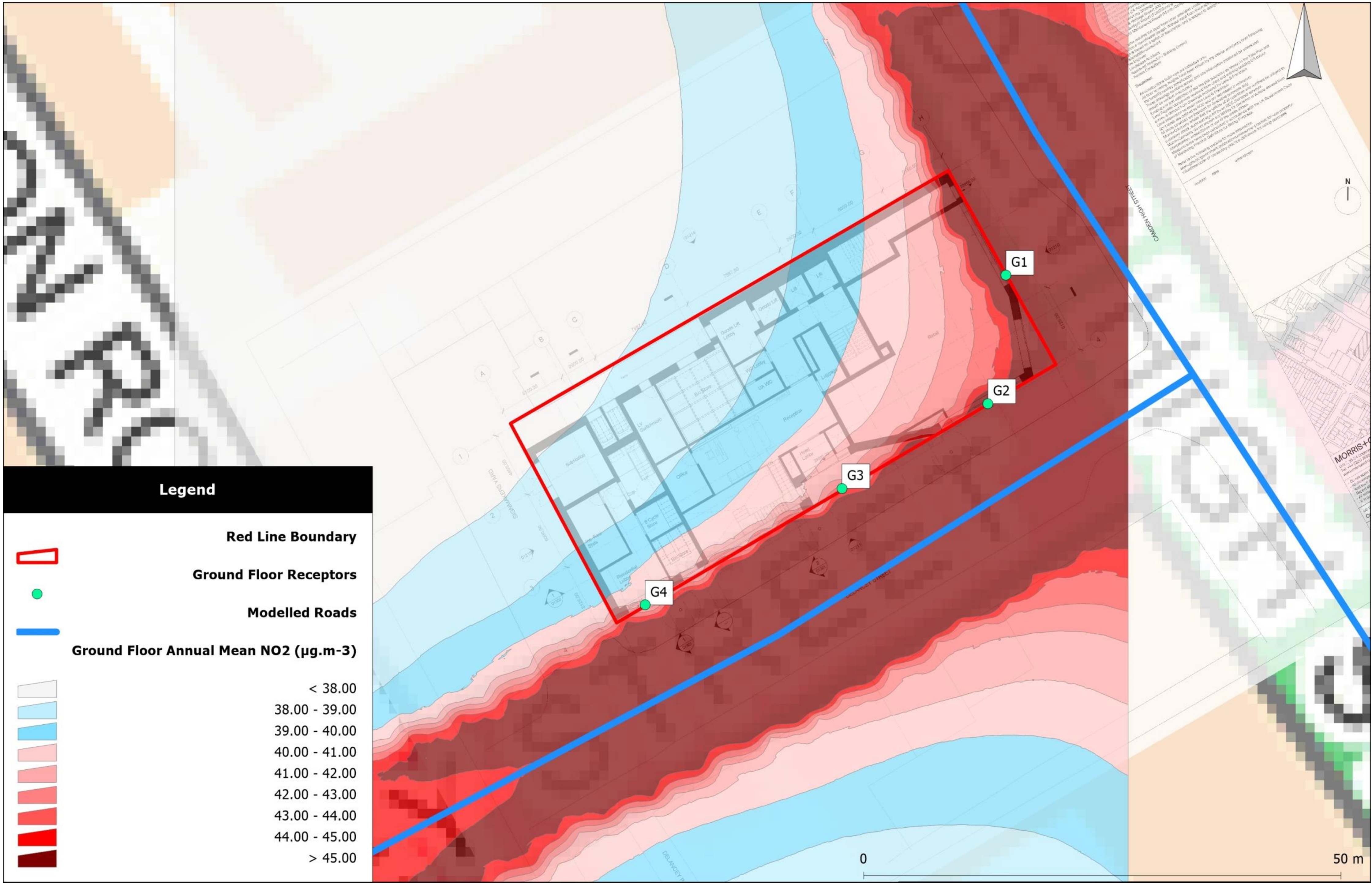

Figure 4: Ground Floor Annual Mean NO2 Contours

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Figure 5: First Floor Annual Mean NO_2 Contours

