Regents Park Road Hotel

Air Quality Assessment

Uchaux Ltd

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Executive Summary

Cundall has been commissioned by Uchaux Ltd to carry out an air quality assessment to support a planning application for the construction of a part ground plus 6-storey building and part ground plus 3-storey building comprising a hotel with associated works. The site is located at 155 – 157 Regents Park Road, London, NW1 8BB, in the London Borough of Camden, and lies within Camden's Air Quality Management Area.

Existing conditions within the study area indicate that there is potential for nitrogen dioxide concentrations near the site to exceed the European Limit Value and National Air Quality Objective threshold levels.

The assessment has been undertaken in accordance with planning guidance provided by the Institute of Air Quality Management (IAQM) and advice provided by the council's sustainability team. In setting the scope of assessment, consideration has been made of the potential for impacts to occur during both the construction and operation phases of the development, and the exposure of nearby residents and future occupants of the site to air pollution.

A construction dust impact assessment was undertaken in accordance with IAQM construction assessment guidance. It was concluded that without appropriate mitigation measures, Medium risks were posed by demolition, earthworks, construction and trackout activities. Overall, the proposed site posed a Medium risk of causing significant effects. During construction, receptors within 350 m of the construction boundary could be susceptible to dust effects. However, with appropriate mitigation measures implemented, it was concluded that the construction effects of the Proposed Development would be not significant.

As the Proposed Development does not include any car parking provision, aside from one blue badge bay, assessment of traffic-related impacts was scoped out of the operation phase assessment.

It is anticipated that heating and cooling for the development will be provided by a refrigerant based variable refrigerant flow heat pump system powered by electricity. Additionally, domestic hot water will be provided by an air source heat pump system. A backup diesel sprinkler pump will be installed for use as an emergency energy supply. The operation hours are anticipated to be less than 50 hours per year for testing and maintenance. A screening assessment was undertaken to calculate the worst-case emissions Process Contributions to air in accordance with Defra and the Environment Agency's air emission risk assessment methodology. The estimated emissions of process contributions to air were predicted to be less than the Institute of Air Quality Management's significance criteria for both long term and short-term air quality objectives. Therefore, it is concluded that the air quality impacts from the backup diesel sprinkler pump are not significant.

The exposure of future occupants of the Proposed Development has also been assessed. No exceedances of the annual mean nitrogen dioxide or particulate matter (PM_{10} and $PM_{2.5}$) objectives were predicted at building facades facing Adelaide Road or Haverstock Hill. Theoretically, openable windows could therefore be allowed from an air quality perspective to assist with natural ventilation or comfort cooling.

It is anticipated, however, that ventilation to all hotel rooms will be based on a minimum fresh air system. Mechanical ventilation with heat recovery (MVHR) will be provided for all units, with a central Air Handling Unit being located at roof level. Fresh air intake and exhaust outlet ductwork will be separated to prevent short circuiting and contamination of the fresh air. Supply and extract ductwork will then distribute vertically through the building to serve the hotel rooms. Since NO_2 concentrations surrounding the development meet both the national air quality objectives and threshold values published by the World Health Organisation (WHO), there will be no requirement for NOx filtration within the MVHR system.

Although particulate levels meet air quality objectives for planning purposes, they do exceed best practice guidelines based on recommended threshold values by WHO, and it is therefore recommended that where practicable, ISO PM_{10}/$PM_{2.5}$ filtration is incorporated into the MVHR system.

An Air Quality Neutral Assessment was undertaken which indicated that both transport and building related emissions are likely to be Air Quality Neutral.

The Client will commit to the implementation of the best practice mitigation measures identified in this report during the construction phase of the development. It is anticipated that the generation of dust and harmful pollutants emissions from construction site activities will be reduced with the correct implementation of these measures.

Additionally, a Construction Management Plan (CMP) which conforms to the requirements of LBC's planning requirements will be submitted in support of the planning application and a suitable monitoring programme will be discussed and agreed with LBCC prior to commencement of works.

Overall, it was concluded that with the provision of appropriate mitigation measures, construction activities and operation impacts will have no significant effects on local air quality. The proposals are therefore compliant with the requirements of the relevant Supplementary Planning Guidance and new draft London Plan.

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1.0

Introduction

1.0 Introduction

Cundall has been commissioned by Uchaux Ltd to carry out an air quality assessment to support a planning application for the construction of a part ground plus 6-storey building and part ground plus 3-storey building comprising a hotel with associated works. The site is in 155 – 157 Regents Park Road, London, NW1 8BB, in the London Borough of Camden, and lies within Camden's Air Quality Management Area (AQMA). The latest proposals update a previous scheme (Planning Reference 2019/3891/P), which was submitted to LBC in August 2019, then subsequently withdrawn.

This air quality assessment has been undertaken to support a detailed planning application for the updated scheme. A preliminary outline masterplan is provided in Figure 1.

Proposals are for the redevelopment to provide a part ground plus 6-storey building and part ground plus 3-storey building comprising a hotel with associated works. The proposed area schedule for the development is summarised in Table 1.

Figure 1 Site Masterplan (Courtesy of Piercy & Company)

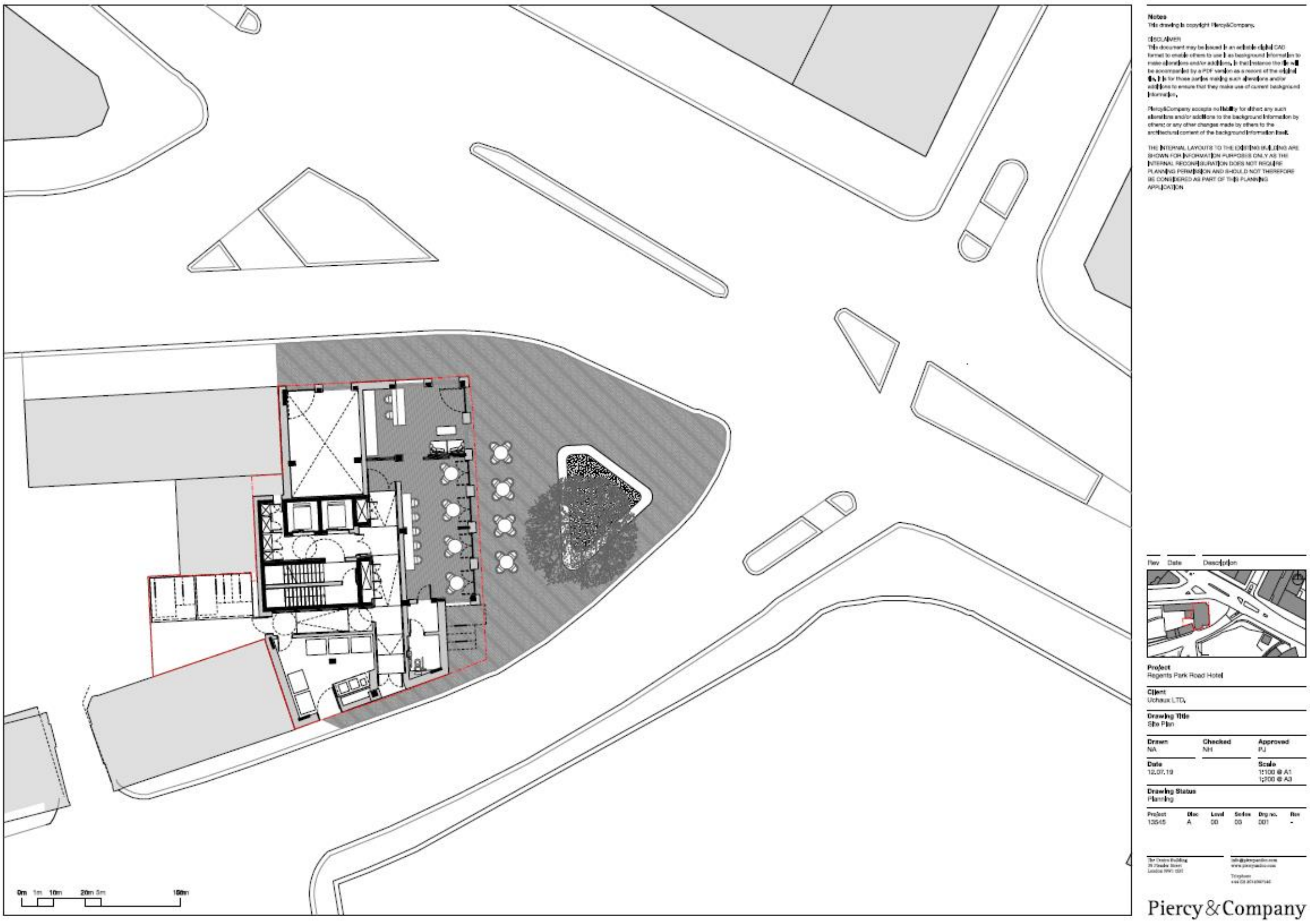

Table 1 Area Schedule for Development, Assume C1 Land-Use Throughout Development (Information supplied by Piercy & Company (03/02/21)

Location	Gross Internal Area (GIA) (m^2)
Basement	198.0
Lower Ground	184.0
Ground	216.0
01	224.0
02	224.0
03	224.0
04	174.0
05	174.0
06	174.0
RF	15.0
Totals	**1807.0**

1.1 Scope of Assessment

In setting the scope of assessment, consideration has been made of the potential for effects to occur during both the construction and operation phases of the development.

1.1.1 Construction

The Proposed Development comprises the demolition the existing building and construction of the new tower block outlined above. It is anticipated that the construction process will take up to twenty-four months, and this is assumed to include demolition, construction, earthworks and trackout activities. The potential for air quality effects during the construction phase has been assessed, and the extent of mitigation required for dust/ Particulate Matter (PM_{10} and $PM_{2.5}$) generated by construction activities has been considered.

Machinery used during construction can generate new sources of emissions, as well as traffic movements to/from the site and the works themselves. When assessing the effect of dust emissions generated during construction works, receptors include those nearest to the construction boundary of the site in each direction. These receptors have the potential to experience effects of greater magnitude due to emissions of dust generated by the works, when compared with more distant receptors.

Without appropriate mitigation controls in place, there is the potential for adverse effects to occur during the construction of the Proposed Development. The implementation of best practice mitigation controls can ensure any potential adverse effects would be not significant.

Best practice mitigation controls have been identified in accordance with IAQM guidance, Guidance on the Assessment of Dust from Demolition and Construction v1.1 (2016)[1].

1.1.2 Operation

During the development's operation, consideration has been made of the potential emissions from road traffic generation. Although the development is nominally 'car-free' due to the absence of any car parking provision, there will be a small number of vehicle trips associated with taxi movements and service vehicles. Therefore, the Proposed

[1] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1), https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

Development has the potential to cause small increases in traffic on local roads, which has the potential to effect concentrations of NO_2, PM_{10} and $PM_{2.5}$.

It is anticipated that heating and cooling for the development will be provided by a refrigerant based variable refrigerant flow (VRF) heat pump system powered by electricity. Additionally, domestic hot water will be provided by an air source heat pump (ASHP) system. External condensers will be mounted at roof level and these will be coupled with buffer vessels to store the hot water; this system will also be powered by electricity.

A secondary means of power for is required for life safety systems including smoke ventilation systems, fire-fighting, lifts and sprinklers. It is currently proposed to utilise an electric sprinkler pump with a backup diesel sprinkler pump for use in emergency situations. The project's M&E Consultant has provided details of typical diesel plant which will be required for this purpose. It is anticipated that this system will be tested on a weekly basis for no more than 30 minutes in duration. Emissions from the testing of the diesel back-up plant were screened in accordance with IAQM Planning Guidance[2].

1.1.3 Human Exposure

Potential exposure of future occupants of the site was considered in accordance with the Mayor of London's Supplementary Planning Guidance (SPG)[3], Defra Technical Guidance[4] and IAQM Planning Guidance.

It has been assumed that the operation phase of the development will commence in 2023.

1.1.4 Air Quality Neutral Assessment

An Air Quality Neutral Assessment was undertaken to determine compliance with the London Plan[5]'s policy relating to "Air Quality Neutral Development". The Air Quality Neutral Planning Support document[6] was published in March 2013 and updated in April 2014 to accompany the 2014 publication of the Greater London Authority's (GLA's) Sustainable Design and Construction SPG[7]. It provides specialist consultants with a methodology to undertake an 'Air Quality Neutral' assessment, as well as emission benchmarks for buildings and transport, against which the predicted values for the Proposed Development can be compared.

1.1.5 Consultation with London Borough of Camden (LBC)

Consultation with Ana Ventura and Gabriel Berry-Khan of LBC's Sustainability Team was initially undertaken on 9th July 2019 to discuss and agree the scope of the assessment for the original scheme (Planning Reference 2019/3891/P). General advice was provided which was read in conjunction with Camden's planning guidance (CPG Air Quality) and Local Plan (Section CC4- Air Quality).

A follow up email was submitted on 27 January 2021 with details of the proposed scope for the revised scheme; as no further comments were received prior to the completion of this report, it was assumed in accordance with the wording of the email that the proposes scope was acceptable. All work was undertaken in accordance with Camden's latest planning guidance (see Table 4).

Further details are provided in Appendices A and B.

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[2] EPUK/IAQM, (2017) Land-Use Planning & Development Control: Planning for Air Quality https://iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf

[3] Mayor of London (2014) Sustainable Design and Construction Supplementary Planning Guidance, London plan 2011 Implementation Framework, April 2014 https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Sustainable%20Design%20%26%20Construction%20SPG.pdf

[4] Defra (2016) Local Air Quality Management Technical Guidance TG(16) https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

[5] Major of London (2016) The London Plan, Spatial Development Strategy for London Consolidated with Alterations since 2011, March 2016 https://www.london.gov.uk/sites/default/files/the_london_plan_2016_jan_2017_fix.pdf

[6] Air Quality Consultants / Environ (2014) Air Quality Neutral Planning Update: GLA 80371, April 2014, https://www.aqconsultants.co.uk/CMSPages/GetFile.aspx?guid=226d8d5e-d7e9-40e1-bf0d-85c4554496da

[7] Mayor of London (2014) Sustainable Design and Construction Supplementary Planning Guidance, London plan 2011 Implementation Framework, April 2014 https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Sustainable%20Design%20%26%20Construction%20SPG.pdf

1.2 Study Area

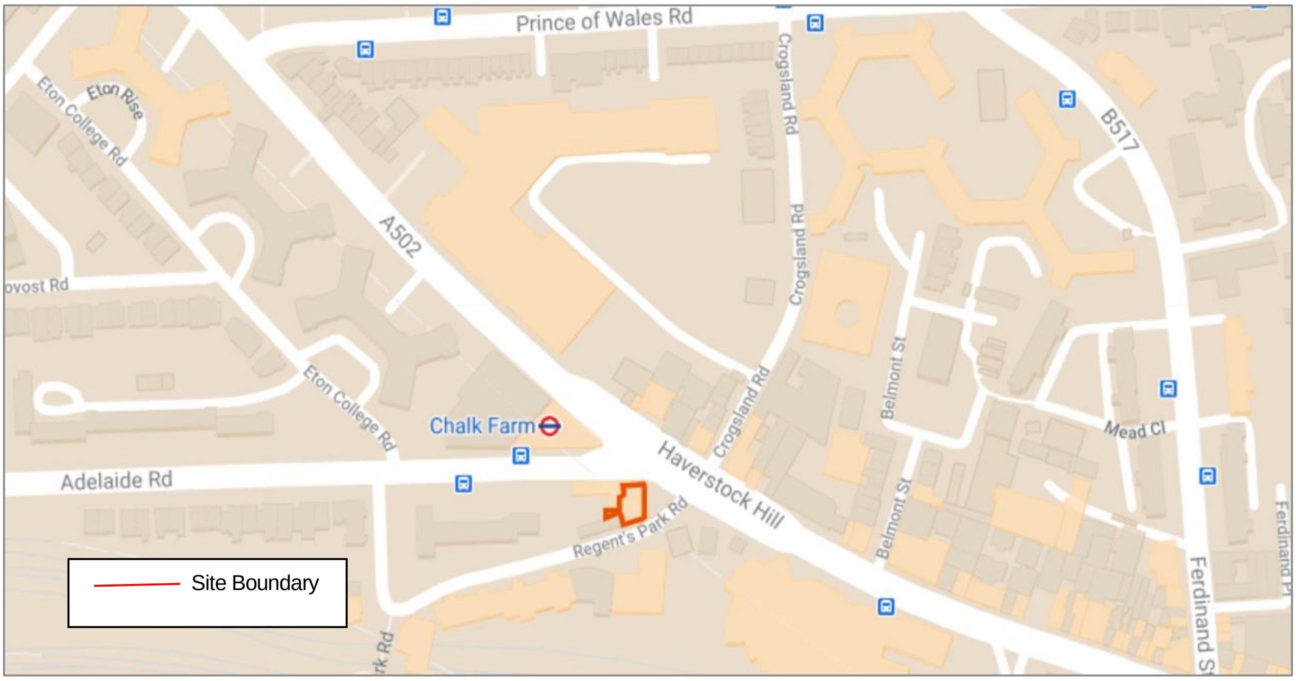
The site is located at 155-157 Regents Park Road, London, NW1 8BB. The existing site comprises a four-storey building on the corner of Regents Park Road and Haverstock Hill. The building fronts Haverstock Hill and is set back from the main road by an area of public realm. The site comprises a mix of uses including retail at ground floor with office accommodation at first and second floor and a single residential unit on the top floor.