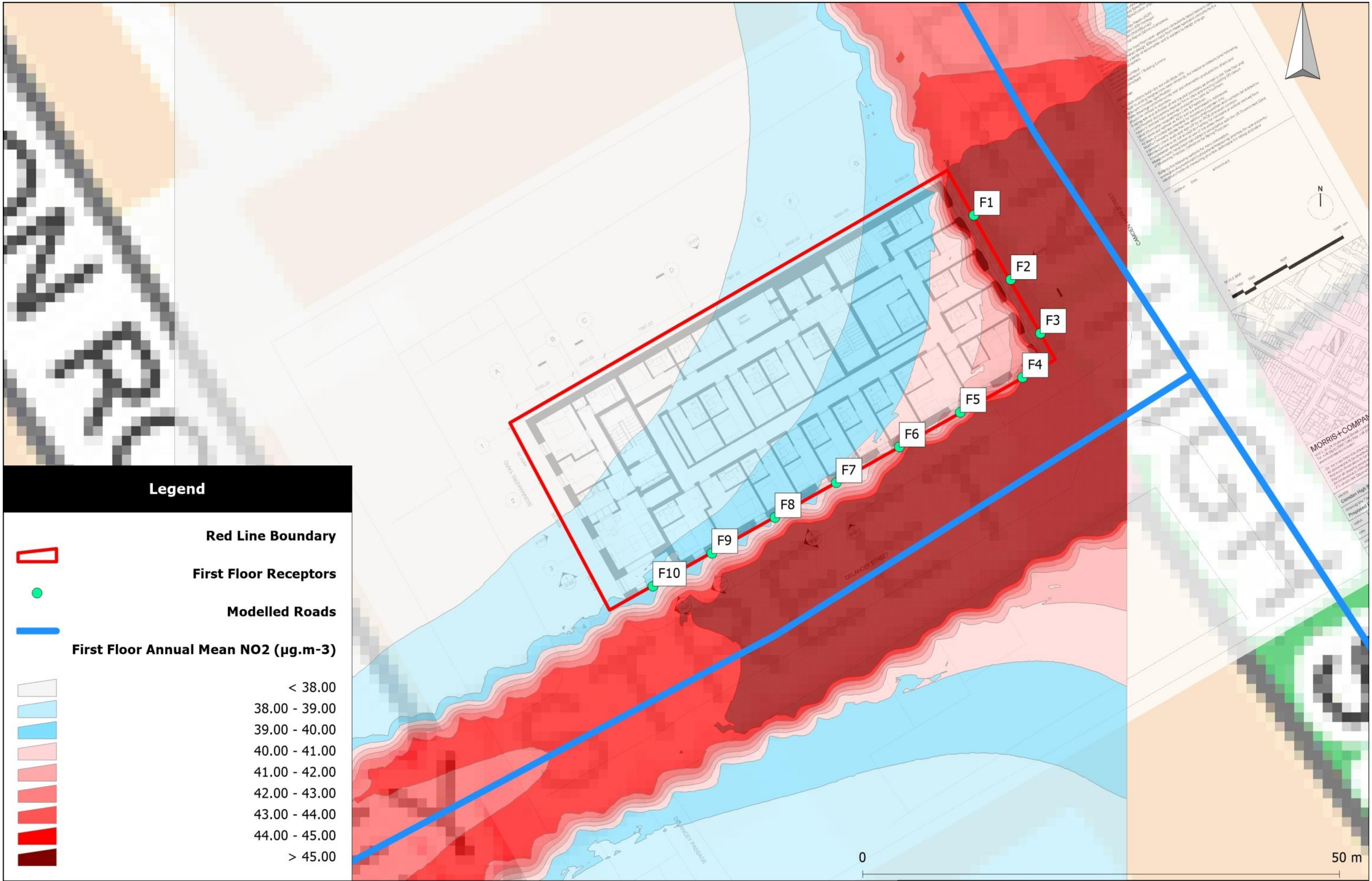

Figure 5: First Floor Annual Mean NO2 Contours

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Figure 6: Second Floor Annual Mean NO_2 Contours