The Site is within a Neighbourhood Centre. The site is immediately adjacent to Chalk Farm Station and is located next to the Roundhouse Arts venue. The site is not located within the Conservation Area but is in close proximity to the Primrose Hill, Eton and Regents Canal Conservation Area.

It is bounded to the north by Adelaide Road, to the east by Haverstock Hill (A502), to the south by Regent's Park Road and to the west by existing residential properties. The land use in the area is mixed, with a range of commercial properties on Haverstock Hill, as well as Chalk Farm underground station located opposite the Proposed Development on Adelaide Road.

The location of the development site is illustrated in Figure 2.

Figure 2 Location of the Proposed Development Site (Courtesy of Google Maps)



2.0

Legislation, Policy and Guidance

2.0 Legislation, Policy and Guidance

2.1 Key Legislation and Policy

This assessment considers key air quality legislation, which is summarised in Table 2.

Table 2 Key Legislation

Legislation	Description
EU Ambient Air Quality Directive 2008/50/EC[8]	Establishes the requirements of Member States in terms of improvements required to air quality. Sets standards for a variety of pollutants for human-health and the environment.
The Air Quality Standards Regulations 2010[9]	Transposes formalised EU Limit Values set out in directive 2008/50/EC to UK law.
The Clean Air Quality Strategy 2019[10]	The Clean Air Strategy sets out the case for action and demonstrates the government's determination to improve air quality. In some cases, the goals are even more ambitious than EU requirements to reduce people's exposure to toxic pollutants like nitrogen oxides, ammonia, particulate matter, non-methane volatile organic compounds and sulphur dioxide.
Environment Act 1995, Part IV[11]	Defines the requirements for Local Air Quality Management (LAQM).
Environment Protection Act 1990, Amended by the Pollution Prevention and Control Act 1999[12]	Part III provides statutory nuisance provisions for nuisance dust. Nuisance complaints about dust would need to be investigated by the Local Authority. In practice, dust deposition is generally managed appropriately by suitable on-site practices and mitigation, avoiding the determination of statutory nuisance and/or prosecution or enforcement notices.

The air quality EU limit values and UK Air Quality Objectives (AQOs) which apply to this assessment are shown in Table 3[13]. Some pollutants have long-term (annual mean) objectives due to the chronic way they affect human health or the natural environment and others have short-term (1-hour, 24-hour mean) objectives due to the acute way they affect human health of the natural environment.

Table 3 AQO and EU Limit Values

Pollutant	Averaging Period	Objective Threshold / EU Limit Value ($\mu g/m^3$)
Nitrogen Dioxide (NO_2)	Annual mean	40
	1-hour mean	200 Not to be exceeded more than 18 times per year (equivalent to the 99.79th percentile of 1-hour mean values)
Particulate Matter	Annual mean	40

[8] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
[9] HMSO (2010). Statutory Instrument 2010 No. 1001, The Air Quality Standards Regulations 2010, London: HMSO
[10] Department for Environment Food and Rural Affairs (Defra) (2019) Clean Air Strategy 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf
[11] Environment Act 1995, Chapter 25, Part IV Air Quality
[12] Environmental Protection Act 1990, Chapter 43, Part III Statutory Nuisances and Clean Air https://www.legislation.gov.uk/ukpga/1990/43/part/III
[13] Other pollutants have been screened out of this assessment as exceedance of their respective objectives is not anticipated to be associated with the pollutant sources of relevance to this assessment.

Pollutant	Averaging Period	Objective Threshold / EU Limit Value (µg/m^3)
(PM_{10})	24-hour mean	50 Not to be exceeded more than 35 times per year (equivalent to the 90.4th percentile of 24-hour mean values)
Fine Particulate Matter ($PM_{2.5}$)	Annual mean	25

Previous research carried out on behalf of Defra identified that exceedances of the NO_2 1-hour mean are unlikely to occur where the annual mean is below 60 µg/m^3. This assumption is still considered valid; therefore, Defra's Technical Guidance document, LAQM.TG (16) confirms that this figure can be referenced where 1-hour mean monitoring data are not available (typically if monitoring NO_2 using passive diffusion tubes).

a. Planning Policy and Guidance

Consideration of the strategic location and design of new developments is of key important in the land-use planning process and can provide a means of improving air quality. Air quality considerations as part of development applications may become material in determining planning applications. Relevant planning policy and guidance at the National, Regional, and Local levels as summarised in Table 4.

Table 4 Key Policy and Guidance

Policy / Guidance	Description
National Policy and Guidance	
Ministry of Housing, Communities & Local Government – National Planning Policy Framework (NPPF) (2019)[14]	The National Planning Policy (NPPF) published March 2012 and last updated in June 2019 with the purpose of planning achieving sustainable development. Paragraph 181 of the NPPF states that: "Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or National objectives for pollutants, taking into account the presence of AQMAs and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making Stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in AQMAs and Clean Air Zones is consistent with the local air quality action plan". In addition, paragraph 103 states that: *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."*

[14] Ministry of Housing, Communities & Local Government, National Planning Policy Framework, June 2019
https://www.gov.uk/government/publications/national-planning-policy-framework--2

Policy / Guidance	Description
	Paragraph 170 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. Of relevance to air quality, NPPF notes that this can be achieved by: *"e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"*
Planning Policy Guidance (updated 2019)[15]	Planning Practice Guidance (PPG) documents have been published as part of the NPPF. PPG relating to air quality was last updated in November 2019. It provides guidance on the significance of air quality in determining the local impact of proposed developments and highlights the importance of local and neighbourhood plans with regard to air quality. A flowchart is provided to assist local authorities in determining how air quality considerations might fit into development management processes.
Clean Air Strategy (2019)[16]	Defra published a Clean Air Strategy in January 2019, setting out a wide range of actions for UK Government to reduce pollutant emissions and improve air quality. The actions are grouped into four main emission sources: Transport, Domestic, Farming and Industry
UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations. Detailed Plan. Defra / Department of Transport (DfT) (2017)[17]	This plan was produced in response to a UK Supreme Court Ruling and sets out how the UK will achieve compliance with EU Limit Values for nitrogen dioxide (NO_2) in the shortest possible time. The plan outlined infrastructure initiatives and grants and the requirements for Local Authorities to produce local action plans, with the aim of reducing NO_2 concentrations below the objective as soon as practically possible.
Regional Planning Policies	
Mayor of London's Environment Strategy (2018)[18]	The London Environment Strategy was published in May 2018. The strategy aims to set out a joint approach to improve London's environment. In regard to air quality, it states the Mayor will: a) Clean up London's transport system and phase out fossil fuels including diesel, making the whole bus fleet zero emission by 2037 at the latest and introducing the Ultra-Low Emission Zone (ULEZ) by 2019 to deter the most polluting vehicles from entering London b) Consider introducing a new Air Quality Positive standard so new building developments contribute to cleaning London's air c) Use the planning system to help ensure that new schools and other buildings that will be used by people who are particularly vulnerable to pollutants are not located in areas of poor air quality d) Fund the implementation of air quality plans that will help at least 50 schools in some of London's most polluted areas reduce their pupils' exposure to poor air e) Provide more information to Londoners on when air pollution is bad, with guidance on monitors

[15] Ministry of Housing, Communities and Local Government (2019) Planning Practice Guidance: Air Quality, updated 1 November 2019 https://www.gov.uk/guidance/air-quality--3
[16] Department for Environment, Food and Rural Affairs (2019) Clean Air Strategy 2019 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf
[17] Department for Environment, Food and Rural Affairs / Department for Transport (2017) UK plan for tackling roadside nitrogen dioxide concentrations, July 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/633269/air-quality-plan-overview.pdf
[18] Mayor of London (2018) London Environment Strategy, May 2018 https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf

Policy / Guidance	Description
	f) Give people with fireplaces or wood burning stoves better information on which to use so they don't make air pollution worse; and: Set even tighter long-term air quality standards based on the best health evidence to make sure Londoners can breathe the cleanest air and start addressing the problem of indoor air quality
The Mayor of London's Air Quality Strategy (2010)[19]	The Mayor of London's Air Quality Strategy was published in 2010. It includes policies to reduce emissions from transport, such as improvements to the London bus and taxi fleets, widening the application of Low Emission Zones, targeting air quality 'priority locations' and encouraging behavioural change to promote cycling, walking and the use of sustainable public transport. A package of non-transport policy measures is also proposed to reduce emissions to air from industry, commercial buildings and residential dwellings. These are intended to improve localised air pollution through a range of policies including reductions in construction dust and stricter control of emissions from power generation. The London Air Quality Strategy also sets out how regional and local planning processes will be used to enable future developments to be 'air quality neutral or better'.
London Plan (2016)	Policy 7.14 Improving air quality on planning decision: Development proposals should: a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3) 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 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 boiler are identified.
Publication London Plan (2020)[20]	The current 2016 London Plan is still the adopted Development Plan but will be replaced by the Publication London Plan (2020) once formal adoption is ratified by the Secretary of State during the early part of 2021. The Publication London Plan is a material consideration in planning decisions: Policy SI1 Improving air quality A Development Plans, through relevant strategic, site-specific and area-based policies, should seek opportunities to identify and deliver further

[19] Mayor of London (2010) Clearing the air, The Mayor's Air Quality Strategy, December 2010 https://www.london.gov.uk/sites/default/files/air_quality_strategy_v3.pdf

[20] Major of London (2020) The London Plan, Publication London Plan. Spatial Development Strategy for Greater London, December 2020 https://www.london.gov.uk/sites/default/files/the_publication_london_plan_2020_-_clean_version_0.pdf. Accessed February 2021.

Policy / Guidance	Description
	improvements to air quality and should not reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality. B To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed: 1 Development proposals should not: a) lead to further deterioration of existing poor air quality b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits c) create unacceptable risk of high levels of exposure to poor air quality. 2 In order to meet the requirements in Part 1, as a minimum: a) Development proposals must be at least air quality neutral b) Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures c) Major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1 d) development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure. C Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating: a) How proposals have considered ways to maximise benefits to local air quality, and b) What measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this. D In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance. E Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of development on local air quality acceptable, this is done on-site. Where it can be demonstrated that emissions cannot be further reduced by on-site measures, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated within the area affected by the development.
The Mayor of London's Transport Strategy (2018)[21]	The Mayor's Transport Strategy (MTS) compliments London's policy documents by setting out policies and measures for the development of London's transport infrastructure. It aims to promote improvements in air quality, by "*improving public transport and assisted transport services for older and disabled people will help a wider range of people to become less car dependent, and improving streets to increase active travel levels, reduce*

[21] Mayor of London, Mayor's Transport Strategy, March 2018 https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf

Policy / Guidance	Description
	road danger, improve air quality and reconnect communities will be vital in reducing unfair health inequalities". Policy 6: *"The Mayor, through TfL and the boroughs, and working with stakeholders, will take action to reduce emissions – in particular diesel emissions – from vehicles on London's streets, to improve air quality and support London reaching compliance with UK and EU legal limits as soon as possible. Measures may include retrofitting vehicles with equipment to reduce emissions, promoting electrification, road charging, the imposition of parking charges/ levies, responsible procurement, the making of traffic restrictions/ regulations and local actions".* The transport Strategy recognises that air quality in London is the worst in the country and supports the policies included in the Mayor of London's Air Quality Strategy. The Strategy lists a number of proposals aimed at improving air quality, such as introduction of the central London Ultra Low Emission Zone (ULEZ) and improvements to bus and taxi fleets.
London Councils' Air Quality and Planning Guidance (2007)[22]	The document provides guidance to developers and local authorities on how to deal with planning applications that could have an impact on air quality. It aims to reduce exposure to air pollution across the whole of London and ensure consistency in the approach to dealing with air quality and planning in London.
Mayor of London's Supplementary Planning Guidance (SPG) Sustainable Design and Construction (2014)[23]	**Mayor's Priorities:** ▪ Developers are to design their schemes so that they are at least 'air quality neutral'. ▪ Developments should be designed to minimise the generation of air pollution. ▪ Developments should be designed to minimise and mitigate against increased exposure to poor air quality ▪ Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out within the document. ▪ Developers and contractors should follow the guidance set out in the emerging The Control of Dust and Emissions during Construction and Demolition SPG when constructing their development. The document provides guidance on: ▪ Assessment requirements ▪ Construction and demolition ▪ Design and occupation ▪ Air quality neutral policy for buildings and transport, and: Emissions standards for combustion plant
GLA 80371 Air Quality Neutral Planning Support (2014)	The document provides guidance on the application of the "air quality neutral" policy of Mayor of London's SPG, Sustainable Design and Construction (2014).

[22] The London Air Pollution Planning and the Local Environment (APPLE) working group (2007) London Councils Air Quality and Planning Guidance, revised version January 2007 https://www.londoncouncils.gov.uk/our-key-themes/environment/air-quality/london-councils-air-quality-and-planning-guidance

[23] Mayor of London (2014) Sustainable Design and Construction Supplementary Planning Guidance, London plan 2011 Implementation Framework, April 2014 https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Sustainable%20Design%20%26%20Construction%20SPG.pdf

Policy / Guidance	Description
Mayor of London's Supplementary Planning Guidance (SPG) The Control of Dust and Emissions during Construction and Demolition (2014)	The SPG seeks to reduce emissions of dust, PM_{10} and $PM_{2.5}$ from construction and demolition activities in London. It also aims to manage emissions of NOx from construction and demolition machinery by means of a new non-road mobile machinery ultra-low emissions zone (ULEZ). The SPG provides guidance on the implementation of all relevant polices in the London Plan and the Mayor's Air Quality Strategy to neighbourhoods, borough, developers, architects, consultants and any other parties involved in the construction phase; sets out methodology for air quality impact of construction in London; identifies good practice for mitigating and managing air quality impacts for construction phase.
Local Planning Policies	
Camden Local Plan (July 2017)[24]	Camden's Local Plan was adopted in July 2017 and includes an air quality chapter. Within this, Policy CC4 states that: ▪ The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough. ▪ The Council will consider the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan. ▪ Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact. ▪ Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan. 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).
Camden Planning Guidance (CPG) - Air Quality (January 2021)[25]	The CPG document support the policies in the Local Plan 2017. This guidance is therefore consistent with the Local Plan and forms a Supplementary Planning Document (SPD) which is an additional "material consideration" in planning decisions. ▪ All of Camden is a designated Air Quality Management Area due to the high concentrations of nitrogen dioxide (NO_2) and particulate matter (PM_{10}). ▪ All developments in areas of poor air quality are to protect future occupants from exposure to poor air quality. ▪ All developments are to limit their impact on local air quality and be at least air quality neutral.

[24] Camden Local Plan 2017. See: https://www.camden.gov.uk/documents/20142/4820180/Local+Plan.pdf/ce6e992a-91f9-3a60-720c-70290fab78a6. Accessed 3 February 2021

[25] Camden Planning Guidance. Air Quality (January 2021), https://www.camden.gov.uk/documents/20142/4823269/Air+Quality+CPG+Jan+2021.pdf/4d9138c0-6ed0-c1be-ce68-a9ebf61e8477?t=1611580574285.