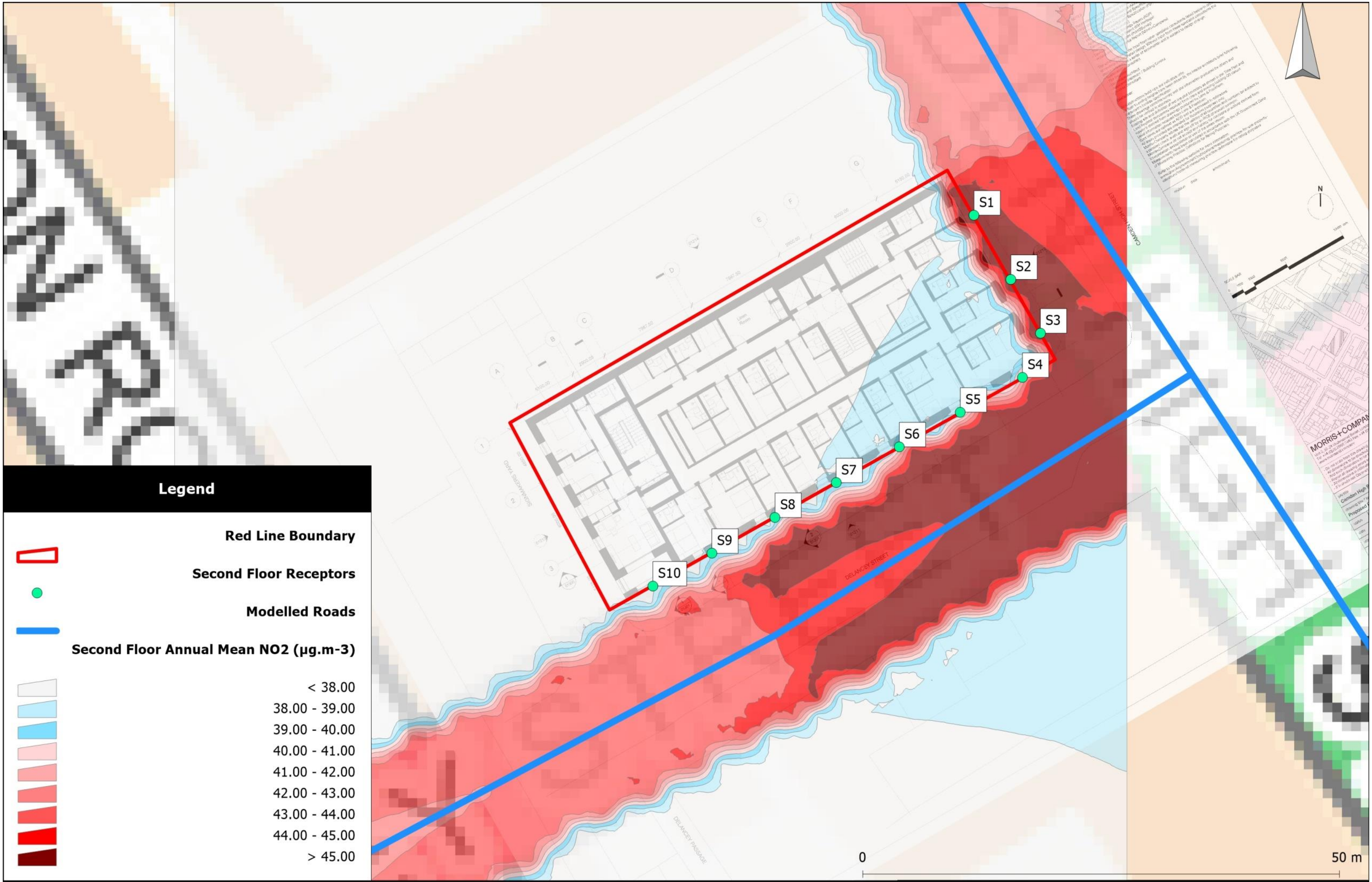

Figure 6: Second Floor Annual Mean NO2 Contours

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Appendix A: Model Input Data

Traffic Data

The data used in the ADMS-Roads assessment are included in the table below and were sourced from Dft Counts.

Table A.1: Traffic data

Road	2017 Baseline			2021 With*		
	AADT	LDV	%HDV	AADT	LDV	%HDV
Camden High Street (DfT 37100)	21080	18724	11%	22253	19763	11%
Camden High Street (DfT 7043)	12968	11281	13%	13702	11917	13%
Delancey Street (DfT 28379)	11033	10498	5%	11663	11092	5%

Note: *TEMPro Growth factor of 1.0541 applied to 2017 data.

Model Inputs

Table A.2: Model inputs

Inputs	
Dataset	DfT Traffic Counts
Emission Year(s)	2017, 2021
Road Type	London (Inner)
Surface roughness	1.5
Meteorological Data	London City Airport (2016)
Canyon Heights	10.5 m

Model Verification

Table A.3: Model verification

Inputs	
Emission Year	2016
Road Type	London (Inner)
Surface roughness	1.5
Meteorological Data	London City Airport (2016)
Traffic Data	DfT Traffic Counts

Traffic Data Used in Model Verification

Table A.4: Model verification traffic data

DfT Control Point	Road	2016 24h AADT	
		LDVs	HGVs
37268, 7214 and 27241	Camden Road	20490, 27408, 28128	3315, 2424, 2064
17007	Kentish Town Road	12414	1748
48159 and 75096	Bloomsbury Street	10435, 8170	2021, 1469

Appendix B: Model Verification Study

Model verification studies are undertaken in order to check the performance of dispersion models and, where modelled concentrations are significantly different to monitored concentrations, a factor can be established by which the modelled results can be adjusted in order to improve their reliability. The model verification process is detailed in LAQM.TG(16).