Policy / Guidance	Description
	Air quality neutral assessments are required for all major developments. Major developments are schemes of 10 or more dwellings or buildings where the floorspace created is 1,000 square metres or more.
LBC Air Quality Assessments in Planning Applications- website guidance[26]	Specific guidance is provided on: ▪ When an air quality assessment is required ▪ What information this document should include ▪ Method of submission ▪ Where you can find further information
LBC Air Quality Annual Status Report 2019[27]	This report provides a detailed overview of air quality in the London Borough of Camden during 2019 and contains local monitoring data as referenced by this report.
LBC Air Quality Action Plan 2019-2022[28]	Camden Council has declared an AQMA for NO_2 and PM_{10} that covers the whole Borough and has developed an Air Quality Action Plan (AQAP). Camden's Clean AQAP outlines the Councils commitment to improving air quality between 2019 and 2022. The key objectives of the plan are to reduce particulate and NO_2 concentrations by: 1. Reducing building emissions 2. Reducing construction emissions 3. Tackling transport emissions 4. Reducing exposure in communities and schools 5. Reducing service vehicle and freight emissions 6. Public Health and awareness raising 7. Lobbying wider organisation The plan contains several air quality 'focus' locations, however, the Proposed Development does not lie within any of these areas.
Mayor of London's Air Quality in Camden: A Guide for Public Health Professionals (2012)[29]	This document provides an overview of the health impacts of air pollution in LBC. It examines the key pollutants of concern in London and the health risks associated with these. It will also examine the concentrations of these pollutants in LBC and the number of deaths in the borough which can be attributed to exposure to air pollution. It also looks at the legal framework which can protect health, along with actions that can, and are, being taken at national, regional, local and individual level to improve air quality and protect individuals. Five specific air quality focus areas are identified, however, the Proposed Development is located within any of these zones.
Other Relevant Policy and Guidance	
Defra Local Air Quality Management (LAQM) Policy Guidance (2016)[30] and Technical Guidance (2018)[31]	The guidance issued under Part IV of the Environment Act 1995 is designed to help local authorities with their LAQM duties. The guidance sets out the general approach to use and detailed technical guidance to guide local authorities through the Review and Assessment process.

[26] London Borough of Camden (2018) Air quality assessments in planning applications., https://www.camden.gov.uk/air-quality-assessment..
[27] London Borough of Camden (2019) Air Quality Annual Status Report for 2019, Date of publication: July 2020
[28] Camden Clean Air Action Plan 2019 to 2022. See: https://www.camden.gov.uk/documents/20142/0/Clean+air+action+plan+2019-2022_final2.pdf/f7cd1a68-e707-0755-528a-59388adf0995.
[29] Air Quality Information for Public Health Professionals – LBC (2021). See: https://www.london.gov.uk/sites/default/files/air_quality_guidance_for_public_health_professionals_-_lb_camden.pdf..
[30] Defra (2016) Local Air Quality Management Policy Guidance (PG16) https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf
[31] Defra (2016) Local Air Quality Management Technical Guidance TG(16) https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

Policy / Guidance	Description
EPUK/IAQM Land Use Planning & Development Control (2017)	This guidance has been produced to ensure that air quality is adequately considered in the land use planning and development control processes by relevant officers within local authorities, developers, and consultants involved in the preparation of development proposals and planning applications. This document is best practice guidance and has no formal or legal status.
Environmental Protection UK (EPUK) / IAQM Assessment of Dust from Demolition and Construction (2016)	The document provides guidance for developers, their consultants and environmental health practitioners on how to undertake a construction impact assessment (including demolition and earthworks). The guidance provides a method for assigning a magnitude of risk (high, medium or low) and identifies appropriate mitigation measures.

3.0

Approach and Methodology

3.0 Approach and Methodology

3.1 Overall Approach

The overall approach of this air quality assessment comprises the following:

- A review of existing conditions within the study area, defined as 2km from the boundary of the Proposed Development
- An assessment of the potential to change in air quality conditions as a result of the construction and operation of the Proposed Development; and
- The formulation of appropriate mitigation measures, where required, to mitigate any adverse impacts on air quality as a result of the construction and/or operation of the Proposed Development.

The scope and methodology of this assessment has been agreed with the environmental health officer at LBC. The email correspondence is included as Appendix B.

3.2 Existing Conditions

Existing ambient air quality conditions relates to relevant pollution that is already present in the environment from various sources such as industrial processes, commercial and domestic activities, road traffic emissions and natural resources.

Existing sources of emissions within the study area (2km) have been defined using several approaches, as follows:

- Industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register[32] and the Environment Agency's Pollution Inventory Data[33].
- Local sources have also been reviewed through examination of the latest LBC Air Quality Annual Status Report
- Information on existing air quality has been obtained by collating the results of monitoring carried out by LBC
- Background concentrations have been defined using the national pollution maps published by Defra[34]. These cover the whole country on a 1x1 km grid.

3.3 Construction Phase

The site currently consists of several existing buildings which will need to be demolished as part of the Proposed Development.

The impact of anticipated construction has been assessed in accordance with London Mayors and IAQM guidance. The construction phase assessment considers the anticipated physical activities occurring on-site that are likely to result in the generation of dust which gives rise to impacts on dust soiling and human-health, especially through the generation of PM_{10} and $PM_{2.5}$.

The assessment involves the identification of whether each phase of on-site activity (demolition, earthworks, construction, and trackout) represents a low, medium, or high risk of causing significant effects, and then identifies suitable mitigation measures for the relevant level of risk assigned. Details of the London Mayors/IAQM construction impact assessment procedure are presented in Appendix C.

Machinery used during construction can generate new sources of emissions, as well as traffic movements to/from the site and the works themselves. When assessing the effect of dust emissions generated during construction works, receptors include those nearest to the construction boundary of the site in each direction. These receptors have the potential to experience effects of greater magnitude due to emissions of dust generated by the works, when compared with more distant receptors.

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[32] Defra (2012) UK Pollutant Release and Transfer Register (PRTR) data sets https://www.gov.uk/guidance/uk-pollutant-release-and-transfer-register-prtr-data-sets

[33] Environment Agency, Pollution Inventory https://data.gov.uk/dataset/cfd94301-a2f2-48a2-9915-e477ca6d8b7e/pollution-inventory

[34] Department for Environment, Food and Rural Affairs (Defra) (2019). Background Mapping data for local authorities, https://uk-air.defra.gov.uk/data/laqm-background-home.

Without appropriate mitigation controls in place, there is the potential for adverse effects to occur during to the construction of the Proposed Development. The implementation of best practice mitigation controls can ensure any potential adverse effects would be not significant.

The impact of anticipated construction activities has been assessed in accordance with IAQM guidance. The construction phase assessment considers the anticipated physical activities occurring on-site that are likely to result in the generation of dust which gives rise to impacts on dust soiling and human health, especially through the generation of PM_{10} and $PM_{2.5}$.

The assessment involves the identification of whether each phase of on-site activity (demolition, earthworks, construction, and trackout) represents a low, medium, or high risk of causing a significant effect and then identifies suitable mitigation measures for the relevant level of risk assigned. Details of the IAQM construction impact assessment procedure are presented in Appendix C.

Best practice mitigation controls have been identified in accordance with IAQM guidance, Guidance on the Assessment of Dust from Demolition and Construction v1.1 (2016)[35] and London Mayor's guidance, The Control of Dust and Emissions during Construction and Demolition supplementary planning guidance (2014)[36].

3.4 Operation Phase

IAQM's guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' (updated in January 2017) was issued to ensure that air quality is adequately considered in the land-use planning and developmental control process. Full details are provided in Appendix D. To determine the need for operational assessment, a screening assessment has been undertaken using the criteria outlined in the IAQM guidance note (Appendix E).

3.4.1 Combustion Plant Impact

Any on-site combustion plant such as boilers and combined heat and power (CHP) has the potential to impact air quality receptors both on and off-site. Emissions from combustion plant would include NO_2 and possibly also PM_{10} and $PM_{2.5}$ if diesel is used as a source.

Typically, any combustion plant where the NO_x emission rate is less than 5 mg per sec (mg/s) is unlikely to give rise to significant effects on air quality, provided that the emissions are released from a vent or a stack in a location and at a height that provides adequate dispersion.

It is anticipated that heating and cooling for the development will be provided by a refrigerant based variable refrigerant flow heat pump system powered by electricity. Additionally, domestic hot water will be provided by an air source heat pump system. A backup diesel sprinkler pump will be installed for use as an emergency energy supply.

Details of the proposed combustion plant are presented in Appendix F.

A screening assessment was undertaken to calculate the worst-case emissions of Process Contributions (PCs) to air in accordance with Defra and Environment Agency (EA)'s Air Emission Risk Assessment methodology[37], and the IAQM guidance IAQM guidance on Land-Use Planning & Development Control: Planning for Air Quality (2017).

3.4.2 Road Traffic Impacts

The Proposed Development has the potential to impact existing air quality as a result of pollutants from road traffic exhaust emissions, such as NO_2, PM_{10} and $PM_{2.5}$, associated with traffic travelling to and from the development during the operation phase.

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[35] IAQM (2016) Guidance on the Assessment of Dust from Demolition and Construction (Version 1.1)https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf

[36] Mayor of London (2014) The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance, London Plan 2011 Implementation Framework, July 2014 https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/london-plan-guidance-and-spgs/control-dust-and

[37] Environment Agency / Department for Environment, Food & Rural Affairs (Defra), Air emissions risk assessment for your environmental permit, https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

The guidance includes a method for screening the requirement for an air quality assessment, the undertaking of an air quality assessment, the determination of the air quality impact associated with a development proposal and whether this impact is significant. Interpretation of this guidance was used to develop a methodology for the assessment of road impact emissions. As the site is located within an AQMA, the EPUK/IAQM guidance states the following criteria to establish where an air quality assessment is likely to be considered necessary:

- A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements; and
- A change of Heavy-Duty Vehicle (HDV) flows of more than 25 AADT movements.

No car parking is included within the development proposals. As the anticipated number of vehicle trips associated with the Proposed Development is unlikely to increase annual average daily traffic flows by greater than 100 vehicles on any road link close to the Proposed Development, assessment of traffic-related impacts was scoped out of the operation phase assessment.

3.4.3 Human Exposure

Potential exposure of future occupants of the site was considered in accordance with the Mayor of London's Supplementary Planning Guidance (SPG), Defra Technical Guidance and IAQM Planning Guidance. This assessment evaluated the exposure that future occupants or visitors might experience associated with existing baseline conditions, considering the following:

- The background and future baseline air quality, and whether this will be likely to approach, or exceed, the threshold values set by the air quality objectives
- The presence and location of air quality focus areas as an indicator of local hotspots where the air quality objective thresholds may be exceeded
- The presence of any heavily trafficked roads, with emissions that could give rise to significantly higher concentrations of pollutants (e.g. NO_2), that would cause unacceptably high exposure for users of the new development; and
- The presence of non-road transport sources that may be significant, such as nearby airports, railway lines with high traffic usage of diesel locomotives[38] or coal-fired steam locomotive railway lines.

The current/baseline conditions were established qualitatively by reviewing relevant air quality information that is readily available from the Local Authority, including Review and Assessment Reports and historic monitoring data. These data were used to understand current/baseline pollutant concentrations at receptors within the study area, and the risk that any changes in air quality may cause exceedance of AQOs at these locations.

The exposure that future residents or users might experience was considered in accordance with IAQM Planning Guidance and Defra technical guidance Local Air Quality Management Technical Guidance (LAQM.TG16).

Detailed dispersion modelling was used to undertake assessment of human exposure at the development site.

3.4.3.1 General

Detailed dispersion modelling of traffic emissions has been carried out using the latest version of ADMS-Roads Extra (version 5.0.0.1), which is an internationally recognised new generation dispersion model developed by CERC. ADMS uses advanced algorithms to describe the boundary layer structure, turbulence and stability.

NO_2 concentrations were estimated from the modelled NO_x concentrations. For roads, Defra's NO_x to NO_2 calculator[39] was used with the 'All London Traffic' mix assumed.

The annual mean background and modelled roads contribution from ADMS-Roads were added together to give total concentrations and enable a comparison to be made with the air quality criteria for annual mean concentrations.

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[38] Defra (2009), Local Air Quality Management Technical Guidance (TG09) - which lists rail lines with a heavy traffic of diesel passenger trains
[39] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc.

3.4.3.2 Background pollutant concentrations

The average of urban background monitored concentrations were used in the NO_2 results processing. Defra's mapped background pollutant concentrations were used in the results processing of PM_{10} and $PM_{2.5}$. Justification of background concentrations used is discussed further in section

The modelling has assumed that there will be no reduction in background NO_2 concentrations with the background value for the base year used in all years of modelling to match that used in the model verification.

Sensitivity calculations have been undertaken assuming:

(a) No reduction in emission factors.
(b) Reduction of emission factors in line with the values presented in the Defra EFT calculations, as described in 3.4.3.5.

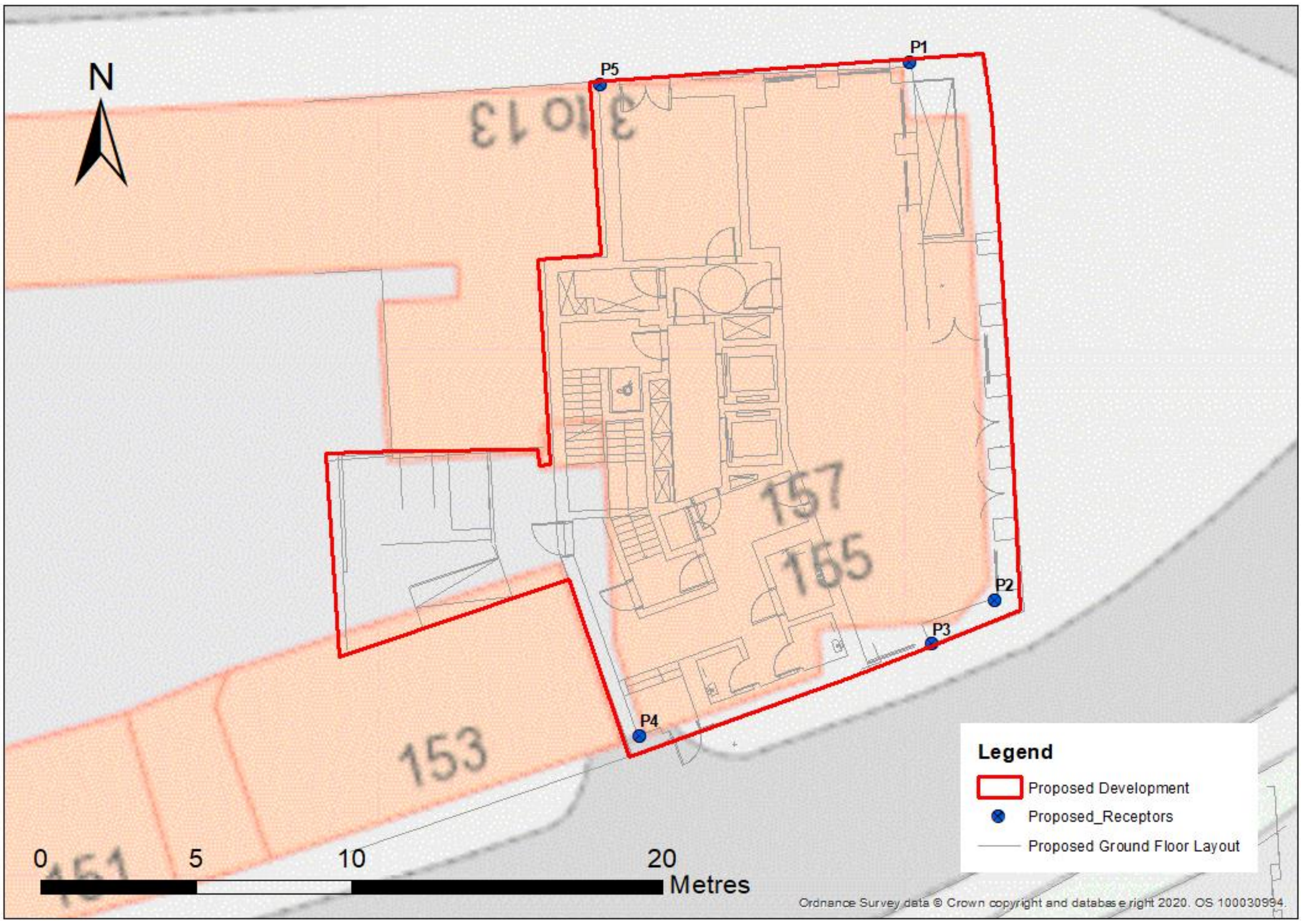
3.4.3.3 Receptors

A number of proposed receptors were included to represent various facades of the Proposed Development at various heights within the development; these are shown in Table *5* and Figure 3.

Table 5 *Modelled Receptors*

Receptor ID	Location		Floors	Heights (m)
	Easting	Northing		
P1	528173.5	184390.9	Ground,1,2,3,4,5,6	1.5, 5.8, 9.0, 12.2, 15.4, 18.6, 21.8
P2	528176.3	184373.6	Ground,1,2,3,4,5,6	1.5, 5.8, 9.0, 12.2, 15.4, 18.6, 21.8
P3	528174.2	184372.2	Ground,1,2,3,4,5,6	1.5, 5.8, 9.0, 12.2, 15.4, 18.6, 21.8
P4	528164.9	184369.3	Ground,1,2,3,4,5,6	1.5, 5.8, 9.0, 12.2, 15.4, 18.6, 21.8
P5	528163.6	184390.2	Ground,1,2,3,4,5,6	1.5, 5.8, 9.0, 12.2, 15.4, 18.6, 21.8

Figure 3: Future Receptors



3.4.3.4 Road Traffic

Local air quality at the Proposed Development is likely to be affected during operation by local traffic flows. For each road link for each scenario, the following data has been included in the model:

- Average Annual Daily Traffic (AADT) flows, including the following splits:
  - – Cars
  - – Taxis
  - – Light Good Vehicles (LGVs)
  - – Heavy Good Vehicles (HGVs)
  - – Buses and Coaches
  - – Motorcycles
- Estimated vehicle speed.

Data for all road links were obtained from the latest 2016 update to the London Atmospheric Emissions Inventory (LAEI)[40]; road widths were obtained from OS Mastermap. Data were factored to the relevant scenario year using data provided by the Transport Consultant (Appendix G)

A summary of the road links used within the model inputs is provided in Appendix H.

[40] Mayor of London, London Atmospheric Emissions (LAEI) 2016 https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016.

3.4.3.5 Vehicle emission rates

Vehicle emission rates for NO_x, PM_{10} and $PM_{2.5}$ were obtained from the latest version of Defra's Emission Factor Toolkit (EFT10.1)[41] , for the 'London' area, with a 'Detailed Option 1' traffic split format. Vehicle emission rates are expected to decrease in the future due to increasingly stringent Euro emission standards, but there is uncertainty as to the rate of improvement for NO_x emissions from diesel vehicles, considering recent measurements of exhaust emissions and ambient air quality.

3.4.3.6 Model verification

Using the guidance provided in Chapter 7 of LAQM.TG (16), the modelled output has been verified against local monitoring data obtained from diffusion tube surveys operated by LBC and also HS2. Full details are provided in Appendix I.

The performance of the dispersion model was assessed by comparing the modelled concentrations with measured concentrations. Meteorological data, monitored concentrations, vehicle emission rates and traffic data for 2019 were all used in the model verification process.

The model adjustment was undertaken using methodology which requires the determination of the ratio between the measured and modelled road contributed NO_x at each comparison site. The ratio between them, referred to as the adjustment factor, is applied to the modelled road contributed NO_x. The modelled NO_2 is then determined using the Defra NO_x/NO_2 calculator[42].

The modelled road contributed NO_x was adjusted by the factor 1.709 and then converted to total NO_2 using the Defra NO_x/NO_2 calculator. The results, in comparison with the measured total NO_2 concentrations, are shown in Appendix I.

The final adjusted total NO_2 concentration predicted at the two diffusion tubes is within ±25% of the measured values and is therefore considered satisfactory.

In accordance with Defra guidance, the road contributed NO_x adjustment factor was also applied to the road contributed PM concentration. The total PM_{10} and $PM_{2.5}$ concentrations are derived by adding the adjusted road contribution value to the Defra background concentrations.

3.4.3.7 Meteorological Data

Hourly sequential data was obtained from London City Airport meteorological station, located approximately 15km to the south-east of the application site, for use in the assessment.

Both the location of the Proposed Development and London City Airport are inland sites, without significant terrain influence. As such, the data from London City Airport are appropriate for the dispersion modelling assessment.

The future setting of the Proposed Development has been considered in the modelling by setting the surface roughness length to 1.5 m. This is the value recommended by the model developers for large urban areas. Furthermore, the minimum Monin-Obukhov Length Scale was set to 30 m (the recommended model setting for cities and large towns).

Data from 2019 has been used in the assessment of road traffic impacts; the wind rose for 2019 is provided in Appendix J and shows a predominant south westerly wind direction. A surface roughness length 0.5m was used for the meteorological station, which is stated within ADMS-Roads as being suitable for 'parkland and open suburbia' areas.

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[41] https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html.
[42] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html.

3.5 Air Quality Neutral

An Air Quality Neutral Assessment was undertaken to determine compliance with the London Plan's policy relating to "Air Quality Neutral Development". The Air Quality Neutral Planning Support document was published in March 2013 and updated in April 2014 to accompany the 2014 publication of the Greater London Authority's (GLA's) Sustainable Design and Construction SPG. It provides specialist consultants with a methodology to undertake an 'Air Quality Neutral' assessment, as well as emission benchmarks for buildings and transport, against which the predicted values for the Proposed Development can be compared.

The guidance relating to Air Quality Neutral follows a tiered approach, such that all developments are expected to comply with minimum standards for emissions associated with land-use. Compliance with "Air Quality Neutral" is then founded on emissions benchmarks that have been derived for both building (energy) use and road transport in different areas of London. Developments that exceed the benchmarks are required to implement on-site or off-site mitigation to offset the excess emissions.

The adopted approach has involved the calculation of emissions from the Proposed Development, and to compare this figure with the calculated building emissions benchmark. As the proposed development does not include any car parking, trip generation is expected to be very low, but has not been fully quantified. A headroom calculation has therefore been undertaken to indicate a maximum figure for the number of daily trips which could be undertaken whilst still meeting the calculated transport benchmark.

4.0

Site Description and Baseline Conditions

4.0 Site Description and Baseline Conditions

To assess the significance of any new development proposal (in terms of air quality), it is necessary to identify and understand the baseline air quality conditions in and around the study area. This provides a reference against which any potential changes in air quality can be assessed. Since air quality is predicted to change in the future (mainly because of changes to vehicle emissions), the baseline situation is extrapolated forward to the opening year. The future baseline scenario is the predicted baseline for the opening year.

To identify the existing air quality conditions, a review of publicly available information has been undertaken, including the latest local authority air quality reports, monitoring data, and background concentration maps. This section presents the results of the review.

4.1 Local Sources of Pollution

Industrial air pollution sources are regulated through operating permits or authorisations, which list stringent emission requirements. Regulated industrial process are classified as either Part A or Part B processes and are regulated through the Pollution Prevention and Control (PPC) system[44] which has been transposed into National legislation[45]. The larger, more polluting, Part A processes are regulated by the Environment Agency for emissions to air, water and land. The smaller, less polluting processes are regulated by the local authority for emission to air.

A review of environmental permit data held by the Environment Agency (EA) was carried out.

A register of Part B processes permitted by LBC was unavailable at the time of preparing this assessment. Given the nature of Part B processes it was concluded that these are unlikely to significantly affect ambient air quality in the vicinity of the Proposed Development.

A review of data held by the Environment Agency did not indicate the presence of any industrial sources within 2 km of the Proposed Development.

Therefore, neither Part A or Part B processes are considered to significantly impact on the Proposed Development in terms of air quality. Any emissions from these installations are assumed to be represented in the Defra background concentrations obtained for this assessment.

The most recent 2019 ASR also confirmed that there were no new industrial or other sources identified.

4.2 Local Air Quality Management

The Environment Act 1995 requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an assessment and provide an Annual Status Report (ASR) of their area every year. If the ASR identifies any potential hotspot areas likely to exceed air quality objectives, a detailed assessment of those areas is required. If objectives are not predicted to be met, the local authority must declare the area as an AQMA. If an AQMA has been declared, the Local Authority will also need to produce an Air Quality Action Plan (AQAP), to includes measures to improve air quality in the AQMA.

The Proposed Development is in Camden, and the baseline assessment includes a brief review and summary of the Council's latest LAQM Annual Status Report (ASR) and AQAP.

The 2019-2022 AQAP concludes that road transport and commercial and domestic gas boilers are the major source of NO_2 air pollution in Camden, and the council has declared a city wide AQMA for exceedances of the annual mean NO_2 objective threshold and 24-hour PM_{10} objective. The AQAP sets out measures to improve air quality in the AQMA, including 5 specific focus areas; it should be noted that the Proposed Development is not located within one of the current focus areas.

[44] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

[45] The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390

4.2.1.1 Local Air Quality Monitoring

A review of existing local air quality conditions in the vicinity of the Proposed Development has been undertaken. Automatic and diffusion tube monitors within 2km of the proposed development have been evaluated as part of this assessment.

4.2.2 Automatic Monitoring

Automatic or continuous monitoring involves drawing air through an analyser continuously to obtain near real-time pollutant concentration data. A review of the most recent ASR from LBC showed that there is 1 automatic monitoring stations within 2km, The location of the automatic monitor is shown in Figure 4 and details about the automatic monitoring sites are provided in Table 6.

Figure 4: Local Automatic Monitoring Sites

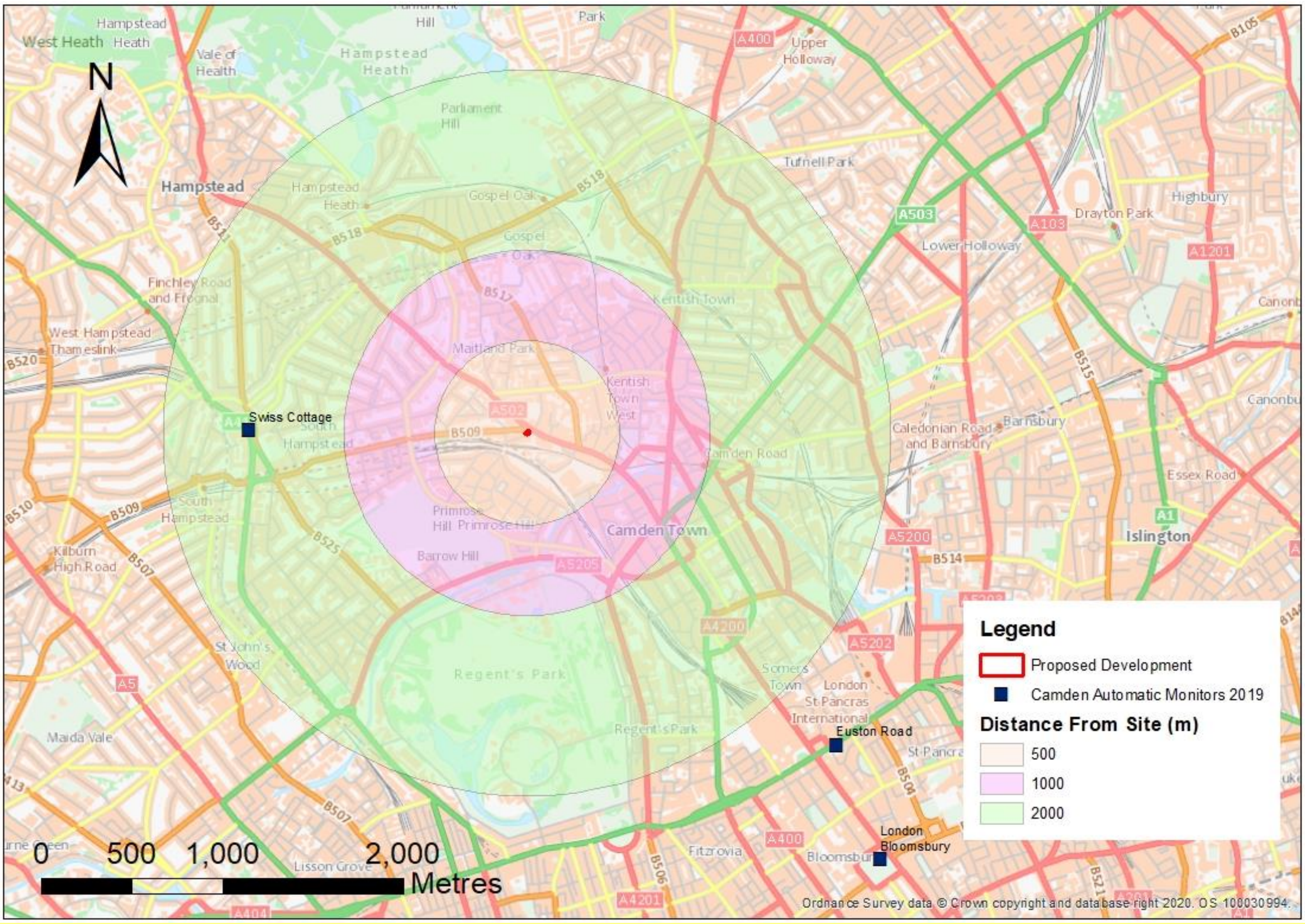


Table 6 Details of Automatic Monitoring Sites within 2km

Site ID	Site Location	OS Grid Reference		Site Type	Distance to kerb of nearest road (m)
		x	y		
CD1	Swiss Cottage	526629	184391	Kerbside	1.5

Recent NO_2 monitoring results from 2015 to 2019 are shown in Table 7, with numbers of hourly exceedances of 200µg/m^3 indicated in brackets. An exceedance is defined as an annual mean greater than 40µg/m^3 for NO_2, or when the daily value exceeds 200µg/m^3 more than 18 days within a calendar year. All exceedances of the objective thresholds are indicated in bold.

Table 7: Results of Local Air Quality Monitoring at Automatic Sites – Nitrogen Dioxide

Site ID	Site Type	Distance from Site	Annual Mean NO_2 Concentration (µg/m³)				
			2015	2016	2017	2018	2019
CD1	Kerbside	1.5 km west	**61** (11)	**66 (37)**	**53** (1)	**54** (2)	**43** (1)

Exceedances of the annual mean air quality objective are indicated in **bold. Underlined** values exceed 60 µg/m³, the value at which exceedances of the short-term objective are likely to occur.

These results show that the NO_2 annual mean air quality objective was exceeded in all years between 2015 and 2019 but concentrations have demonstrated a discernible downward trend since 2016.

The short-term NO_2 objective was met in all years between 2015 and 2019, excluding 2016.

Annual mean concentrations of PM_{10} recorded at this monitoring are shown in Table 8, with number of days exceedance shown in brackets. An exceedance is defined as an annual mean greater than 40µg/m³ for PM_{10}, or when the daily value exceeds 50µg/m³ more than 35 days within a calendar year.

Table 8 Results of Local Air Quality Monitoring at Automatic Sites- PM_{10}

Site ID	Site Type	Distance from Site	Annual Mean PM_{10} Concentration (µg/m³)				
			2015	2016	2017	2018	2019
CD1	Kerbside	1.5 km west	20 (8)	21 (7)	20 (8)	21 (4)	19 (8)

Annual mean concentrations of PM_{10} have met the air quality objective in all years. There have been no daily exceedances since 2015. Trends have remained broadly static since 2015.

Annual mean concentrations of $PM_{2.5}$ recorded at this monitoring are shown in Table 9. An exceedance is defined as an annual mean greater than 25µg/m³ for $PM_{2.5}$.

Table 9 Results of Local Air Quality Monitoring at Automatic Sites- $PM_{2.5}$

Site ID	Site Type	Distance from Site	Annual Mean $PM_{2.5}$ Concentration (µg/m³)				
			2015	2016	2017	2018	2019
CD1	Kerbside	1.5 km west	12	15	16	11	11

Annual mean concentrations of $PM_{2.5}$ have met the air quality objective in all years. Trends have remained broadly static since 2015, with slightly elevated levels observed between 2016 and 2017.

4.2.3 Non-Automatic Monitoring

The latest ASR indicates that LBC has 33 diffusion tubes monitoring NO_2 across the borough, 21 of which are within 2km of the proposed development; all of these are classified as "Kerbside" or "Roadside". The locations of the sites of interest for this assessment are shown in Figure 5. Details of the diffusion tubes and recent monitoring results are presented in Table 9.