According to TG(16), no adjustment factor is necessary where the results of the model all lie within 25% of the monitored concentrations.

Model verification can only be undertaken where there is sufficient roadside monitoring data in the vicinity of the subject scheme being assessed. LAQM.TG(16) recommends that a combination of automatic and diffusion tube monitoring data is used; although this may be limited by data availability. Four monitoring locations in Camden with appropriate DfT traffic data were selected for this study.

Table B.1 compares monitored and modelled NO_2 concentrations at the three monitoring locations.

Dft ID	Monitor ID	Type	Concentrations ($\mu g.m^{-3}$)		
			Modelled	Monitored	% Difference
37268, 7214 and 27241	Camden Road	DT	47.4	61.8	-23.3%
17007	Kentish Town Road	DT	58.7	45.6	-22.4%
48159 and 75096	Bloomsbury Street	DT	72.2	44.6	-38.2%

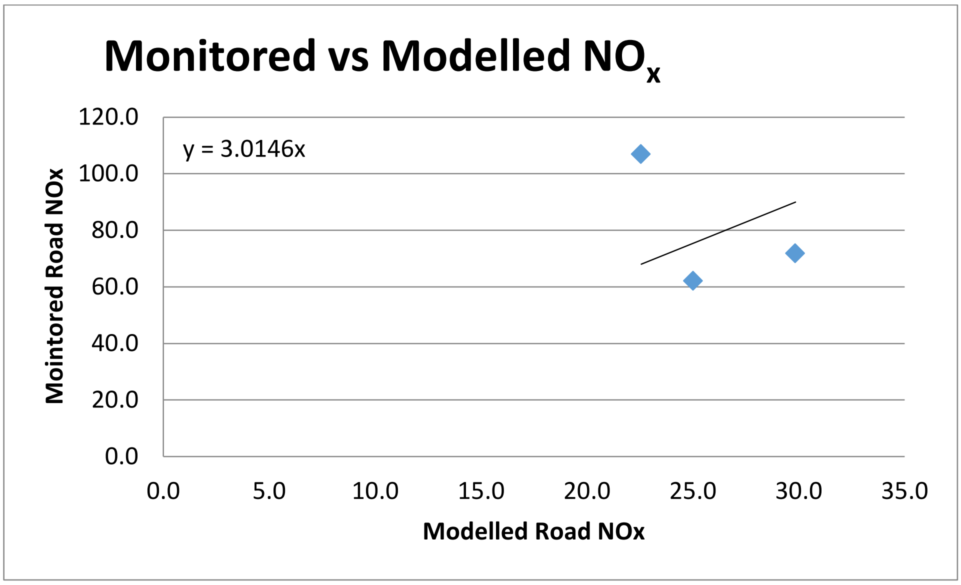
Note: DT = Diffusion Tube

The data in Table B.1 shows that the model is under-predicting concentrations at all locations to a varying degree. This is a pattern frequently seen in model verification studies, and is likely to be the result of local dispersion characteristics. As the modelled results were outside 25% of the monitored results, it was decided to proceed with adjustment as the model was systematically under predicting NO_2 concentrations. This was done in order to ensure conservative results.

As it is primary NO_x, rather than secondary NO_2, emissions that are modelled, an adjustment factor must be derived for the road contribution of NO_x.

A plot of modelled versus monitored NO_x concentrations on a graph shows a positive correlation. This graph is included in Figure B.1 below.

Figure B.1 Monitored vs Modelled Road NO_x



By plotting a trend line through the points on the graph, a factor of **3.02** was derived. Table B.2 shows total monitored versus modelled NO_2 following the adjustment of the road contribution of NO_x by this factor. It shows that, following this adjustment, all modelled concentrations of NO_2 are within 25% of monitored concentrations at these locations. As a result, the factor of **3.02** was considered appropriate for the adjustment of all modelled road contributions of NO_x for the proposed development.