Figure 5: Local Diffusion Tube Sites

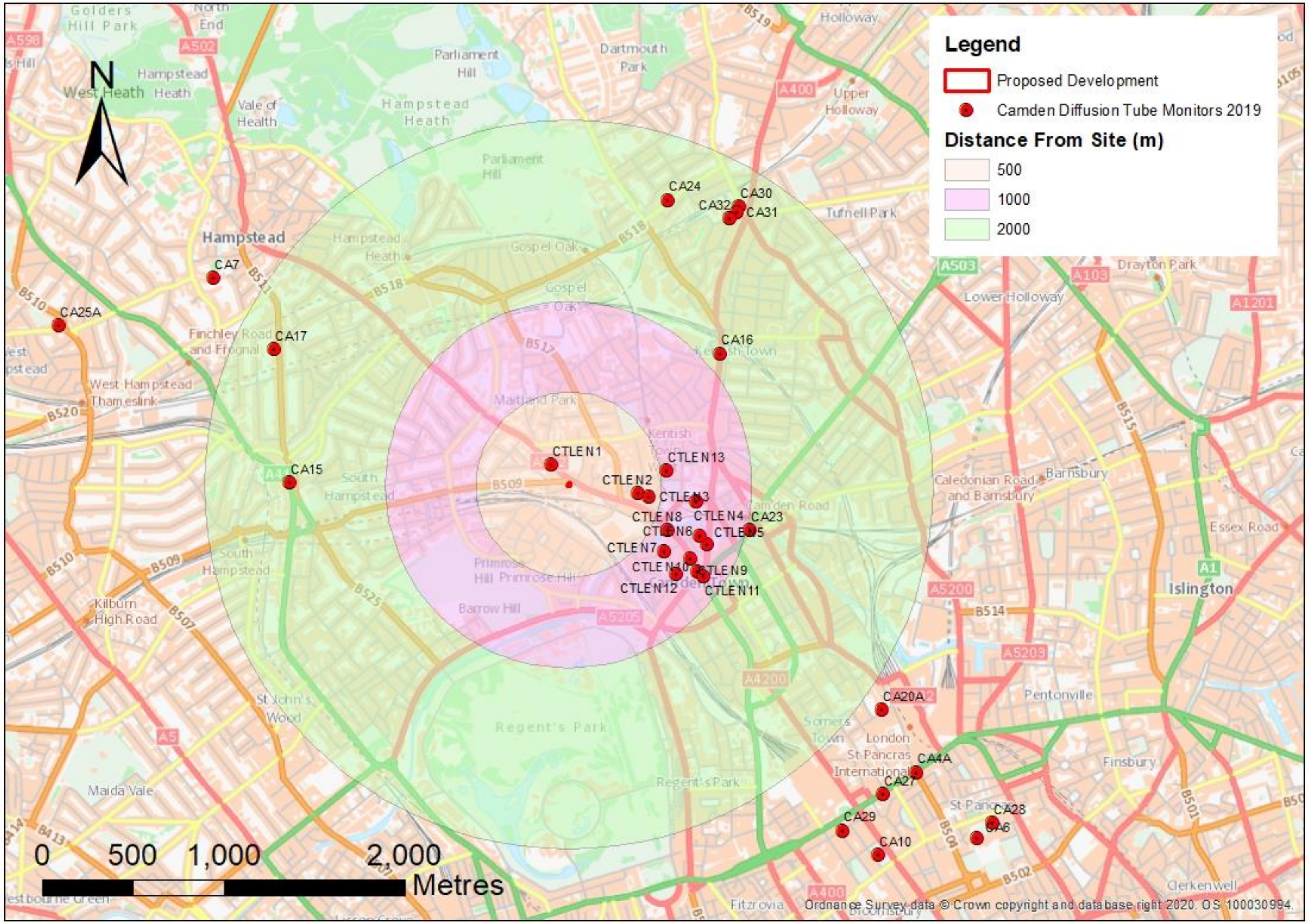


Table 10 Details of Diffusion Tube Monitoring Sites within 2km

Site ID	Site Location	OS Grid Reference		Site type	Distance to kerb of nearest road (m)
		x	y		
CA15	Swiss Cottage	526633	184392	Kerbside	0.5
CA16	Kentish Town Road	529013	185102	Roadside	0.5
CA17	47 Fitzjohn's Road	526547	185125	Roadside	0.5
CA23	Camden Road	529173	184129	Kerbside	<1.0
CA24	Chetwynd Road	528722	185950	Roadside	1.0
CA30	Dartmouth Park Hill	529118	185913	Roadside	0.5
CA31	Acland Burghley School (Burghley Road)	529099	185881	Roadside	7.0
CA32	Oakford Road	529060	185848	Roadside	1.0
CTLEN1	Haverstock School (Haverstock Hill)	528081	184490	Roadside	0.5
CTLEN2	Harmood Street	528558	184331	Roadside	1.0
CTLEN3	Hartland Road	528619	184315	Roadside	1.0
CTLEN4	Hawley Primary School (Hawley Road)	528881	184287	Roadside	6.0
CTLEN5	Kentish Town Road	528935	184053	Roadside	0.5
CTLEN6	Hawley Crescent	528898	184094	Roadside	0.5
CTLEN7	Jamestown Road	528704	184011	Roadside	0.5
CTLEN8	Camden High Street (American Candy) (Bridge)	528722	184127	Roadside	2.0
CTLEN9	Camden High Street (Camden News)	528845	183970	Roadside	2.0
CTLEN10	Camden High Street (American Candy)	528884	183901	Roadside	1.0
CTLEN11	Britannia Junction	528915	183870	Kerbside	0.5
CTLEN12	Cavendish School (Arlington Road)	528770	183887	Roadside	2.0
CTLEN13	Holy Trinity & St. Silas School (Hartland Road)	528715	184456	Roadside	1.5

Table 11 Diffusion Tube Monitoring Results 2015 to 2019

Site ID	Site Type	Distance from Site (m)	Annual Mean NO_2 Concentration (µg/m^3)				
			2015	2016	2017	2018	2019
CA15	Kerbside	1.5 km W	**<u>69.3</u>**	**<u>73.9</u>**	-	-	**49.7**
CA16	Roadside	1.1 km	**<u>63.6</u>**	**58.7**	**<u>68.8</u>**	54.7	**45.0**
CA17	Roadside	1.8 km NW	**55.8**	**56.4**	**<u>66.3</u>**	48.1	**42.5**
CA23	Kerbside	1 km NE	**<u>63.3</u>**	**<u>61.7</u>**	**<u>69.3</u>**	55.6	**52.5**
CA24	Roadside	1.7 km NE	**46.5**	**42.0**	**50.6**	38.7	35.2
CA30	Roadside	1.8 km NE	-	-	-	**42.6**	37.0
CA31	Roadside	1.8 km NE	-	-	-	27.1	27.4
CA32	Roadside	1.7 km NE	-	-	-	30.5	29.2
CTLEN1	Roadside	0.1 km NW	-	-	-	-	32.3
CTLEN2	Roadside	0.4 km NE	-	-	-	-	31.0

Site ID	Site Type	Distance from Site (m)	Annual Mean NO_2 Concentration (µg/m^3)				
			2015	2016	2017	2018	2019
CTLEN3	Roadside	0.4 km NE	-	-	-	-	31.1
CTLEN4	Roadside	0.7 km NE	-	-	-	-	**42.0**
CTLEN5	Roadside	0.8 km SE	-	-	-	-	**44.0**
CTLEN6	Roadside	0.8 km SE	-	-	-	-	38.0
CTLEN7	Roadside	0.6 km SE	-	-	-	-	37.8
CTLEN8	Roadside	0.6 km SE	-	-	-	-	**40.5**
CTLEN9	Roadside	0.8 km SE	-	-	-	-	37.9
CTLEN10	Roadside	0.9 km SE	-	-	-	-	**46.6**
CTLEN11	Kerbside	0.9 km SE	-	-	-	-	**52.7**
CTLEN12	Roadside	0.8 km SE	-	-	-	-	33.2
CTLEN13	Roadside	0.5 km NE	-	-	-	-	27.5

Exceedances of the annual mean air quality objective are indicated in **bold.**
Values greater than 60µg/m^3 are underlined.
- no data available

Of the 21 diffusion tube monitoring locations, 10 of the roadside sites exceeded the NO_2 objective (40µg/m^3) at some point during the period between 2015 and 2019. In 2019, 9 of the roadside sites recorded NO_2 concentrations above the annual mean objective. The maximum recorded concentration in 2019 was 52.7µg/m^3, which was recorded at CTLEN11, which is located next to Britannia Junction.

The annual mean NO_2 concentrations recorded at all of the 21 sites within 2km during 2019 are below 60µg/m^3, exceedances of the short-term objective are therefore considered to be unlikely.

4.2.4 HS2 Monitoring

The High Speed Two project (HS2) is the Government's proposal for a new, high speed, north-south railway. The key area of impacts identified was highway construction traffic, and highway interventions which will cause temporary significant effects for local air quality. These significant effects are confined to a limited number of roads in the Greater London area, including LBC.

To facilitate the management of impacts related to highway traffic changes and interventions, HS2 Ltd. are committed to putting in place a process to manage those impacts through measurement and regular assessments of air quality during the construction of the Proposed Scheme.

HS2 Ltd has published a series of annual reviews of air quality covering the years 2016 to 2019[46]. These annual reports focused on reporting monitoring data for air quality around highways, including a selection of sites in LBC near the Proposed Development.

The latest monitoring undertaken as part of the HS2 project indicates that there are currently 48 diffusion tubes monitoring NO_2 across Camden Borough within 2km of the proposed development; all of these are classified as “Kerbside”, “Roadside” or “Background”. The locations of the sites of interest for this assessment are shown in Figure 6. Details of the diffusion tubes and recent monitoring results are presented in Table 12.

[46] https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2#annual-monitoring-reports

Figure 6: HS2 Diffusion Tube Sites

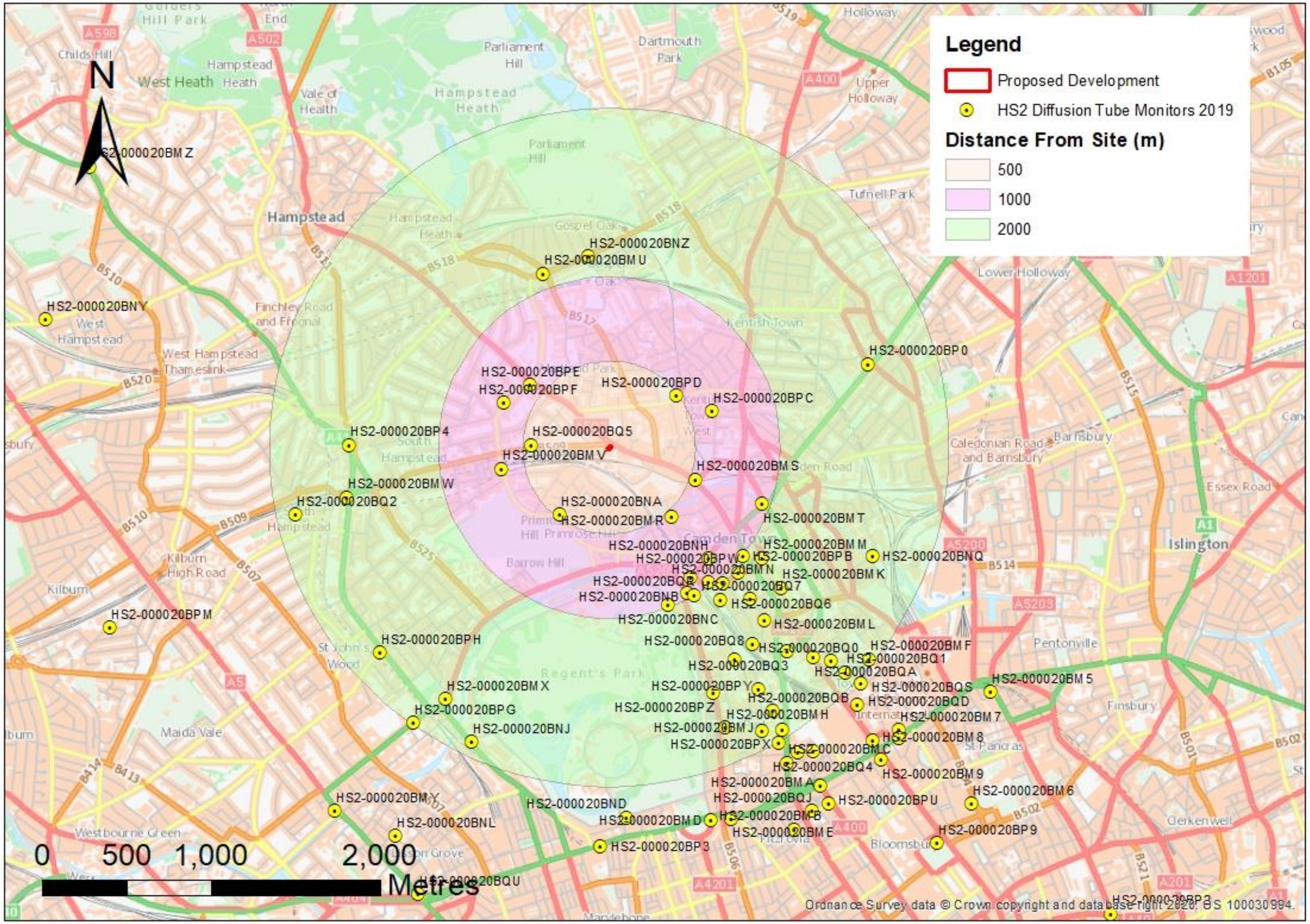


Table 12 Details of HS2 Diffusion Tube Monitoring Sites within 2km

Site ID	Site Location	OS Grid Reference		Site type
		x	y	
HS2-000020BMF	Junction of Polygon Rd and Ossulston St	529715	183123	Background
HS2-000020BMH	Nash St	528861	182717	Background
HS2-000020BMJ	Junction on Robert St and Stanhope St	529080	182698	Background
HS2-000020BMK	Junction of Plender St and Bayham St	529196	183546	Roadside
HS2-000020BML	Junction of Arlington Rd and Mornington Cres	529093	183356	Background
HS2-000020BMM	Junction of Bayham St and Pratt St	529084	183722	Roadside
HS2-000020BMN	Junction of Delancey St and Albert St	528850	183573	Roadside
HS2-000020BMQ	Junction of Delancey St and Albert St	528662	183604	Roadside
HS2-000020BMR	Junction of Oval Rd and Jamestown Rd	528548	183967	Background
HS2-000020BMS	Junction of Chalk Farm Rd and Castlehaven Rd	528685	184188	Roadside
HS2-000020BMT	Junction of Camden Rd and Camden St	529079	184043	Kerbside
HS2-000020BMU	Junction of Southampton Rd and Fleet Rd	527783	185407	Roadside
HS2-000020BMV	Primrose Hill Rd	527538	184250	Roadside
HS2-000020BMW	Junction of Finchley Rd and Hilgrove Rd	526619	184081	Roadside
HS2-000020BMX	Sign post by roundabout on A5205	527206	182887	Roadside
HS2-000020BNA	Junction of Regent's Park Rd and Rothwell St	527884	183980	Roadside
HS2-000020BNB	Jn of Gloucester Gate Bridge and Pk Village E	528639	183518	Roadside
HS2-000020BNC	Junction of Outer Circle and Gloucester Gate	528528	183443	Background
HS2-000020BNH	Junction of Parkway and Albert St	528763	183720	Kerbside
HS2-000020BNJ	Light post on Park Rd	527359	182633	Roadside
HS2-000020BNQ	Camley St	529735	183737	Background
HS2-000020BNZ	Mansfield Rd	528050	185508	Roadside
HS2-000020BP0	Junction of Camden Rd and Torriano Avenue	529708	184871	Roadside
HS2-000020BP4	Triplicate- Swiss Cottage kerbside AMS	526633	184392	Kerbside
HS2-000020BPB	Camden High St	528966	183735	Roadside
HS2-000020BPC	Castlehaven Rd	528788	184591	Background
HS2-000020BPD	Prince of Wales Rd	528571	184683	Roadside
HS2-000020BPE	Haverstock Hill	527710	184749	Roadside
HS2-000020BPF	Jn of Primrose Gardens and England's Lane	527549	184640	Background
HS2-000020BPG	Lamp post on St John’s Wood St	527019	182748	Roadside
HS2-000020BPH	Lamp post St John’s Wood Terrace	526818	183164	Roadside
HS2-000020BPW	Junction of Delancey St and Arlington Rd	528939	183637	Roadside
HS2-000020BPY	Stanhope St	529060	182947	Background
HS2-000020BPZ	Albany St	528790	182923	Roadside
HS2-000020BQ0	Werrington St	529493	183113	Background
HS2-000020BQ1	Polygon Rd	529574	183045	Background
HS2-000020BQ2	Alexandra Place	526320	183980	Background

Site ID	Site Location	OS Grid Reference		Site type
		x	y	
HS2-000020BQ3	Harrington Square	529228	183172	Kerbside
HS2-000020BQ5	Adelaide Rd	527713	184392	Roadside
HS2-000020BQ6	Mornington Terrace	528836	183474	Background
HS2-000020BQ7	Arlington Rd	529009	183479	Background
HS2-000020BQ8	Clarkson Row	529024	183213	Background
HS2-000020BQ9	Park Village East	528923	183121	Background
HS2-000020BQA	Eversholt St	529386	183132	Kerbside
HS2-000020BQB	Junction of Harrington St and Varndell St	529147	182816	Background
HS2-000020BQC	Junction of Robert St and Hampstead Rd	529199	182704	Kerbside
HS2-000020BQL	Delancey St	528768	183581	Roadside
HS2-000020BQR	Lamp post on Park Village East	528682	183505	Background

Table 13 HS2 Diffusion Tube Monitoring Results 2016 to 2019

Site ID	Site Type	Distance from Site (m)	Annual Mean NO_2 Concentration (µg/m^3)			
			2016	2017	2018	2019
HS2-000020BMF	Background	2.0 km SE	**42.4**	35.8	29.7	28.6
HS2-000020BMH	Background	1.8 km SE	**42.5**	39.5	34.8	30.9
HS2-000020BMJ	Background	1.9 km SE	**44.1**	39.1	33.7	29.8
HS2-000020BMK	Roadside	1.3 km SE	**60.5**	**51.4**	**49.6**	**48.2**
HS2-000020BML	Background	1.4 km SE	**44.9**	38.2	34.0	30.1
HS2-000020BMM	Roadside	1.1 km SE	-	**67.3**	**57.4**	**51.3**
HS2-000020BMN	Roadside	1.0 km SE	**45.6**	**41.9**	39.5	36.9
HS2-000020BMQ	Roadside	0.9 km SE	**61.0**	**48.6**	**53.0**	**44.8**
HS2-000020BMR	Background	0.6 km SE	**43.2**	**40.1**	35.7	31.8
HS2-000020BMS	Roadside	0.5 km SE	**61.0**	**50.6**	**54.6**	**46.9**
HS2-000020BMT	Kerbside	1.0 km SE	**88.1**	**62.4**	**48.7**	**44.3**
HS2-000020BMU	Roadside	1.1 km NW	**45.0**	37.3	41.1	37.5
HS2-000020BMV	Roadside	0.6 km W	**43.4**	39.3	38.3	33.7
HS2-000020BMW	Roadside	1.6 km W	-	**55.5**	**52.9**	**47.4**
HS2-000020BMX	Roadside	1.8 km SW	**59.3**	**51.7**	**49.5**	**43.0**
HS2-000020BNA	Roadside	0.5 km SW	-	38.5	36.5	31.4
HS2-000020BNB	Roadside	1.0 km SE	-	**42.4**	**43.5**	33.4
HS2-000020BNC	Background	1.0 km SE	-	28.8	30.2	25.6
HS2-000020BNH	Kerbside	0.9 km SE	-	39.8	38.2	34.5
HS2-000020BNJ	Roadside	1.9 km SW	**66.3**	**54.1**	**55.0**	**47.6**
HS2-000020BNQ	Background	1.7 km SE	-	**41.1**	37.4	29.6
HS2-000020BNZ	Roadside	1.1 km NW	-	37.4	35.8	31.7

Site ID	Site Type	Distance from Site (m)	Annual Mean NO_2 Concentration (µg/m³)			
			2016	2017	2018	2019
HS2-000020BP0	Roadside	1.6 km SE	-	**55.0**	**61.1**	**50.7**
HS2-000020BP4	Kerbside	1.5 km W	**66.6**	**62.1**	**60.6**	**44.2**
HS2-000020BPB	Roadside	1.0 km SE	-	**66.0**	**69.1**	**60.1**
HS2-000020BPC	Background	0.6 km NE	-	36.6	31.5	32.1
HS2-000020BPD	Roadside	0.5 km NE#	-	34.4	33.8	30.0
HS2-000020BPE	Roadside	0.6 km NW	-	**44.3**	**43.0**	42.2
HS2-000020BPF	Background	0.7 km NW	-	37.2	31.9	31.8
HS2-000020BPG	Roadside	2.0 km SW	**49.8**	**43.2**	**43.4**	38.5
HS2-000020BPH	Roadside	1.8 km SW	**49.0**	**45.7**	**42.7**	39.5
HS2-000020BPW	Roadside	1.1 km SE	-	**42.9**	**45.0**	**40.2**
HS2-000020BPY	Background	1.7 km SE	-	32.4	32.2	28.9
HS2-000020BPZ	Roadside	1.6 km SE	-	39.5	**40.4**	38.5
HS2-000020BQ0	Background	1.8 km SE	-	33.9	32.1	29.4
HS2-000020BQ1	Background	1.9 km SE	-	35.0	34.0	31.6
HS2-000020BQ2	Background	1.9 km W	-	31.6	28.7	27.6
HS2-000020BQ3	Kerbside	1.6 km SE	-	**45.5**	**44.6**	**40.6**
HS2-000020BQ5	Roadside	0.4 km W	-	**43.0**	39.9	37.6
HS2-000020BQ6	Background	1.1 km SE	-	35.2	33.2	28.9
HS2-000020BQ7	Background	1.2 km SE	-	34.9	32.1	28.9
HS2-000020BQ8	Background	1.4 km SE	-	35.3	32.6	28.9
HS2-000020BQ9	Background	1.5 km SE	-	32.7	30.8	27.1
HS2-000020BQA	Kerbside	1.7 km SE	-	**53.6**	**49.0**	45.6
HS2-000020BQB	Background	1.8 km SE	-	33.4	35.0	29.0
HS2-000020BQC	Kerbside	2.0 km SE	-	39.7	**41.3**	36.3
HS2-000020BQL	Roadside	1.0 km SE	-	**49.3**	**51.0**	44.8
HS2-000020BQR	Background	1.0 km SE	-	-	34.8	29.3

Exceedances of the annual mean air quality objective are indicated in **bold.**
Values greater than 60µg/m³ are underlined.
- no data available

Of the 48 diffusion tube monitoring locations, 31 of the sites exceeded the NO_2 objective (40µg/m³) at some point during the period between 2016 and 2019. In 2019, 16 of the roadside sites recorded NO_2 concentrations above the annual mean objective. The maximum recorded concentration in 2019 was 60.1µg/m³, which was recorded at HS2-000020BPB, which is located on Camden High Street.

Excluding 000020BPB, the annual mean NO_2 concentrations recorded at all of the other 47 sites within 2km during 2019 are below 60µg/m³, exceedances of the short-term objective are therefore considered to be unlikely at these locations.

4.3 Defra's Background Pollutant Concentration Mapping

Defra publishes background pollutant mapping for every 1km x 1km OS grid square across the UK for NO_x, NO_2, PM_{10} and $PM_{2.5}$. Background pollutant mapping has been reviewed for the grid square in which the proposed development lies and surrounding grid squares. The background concentrations (which are based on 2018 monitoring data) are presented in Table 14.

Table 14 Defra's 2019 background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$

OS Grid Square		2019 Modelled Annual Mean Concentration (µg/m³)							
		Raw Data				Background Subtracted			
X	Y	NO_x	NO_2	PM_{10}	$PM_{2.5}$	NO_x	NO_2	PM_{10}	$PM_{2.5}$
528500	**184500**	46.8	29.3	19.0	12.2	44.6	28.2	19.0	12.2
528500	**185500**	42.4	27.2	18.1	11.8	42.1	27.0	18.1	11.8
529500	**185500**	43.0	27.6	19.2	12.4	40.7	26.3	19.2	12.3
529500	**184500**	49.2	30.5	19.8	12.7	45.4	28.6	19.8	12.7
529500	**183500**	53.7	32.5	19.9	12.7	49.7	30.6	19.9	12.7
528500	**183500**	48.5	30.2	18.7	12.1	45.9	28.8	18.7	12.1
527500	**183500**	44.6	28.3	18.2	11.7	43.0	27.5	18.1	11.7
527500	**184500**	42.9	27.4	18.3	11.8	42.3	27.1	18.3	11.8
527500	**185500**	41.9	26.9	18.0	11.8	41.3	26.7	18.0	11.8
Average		46.4	29.1	18.9	12.2	44.2	28.0	18.9	12.2

Defra background concentrations are below the air quality objectives for annual mean NO_2 and PM_{10} and $PM_{2.5}$.

Table 15 shows the comparison between the measured concentrations at LBC's urban background monitor and the estimated Defra background concentrations for the equivalent OS grid squares in 2019.

This comparison indicates that local monitored backgrounds are more conservative than Defra modelled values, presumably incorporating additional local sources.

Table 15 Comparison between monitored and Defra background concentrations

Monitor	Easting	Northing	Estimated Defra background concentration (µg/m³)	Background subtracted Defra background concentration (µg/m³)	2019 Measured concentration (µg/m³)	Ratio of Background Subtracted Modelled / Monitored Value
B0 London Bloomsbury	530123	182014	39.3	37.2	32	1.16

Subsequently, it was decided to use Defra modelled background concentrations in subsequent calculations. In order to provide a more realistic assessment of local conditions, regional road contributions were discounted from the mapped background concentrations prior to using the dispersion model using Defra's NOx sector removal tool in accordance with Defra recommended procedures. A similar process was used to process background PM_{10} and $PM_{2.5}$ values.

The adjusted background concentrations for 2019 have been applied to all future scenarios used in subsequent modelling undertaken within this assessment.

4.4 London Atmospheric Emissions Inventory

The LAEI is a database of geographically referenced datasets of pollutant emissions and sources in Greater London. The base year is 2016 and the LAEI includes the key pollutants emissions such as NO_x and PM_{10} from line sources (e.g. road transport), area sources (e.g. aviation, domestic and commercial fuel) and point sources (e.g. Part A and Part B processes). The concentration maps across the whole LAEI area, in a resolution of 20 m x 20 m, were produced by the LAEI dispersion modelling.

- The 2016 annual mean NO_2 concentration map shows that modelled concentrations at the proposed site are expected to range between 43 µg/m^3 and 55 µg/m^3, as shown in Figure 7.
- The 2016 annual mean PM_{10} concentration map shows that modelled concentrations at the proposed site are expected to range between 22 µg/m^3 and 28 µg/m^3, as shown in Figure 8.
- The 2016 annual mean $PM_{2.5}$ concentration map shows that modelled concentrations at the proposed site are expected to range between 13 µg/m^3 and 17 µg/m^3, as shown in Figure 9.

The concentration maps from LAEI show that there are likely exceedances of the annual mean NO_2 objective in 2016, but unlikely exceedances of the annual mean PM_{10} and $PM_{2.5}$ objective limit values in 2016 at the proposed site.