Table B.2: Monitored and Adjusted Modelled Total NO_2 at Roadside Monitoring Sites

Dft ID	Monitor ID	Type	Concentrations ($\mu g.m^{-3}$)		
			Modelled	Monitored	% Difference
37268, 7214 and 27241	Camden Road	DT	67.4	61.8	9.0%
17007	Kentish Town Road	DT	33.0	45.6	7.3%
48159 and 75096	Bloomsbury Street	DT	60.7	44.6	-16.0%

Appendix C: IAQM Highly Recommended Mitigation Measures for Medium Risk Sites

IAQM Highly Recommended Mitigation Measures for sites with a Medium Risk of Dust Impacts

Please refer to the IAQM's Construction Dust Guidance (*Guidance on the assessment of dust from demolition and construction (2014)* [24] and *Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites (2018)* [25] for further, "desirable", mitigation measures.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- 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.
- Display the head or regional office contact information.
- 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 Appendix. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

Site Management

- 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.
- Make the complaints log available to the local authority when asked.
- Record any exception incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of 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.
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it is a large site, before work on a phase commences. Further guidance is provided by the IAQM[26] on *monitoring during demolition, earthworks and construction*.

Preparing and Maintaining the Site

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible.
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.

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24 IAQM (2014) Guidance on the assessment of dust from demolition and construction
25 IAQM. (2018). Guidance on Air Quality Monitoring in the Vicinity of Demolition and Construction Sites. https://iaqm.co.uk/text/guidance/guidance_monitoring_dust_2018.pdf

- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on site cover as described below.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

- Avoid bonfires and burning of waste materials.

Demolition

- 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.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Construction

- 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.

Trackout

- 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.

- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior leaving the site where reasonably practicable).
- 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.
- Access gates to be located at least 10m from receptors where possible.

Appendix D: Air Quality Neutral Assessment

Transport Emissions

Table D.1: Transport Emissions Benchmark (TEB) derived from GLA Guidance

Area	Inner London	
Land Use	**Residential (C3)**	**Retail (A1)**
Number of Trips	407 (dwelling/annum)	100 (m^2/annum)
Average Trip Length	3.7km	5.9km
Average Distance / annum	1506 km/dwelling/annum	590 km/m^2/annum
Emissions factor (NO_x)	0.370	
Emissions factor (PM_{10})	0.0665	
TEB (NO_x)	**558 (x3 dwellings) = 1674**	**219 (x 156.2) = 34,207.8**
TEB (PM_{10})	**100. (x3 dwellings) = 300**	**39.3 (x 156.2) = 6128.5**
Sum Total Emissions (NOx)		35.9kgNO_X.annum^{-1}
Sum Total Emissions (PM_{10})		6.4kgNO_X.annum^{-1}

Table D.2: Proposed Development Transport Emissions

Land Use	**Residential (C3)**	**Retail (A1)**
Number of Trips (31 per day)	11315 / annum (total, not split between land use)	11315 / annum (total, not split between land use)
Dwellings / Floor Space m^2	3 Dwellings	156.2 m^2
Average Trip Length	3.7km	5.9km
Emissions factor (NO_x)	0.370	0.370
Emissions factor (PM_{10})	0.0665	0.0665
Total Emissions (NO_x)	**1499.1**	**1593.6**
Total Emissions (PM_{10})	**269.4**	**286.4**
Sum Total Emissions (NOx)		**3.1** kgNO_X.annum^{-1}

Sum Total Emissions (PM_{10})	**0.6** $kgNO_X.annum^{-1}$

TRAVL Benchmark Trip Rates

Where a specific Transport Emissions Benchmark has not been calculated, it is possible to show that a development would meet the benchmark if the scheme-generated trip rate for a particular land-use class does not exceed the benchmark trip rate, derived from TRAVL, in the table D.3 below:

Table D.3: TRAVL benchmark trip rates

Land-use Class	Number of Trips (trips / m2 / annum)		
	CAZ	Inner	Outer
C1	1.9	5.0	6.9

Building Emissions

Table D.4: Building Emissions Benchmark (BEB) derived from GLA Guidance

Land Use Class	GIA (m^2)	Building emissions Benchmarks ($gNO_X.m^{-2}.annum^{-1}$)	Benchmarked emissions ($KgNO_X.annum^{-1}$)
C3 (Residential)	340.6	26.2	8.9
A1 (Retail)	156.2	22.6	3.5
C1 (Hotel)	2323.1	70.9	164.7
Total Benchmarked Building Emissions			**177.2**

Table D.5: Proposed Development Building Emissions (HIflo EVO 65/300 units)

Emission rating	17.6 $mgNO_x/KWh$
Total Energy Demand	1,105,400 KWh/year
Calculated Total Annual NO_X Emissions (kg)	6.5 kg (for 1 GFWH)
Total Annual NO_X Building Emissions (kg)	**19.5 kg** (for 3 GFWH)

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