Figure 7 LAEI NO_2 concentration map for 2016 projection

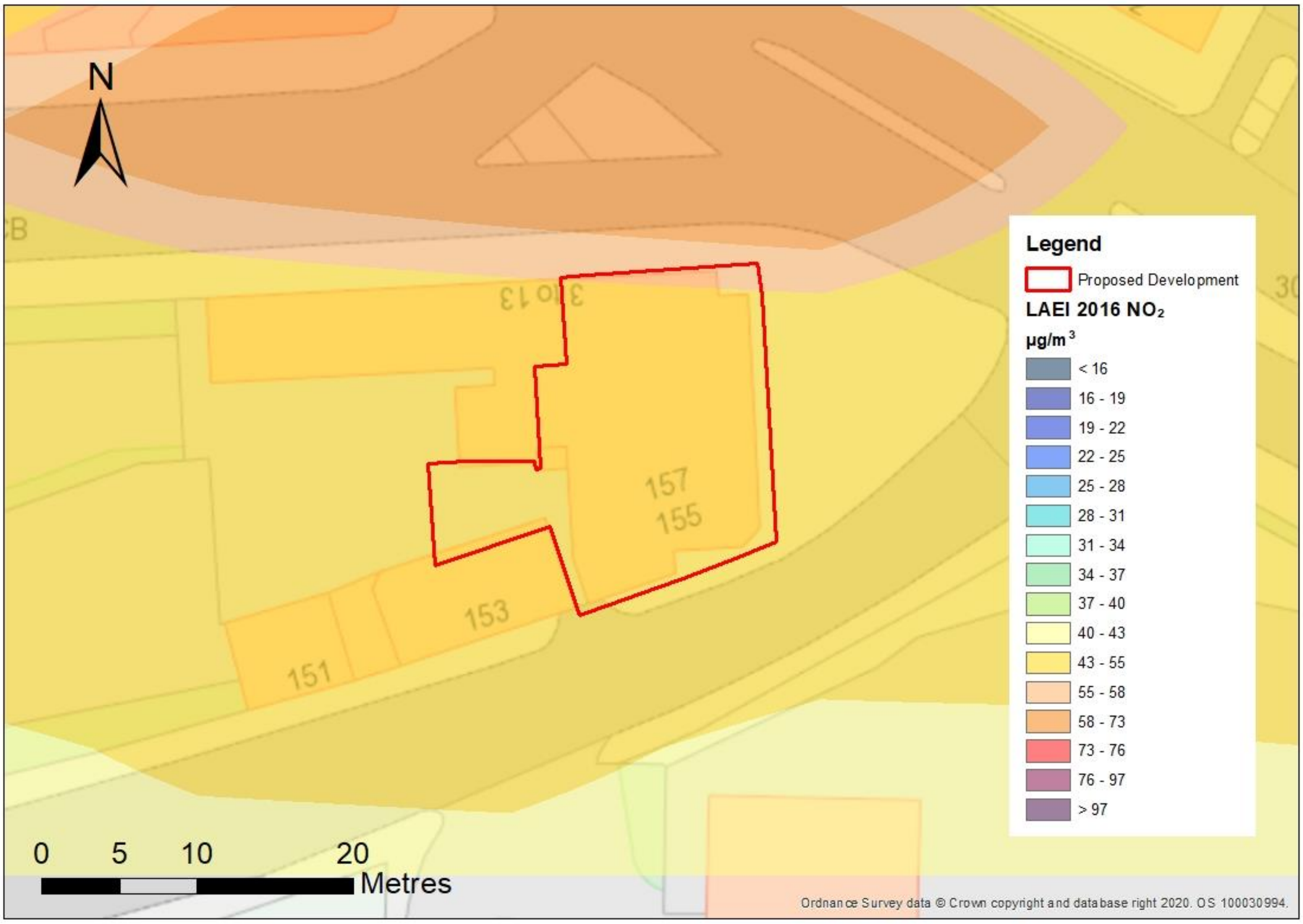


Figure 8 LAEI PM_{10} concentration map for 2016 projection

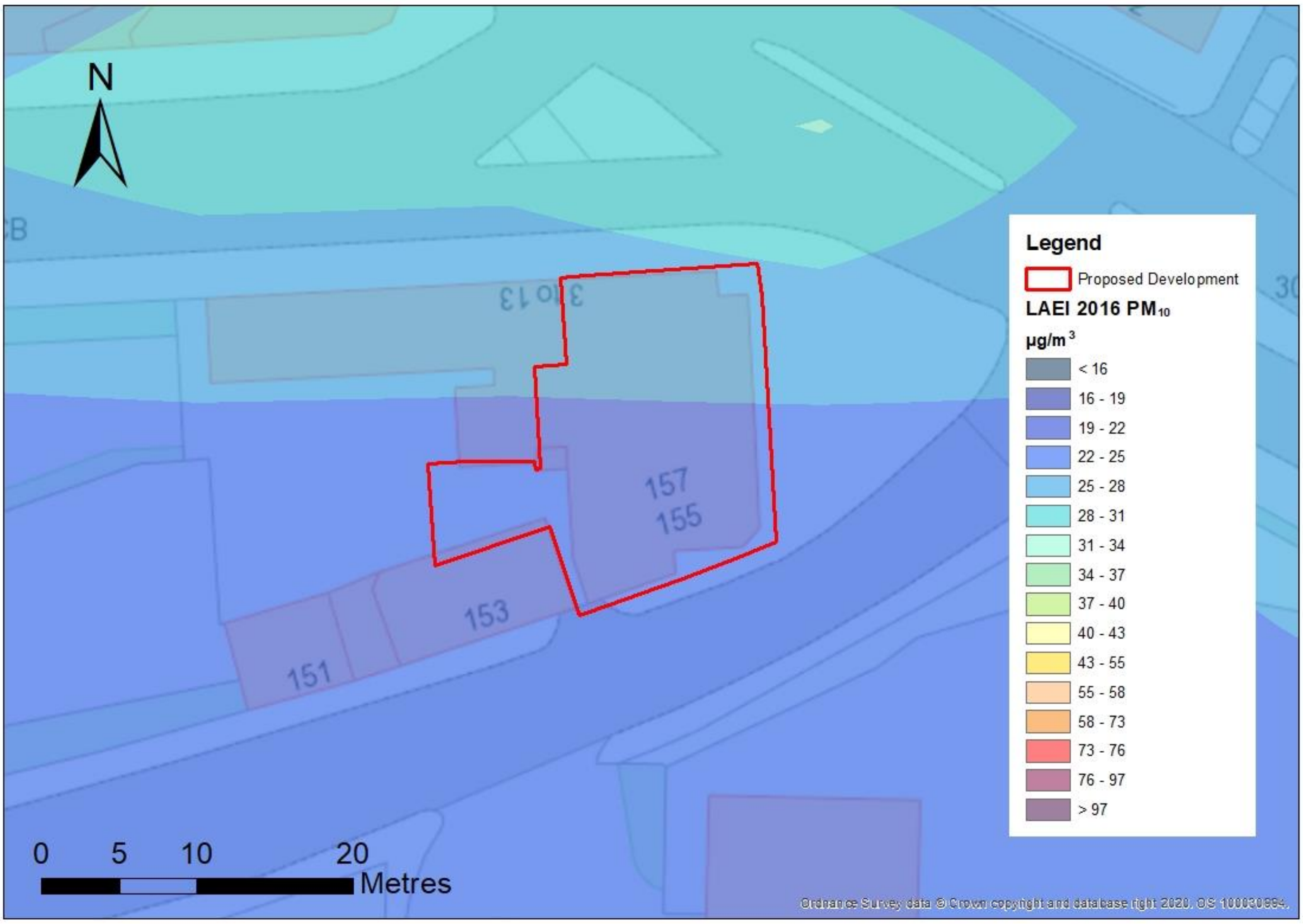
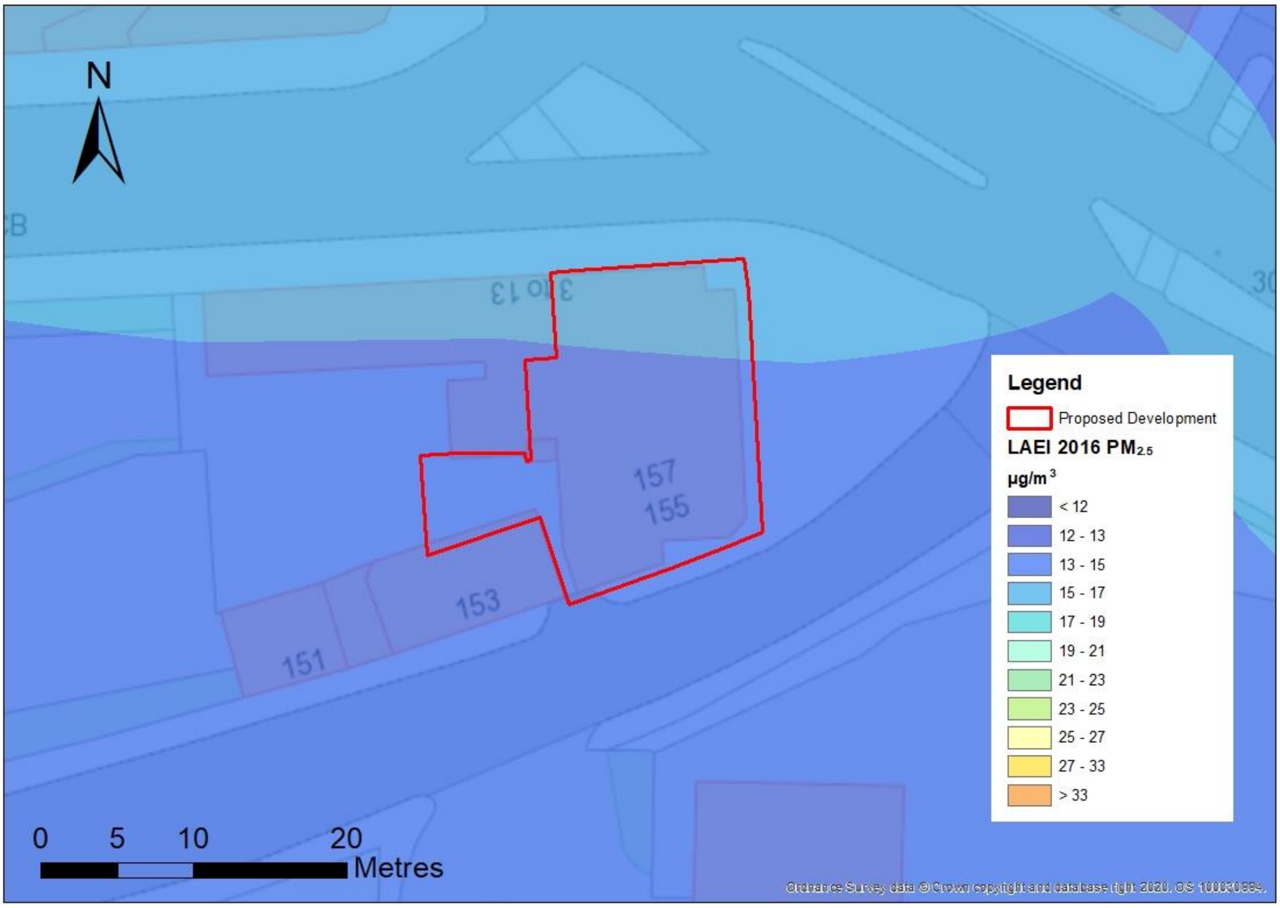


Figure 9 LAEI $PM_{2.5}$ concentration map for 2016 projection



4.5 Local Traffic Flows

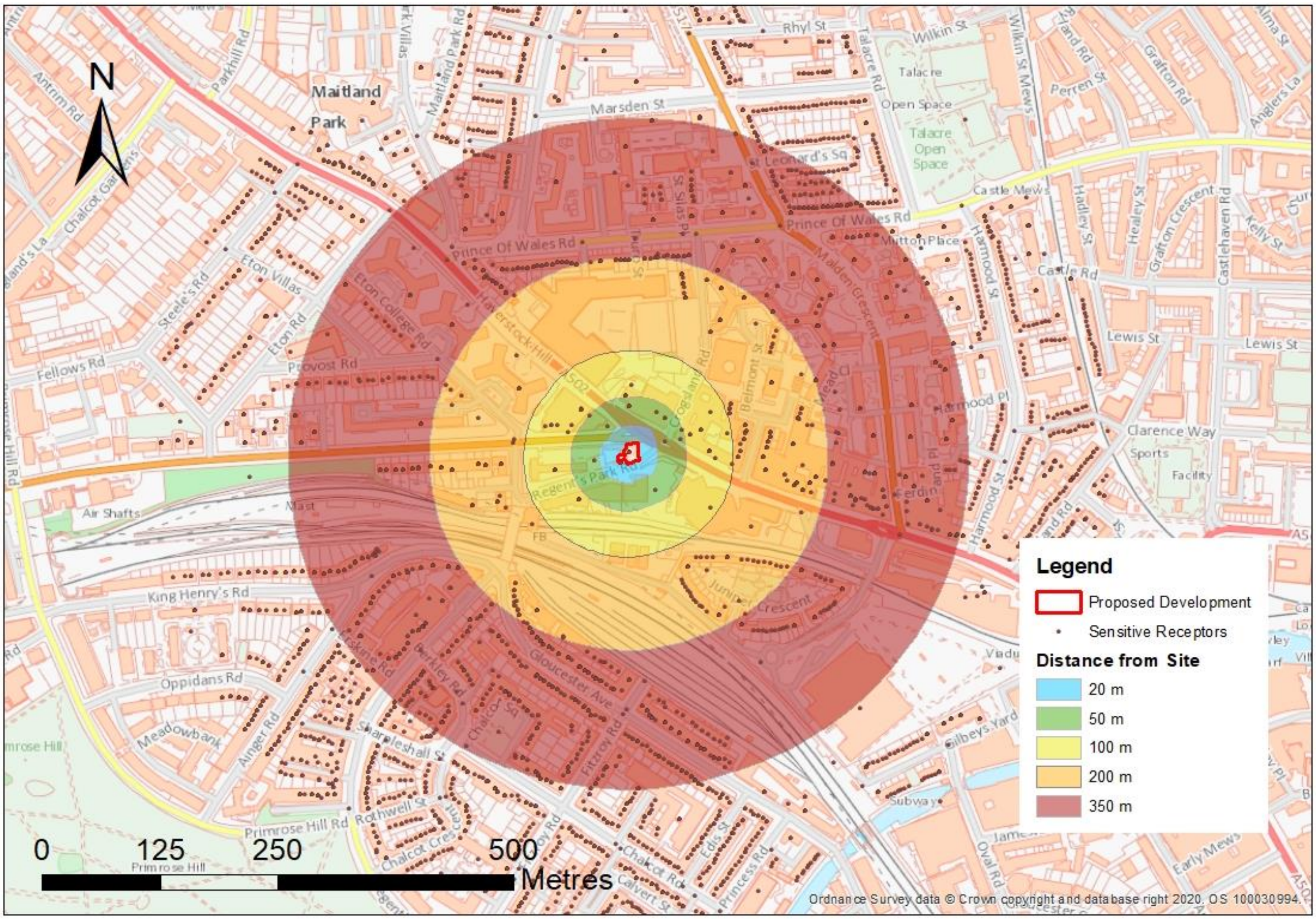
Baseline Traffic flows were obtained from the LAEI (updated 2016).

4.6 Sensitive Residential Receptors

Sensitive residential receptors near the development were identified with reference to AddressBase Plus data provided by Ordnance Survey.

Sensitive residential receptors are located within 20 m of the red line boundary and within 20 m of the carriageway on the main approach routes to the site. Sensitive receptors within 500m are illustrated in Figure *10* and include receptors within 20 m of the red line boundary and within 20 m of the carriageway on the main approach routes to the site.

Figure 10 *Sensitive Receptor Locations*



5.0

Impact Evaluation

5.0 Impact Evaluation

5.1 Construction Phase Impacts

5.1.1 Need for a Detailed Assessment

An assessment was undertaken as there are 'human receptors' within 350 m of the boundary of the site; and 50 m of the route used by construction vehicles on the public highway, up to 500 m from the site entrance.

5.1.2 Risk of Dust Impacts Assessment

Dust Emission Magnitude Analysis

The dust emission magnitude is based on the scale of the anticipated work and classified as Table 16 below:

Table 16 Determination of the potential dust emission magnitude

Stage	Relevant Definition	Highest Potential Dust Emission Magnitude
Demolition	1. Existing building volume <20,000 m^3 2. Potentially dusty construction material includes bricks, mortar, concrete	Medium
Earthworks	3. Estimated site area is <2,500 m^2 4. Soil has likely loamy/clay content (potentially dusty when dry) 5. Formation of stockpile enclosures <4 m in height 6. 5-10 heavy earth moving vehicles active at any one-time	Medium
Construction	7. Estimated total building volume is less than 25,000 m^3 8. Construction materials involve bricks, mortar, concrete	Medium
Track out	9. 10 – 50 HDV (>3.5 tonnes) outward movements in any one day 10. Potentially dusty surface material (e.g. clay content) 11. Unpaved road length <50m	Medium

The highest dust emission magnitude is likely to be Medium.

Sensitivity of Areas Analysis

The sensitivity of the receptors and area has been defined for both dust soiling and human-health impact as shown in Table 17.

Table 17 Determination of the sensitivity of the surrounding area

Receptor Sensitivity	Relevant Definition	Sensitivity of the Receptors	Relevant Definition	Sensitivity of the Area
Dust Soiling for Demolition, Earthworks, Construction	Dwellings	High	10 – 100 receptors within 20 m of site	High
Dust Soiling for Trackout	Dwellings	High	>100 receptors within 20 m of route used by construction traffic	High
Human-Health Effects of PM_{10}	Dwellings	High	<24 µg/m^3 annual mean PM_{10} background concentration for 2017 >100 receptors within 20 m of site	Medium

For the purposes of this assessment, ecological receptors are defined in accordance with the IAQM Guidance document and include RAMSAR sites, Special areas of conservation (SACs), potential SACs, candidate SACs, Special Protection Areas (SPAs), potential SPAs, Sites of Special Scientific Interest (SSSIs).

There are no ecological sensitive receptors within 50 m of the boundary of the site; and within 50 m of the route used by construction vehicles on the public highway, up to 500 m from the site entrance. Therefore, no further consideration of dust impact on ecological receptors has been undertaken.

5.1.3 Risk of Impact

The risk of dust impact to both dust soiling and human-health effects for each construction activities are summarised in Table 18.

Table 18 Risk of Impacts

Potential Impact (Sensitivity of the Area)	Dust Risk (Dust Emission Category)				
	Demolition (Medium)	Earthworks (Medium)	Construction (Medium)	Trackout (Medium)	Overall Risk
Dust Soiling (High)	Medium	Medium	Medium	Medium	Medium
Human-health (Medium)	Medium	Medium	Medium	Low	Medium
Overall Risk	**Medium**	**Medium**	**Medium**	**Medium**	**Medium**

The dust impact assessment has demonstrated that the risk of dust soiling without any mitigation is Medium for demolition, earthworks, construction and trackout.

The risk of adverse human-health effects of PM_{10} without any mitigation is Low for demolition, earthworks, construction and trackout.

The overall risk of impacts is Medium**.**

5.2 Operation Phase

5.2.1 Emissions from Backup Diesel Sprinkler Pump

Calculation of potential NO_x emissions from the emergency backup diesel sprinkler pump are provided in Appendix K and assume that the plant will operate for a maximum of 30 minutes per week per year.

Under these conditions, the typical NO_x emission rate was calculated to be 296 mg/sec, which is higher than the IAQM screening criteria for likely significant effect on air quality. As such, a screening assessment was undertaken to calculate the maximum Process Contribution to air using EA's air emission risk assessment methodology.

Using the Environment Agency's dispersion factor, the maximum Process Contribution to air is estimated to be 0.1 µg/m^3 for the annual mean NO_x concentration. For short term mean concentrations, the maximum Process Contribution to air is estimated to be 1.7 µg/m^3. As such, concentrations from the emergency backup diesel sprinkler pump were likely below the 1% threshold criteria for annual mean objective and 10% for short term mean objective. Therefore, it was concluded that no significant impacts were likely to arise from the operation of the backup diesel sprinkler pump.

5.2.2 Human Exposure

Air quality conditions for future occupiers and visitors of the Proposed Development are presented in Appendix L, see proposed receptors P1 to P5.

Results are presented for 3 different scenarios:

a) 2019 Background with 2019 traffic flows and 2019 emission factors (intermediate case)

b) 2019 Background with traffic flows factored to 2023 and 2019 emission factors (worst case)
c) 2019 Background with traffic flows factored to 2023 and 2023 emission factors (best case)

The annual mean NO_2, PM_{10} and $PM_{2.5}$ objectives are predicted to meet the air quality objective threshold values in the opening year. Since all modelled NO_2 values are below 60 µg/m^3, it is concluded that there will be no exceedances of the NO_2 1-hour mean objective.

5.3 Air Quality Neutral Assessment

5.3.1 Building Emissions

An estimate of the Total Building Emission Benchmark has been calculated and is presented in Table 19 and Table 20. These data are based upon the most recent area information provided by Piercy and Company, the scheme architects, on 03/02/2021.

Table 19 Building Emissions Benchmark – NO_2

Land Use	Gross Internal Area (GIA) (m^2)	Pollutant	Emissions Benchmark (g/m^2/annum)	Benchmarked Emissions (kg/annum)
C1 Hotel	1807	NO_2	70.9	128.1

Table 20 Building Emissions Benchmark – PM_{10}

Land Use	Gross Internal Area (GIA) (m^2)	Pollutant	Emissions Benchmark (g/m^2/annum)	Benchmarked Emissions (kg/annum)
C1 Hotel	1807	PM_{10}	4.1	7.4

The Total Building Emissions is estimated based on the emergency backup diesel sprinkler pump's specification, as presented in Appendices F and K. Table 21 presents the calculation of the Total Building Emissions for the development.

Table 21 Development Total Building Emission

	Unit	NO_x emission rate (mg/s)	Operation Hours (hours/annum)	Operation Hours (sec/annum)	NO_x emission (kg/annum)
Backup sprinkler pump	1	296	26	93600	27.7

The Total Building Emission of 27.7 kg/annum is less than the Total Building Emissions Benchmark (BEB) of 128.1 kg/annum for this development and therefore meets Air Quality Neutral requirements.

5.3.2 Transport Emissions

5.3.2.1 Introduction

The Proposed Development is a "car-free" development, due to the absence of any car parking provision. However, the air quality neutral assessment included taxi movements and service deliveries associated with the development as per advice provided by LBC (Appendices A and B). The proposed trips associated with the development are shown in Table 22.

Table 22 Development Trip Summary

Trip Details	Taxi access to hotel	Service Vehicles
Daily	8	12
Annual	2920	4380
Total trips per annum	**7,300**	

5.3.2.2 Benchmark Trip Rate

Benchmark trip rates provided in the GLA 80371 guidance based on values in the Trip Rate Assessment Valid for London (TRAVL) database. TRAVL benchmark trip rates for land uses C1, A1 and C3 are presented in Table 23.

These data are based upon the most recent area information provided by Piercy and Company, the scheme architects, on 03/02/2021.

Table 23 TRAVL Average Number of Trips per Annum for C1 Hotel

Classification	No. of Trips (trips / m^2 / annum)	Floor Area (m^2)	Total trip per annum
C1 Hotel	5	1,807	9,230

The development lies within LBC, which is classified as Inner London. The appropriate trip benchmark for the development is therefore 5 trips per m^2 per annum, where m^2 is Gross Internal Area (GIA) for hotel land use. The number of trips generated by the development is less than the TRAVL benchmark for C1 Hotels. Additionally, any taxi or service trips made by electric vehicles would further reduce the contribution from the Proposed Development. It is therefore concluded that the development is "air quality neutral" with respect to transport emissions.

6.0

Assumptions and Limitations

6.0 Assumptions and Limitations

6.1 Dispersion Modelling- General

No terrain data have been included within the model. Based on the topography of the site, this is not considered necessary.

6.2 Model Verification

The local air quality impacts were assessed based on the results from atmospheric dispersion modelling. A series of assumptions have been made in relation to the dispersion modelling used to predict impacts from the Proposed Development. These have been outlined in the impact assessment methodology outlined in Section 3.0.

The uncertainty in the predictions for the current baseline was reduced by carrying out model verification and adjustment of results to align with measured concentrations. This process is summarised in Appendix I.

6.3 Future Year Emission Factors

A greater level of uncertainty is associated with predictions for future years than for the base year, with greater uncertainty the further into the future the predictions are made. Sensitivity testing has therefore been undertaken with modelling using both the base year and future year EFT v10.1 factors produced by Defra.

Results are presented for 3 different scenarios in Appendix L:

d) 2019 Background with 2019 traffic flows and 2019 emission factors (intermediate case)
e) 2019 Background with traffic flows factored to 2023 and 2019 emission factors (worst case)
f) 2019 Background with traffic flows factored to 2023 and 2023 emission factors (best case)

Interpretation of results was made using worst-case data.

7.0

Mitigation

7.0 Mitigation

7.1 Construction

The primary aim of the dust risk assessment is to identify the appropriate site-specific mitigation measures that will be adopted to ensure there will be no significant effect on local amenity and public health.

Full details of mitigation measures are presented in Appendix M. Monitoring and Non-Road Mobile Machinery (NRMM) Protocols are presented in Appendix N and Appendix O.

The Client will commit to the implementation of the best practice mitigation measures identified above during the construction phase of the development. It is anticipated that the generation of dust and harmful pollutants emissions from construction site activities will be reduced with the correct implementation of these measures.

Additionally, a Construction Management Plan (CMP) which conforms to the requirements of LBC's planning requirements will be submitted in support of the Planning Application.

7.2 Operation Phase

Ventilation to the building will be based on a minimum fresh air system using MVHR.

MVHR will be provided for all units, with a central Air Handling Unit (AHU) being located at roof level. Fresh air intake and exhaust outlet ductwork will be separated to prevent short circuiting and contamination of the fresh air. Supply and extract ductwork will then distribute vertically through the building to serve the hotel rooms. Since NO_2 concentrations surrounding the development meet both the national air quality objectives and threshold values published by the World Health Organisation (WHO), there will be no requirement for NOx filtration within the MVHR system.

Whereas $PM_{10/2.5}$ filtration is unlikely to be required for planning (as it considers exceedances of national air quality objectives) it is recommended to be considered for good practice design (as Building Regulations often consider WHO guidelines which are usually more stringent), see Table 24 below.

Modelled PM_{10} and $PM_{2.5}$ values exceed the recommended WHO guidelines and it is therefore recommended that where practicable, ISO PM_{10}/$PM_{2.5}$ filtration is incorporated into the MVHR system.

Table 24 Comparison of WHO Guidelines with National Air Quality Objectives

Pollutant	Averaging Period	Air Quality Objective (AQO) (µg/m³)	WHO Guidelines (µg/m³)
NO_2	Annual mean	40	40
PM_{10}	Annual mean	40	20
$PM_{2.5}$	Annual mean	25	10

Using MVHR with particulate filtration to provide an adequate supply of clean air, it is anticipated that the exposure of future occupants to poor air quality will be unlikely and no additional mitigation measures will be required.

It is anticipated that the impact of the operation phase on nearby receptors is likely to be negligible, and therefore no further mitigation measures are required.

7.3 Air Quality Neutral

It has been demonstrated that the development's NO_x building emissions meet the Air Quality Neutral benchmark by 100.4kg NO_2 kg/annum, based on an assumed operation period of 30 minutes per week for the whole year.

Additionally, the number of trips generated by the development is less than the TRAVL benchmark for C1 Hotel Land Use

As such, the development is therefore considered to be compliant with the Air Quality Neutral building emissions and transport benchmarks, and no further mitigation measures or additional abatement will be required.

8.0

Discussion and Conclusions

8.0 Discussion and Conclusion

8.1 Discussion

The assessment findings were reviewed against London Plan policy and London Mayor's SPG. A summary of the consideration and comments is presented in Table 25.

Table 25 London Planning Consideration

Consideration	Y/N	Comment
London Plan		
Policy 3.2, 5.3, 7.14 Has the development been designed to minimise and mitigate against increased exposure to poor air quality?	Y	MVHR is incorporated into the development design to prevent exposure of future occupants to poor air quality.
Publication London Plan (2020) policy		
Policy SI1 The aim of this policy is to ensure that new developments are designed and built, as far as is possible, to improve local air quality and reduce the extent to which the public are exposed to poor air quality. This means that new developments, as a minimum, must not cause new exceedances of legal air quality standards, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits. Where limit values are already met or are predicted to be met at the time of completion, new developments must endeavour to maintain the best ambient air quality compatible with sustainable development principles. Has the development been designed to minimise and mitigate against increased exposure to poor air quality?	Y	The development is unlikely to cause new exceedances of air quality standards. MVHR is incorporated into the development design to prevent exposure of future occupants to poor air quality.
SPG Air Quality		
Has the development maximised the contribution the building's design, layout and orientation make to avoiding the increased exposure to poor air quality?	Y	MVHR is incorporated into the development design to prevent exposure of future occupants to poor air quality.
Have air intakes located away from the main source of air pollution?	Y	Air intakes will be located at roof level away from the main source of air pollution.
Has European standard EN 13779 been adhered to, to ensure that air filters are fitted and regularly maintained?	Y	The MVHR system will be regularly maintained in accordance with manufacturer's recommendations.
Has outside space, including gardens, balconies and roof terraces, been screened where practical, and exposure minimised through appropriate positioning and design?	N/A	Not applicable. Members of the public do not have regular access to the roof terraces.
Has the location of equipment resulted in flues and exhaust vents being near recreational areas?	N	No recreation areas are located in the vicinity of the development site.

8.2 Conclusions

With the implementation of the appropriate recommended mitigation measures, it is anticipated that the construction phase impacts of the Proposed Development will not be significant.

Mechanical ventilation will be incorporated to ensure an adequate supply of clean air. Incorporation of particulate filtration should be implemented wherever practicable. It is anticipated that the exposure of future occupants to poor air quality will be unlikely and no additional mitigation measures will be required.
It has been demonstrated that the development's NO_x building emissions will meet the Air Quality Neutral benchmarks.

Therefore, it is concluded that there are no air quality constraints to the construction and operation of the Proposed Development.

9.0 References

9.0 References

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10.0

Glossary

10.0 Glossary

Term/Acronym	Details
COPERT	Computer Programme to calculate Emissions from Road Transport
μg/m^3	Micrograms (one-millionth of a gram) per cubic metre of air
AADT	Annual average daily traffic
AHU	Air Handling Unit
AQA	Air Quality Assessment
AQAL	Air Quality Assessment Level
AQAP	Air quality action plan
AQMA	Air quality management area. Areas where the air quality objectives are likely to be exceeded. Declared by way of an order issued under the Section 83(1) of the Environment Act 1995.
AQO	Air quality objective. Air quality targets to be achieved locally as set out in the Air Quality Regulations 2000 and subsequent Regulations. Objectives are expressed as pollution concentrations over certain exposure periods, which should be achieved by a specific target date. Some objectives are based on long term exposure (e.g. annual averages), with some based on short term objectives. Objectives only apply where a member of the public may be exposed to pollution over the relevant averaging time.
AQS	Air quality strategy
ASR	Annual status report
COV	Coefficient of Variation
CPG	Camden Planning Guidance
Defra	Department for Environment, Food and Rural Affairs
EA	Environment agency
Earthworks	The process of soil stripping, ground-levelling, excavation and landscaping.
EfT	Emission Factor Toolkit
ELV	Electric Vehicle
EPUK	Environmental Protection UK
EU	European union
Exceedance	Concentrations of a specified air pollutant greater than the appropriate Air Quality Objective.
GEA	Gross External Area
GIA	Gross Internal Area
GLA	Greater London Authority
HDV	Heavy duty vehicle
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LA	Local authority
LAEI	London Atmospheric Emission Inventory
LAQM	Local air quality management
LAQM, TG	Local air quality management technical guidance
LBC	London Borough of Camden
LDV	Light duty vehicle
LGV	Light Goods Vehicle
Limit Values / EU limit values	The maximum pollutant levels set out in the EU Daughter Directives on Air Quality. In some cases, the limit values are the same as the national air quality objective but may allow a longer period for achieving.
LLAQM	London Local Air Quality Planning Guidance
LT	Long-term averaging period (i.e. Annual mean)

Term/Acronym	Details
MVHR	Mechanical Ventilation with Heat Recovery
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPPF	National planning policy framework
NRMM	Non-Road Mobile Machinery
PC	Process Contribution
PM_{10}	The fraction of particulates in air of very small size (less than 10 micrometres).
$PM_{2.5}$	Fine particles in the (ambient) air 2.5 micrometres or less in size.
Ramsar/ Ramsar site	The Convention on Wetlands of International Importance, called the Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. Ramsar sites are wetlands of international importance, designated under the Ramsar Convention.
SAC/ pSAC/ cSAC	Special area of conservation / potential SAC / candidate SAC
SPA / pSPA	Special protection area / potential special protection area
SPD	Supplementary Planning Document
SPG	Supplementary Planning Guidance
SSSI	Site of special scientific interest
TA	Transport Assessment
TC	Transport Consultant
TEMPRO	Trip End Model Presentation Program
TP	Travel Plan
Trackout	The transfer of dust or dirt on the local road network and then re-suspended by vehicles on the network.
TRAVL	Trip Rate Assessment Valid for London
TRICS	Trip Rate Information Computer System
TS	Transport Statement
ULEZ	Ultra-Low Emission Zone

Appendices

Appendix A Summary of Air Quality Assessment Scoping Advice

Table A1 Air Quality Assessment Scoping Advice

Ref	Topic	Comments
1	If a screening assessment (in practice, referring to LAEI 2016) suggests possible exceedances above the AQO less 5% (e.g. NO_2 levels 38 or higher), a detailed AQA must be conducted.	Baseline evaluation indicates 2016 NO_2 concentrations between 43 and 55µg/m^3 NO_2 at the Proposed Development site, confirming that a full air quality assessment is required (See 4.4).
2	Applicants should use 2016 vehicle emission figures, and not predict future improvements.	Calculations are based on EfT 10.01, which only provides data from 2018 onwards. The assessment presents both worst case (2019 backgrounds & emissions) and best case (opening year emissions with 2019 backgrounds) as part of the scenarios examined.
3	In relation to background, applicants can use Defra background maps for base year (2018 data are currently fine here) or a nearby background site that we approve in advance. In practice, this means comparing Bloomsbury AMS and Defra, and using whichever is the higher (on the worst-case principle).	Calculations have used the latest (2018) background maps, with 2019 background data. Defra's sector removal tool has been used to remove Motorway, Trunk and A Road contributions to avoid 'double counting' within the dispersion model.
4	Applicants must not predict future improvements in their model – so stick to base year. (The exception is development year traffic movements, the only parameter where we will accept predicted data.)	Agreed. See response to point 3. A full range of scenarios are presented in Appendix L.
5	IAQM/EPUK guidance should not be used for the screening or detailed assessment. However, this guidance can be used to assess impacts of the demolition/construction works.	The decision to proceed to a full air quality assessment was based on (1), however as development is nominally 'car-free', operation phase traffic impacts were scoped out of the dispersion modelling assessment.
6	Applicants should verify their model using monitoring data for the area therefore, should refer to nearby monitoring sources (monitoring stations and diffusion tubes – single locations are not recommended) that may assist them.	Verification based on 6 monitoring locations, see Appendix I.
7	In relation to AQN, if a development is formally car free it may still have vehicle trips associated with taxis, coaches, servicing and waste. These should be taken from the Transport Assessment and should be considered in the AQN if possible.	Agreed and actioned, see 5.3.
8	Lastly, in poor air quality areas (LAEI 2016) the Council prefers zero emissions energy sources e.g. heat pumps wherever feasible. If gas boilers or any micro CHP are accepted, in practice they would need to meet the ultra-low NOx levels. Any CHP details must be included in the AQ assessment. Stack height and pollutant dispersion assessment to demonstrate appropriate pollutant dispersion must also be provided. This is to ensure compliance with policy 7.14 of the London Plan and to also provide an accurate/representative AQA. Lastly, any large CHP must comply with Appendix B of the Mayor's Sustainable Design and Construction SPG.	Air source heat pumps have been used instead of gas fired boilers and CHP plant. Emissions from the emergency backup diesel sprinkler pump were assessed in accordance with IAQM guidance and determined to be not significant (see Appendix K).

Appendix B Scoping Correspondence

Hodgkiss, Glyn

From:	Hodgkiss, Glyn
Sent:	27 January 2021 16:44
To:	'Berry-Khan, Gabriel'
Cc:	'Ana.Ventura@camden.gov.uk'
Subject:	RE: Regents Park Road Hotel- Air Quality Assessment

Good Afternoon Gabriel,

You kindly provided the following comments in relation to a planning application for a new hotel in Regents Road approximately 18 months ago. The planning reference is detailed below:
http://camdocs.camden.gov.uk/HPRMWebDrawer/PlanRec?q=recContainer:2019/3891/P

The application was withdrawn and the scheme has now been revised, subsequently, I am preparing an updated air quality assessment in which I propose to update the review of Camden Planning Policy, rerun the original models to reflect latest monitoring data, meteorological conditions and backgrounds from 2019, and update the construction dust risk assessment and air quality neutral assessment for the current scheme.

I wondered if there has been any updates to the general advice offered below that I would need to include in the revised assessment? It would also be useful if you could include Camden's latest environmental permit register for Part A and Part B processes which I could include in the updated baseline review.

If you disagree with any elements of the proposed scope please let me know, otherwise I will proceed with the assumption it is acceptable.

Thank you for your assistance in this matter and feel free to call me with any further queries.

Best Regards,

Glyn

Hodgkiss, Glyn

From:	Berry-Khan, Gabriel <Gabriel.Berry-Khan@camden.gov.uk>
Sent:	09 July 2019 12:00
To:	Hodgkiss, Glyn
Subject:	RE: Regents Park Road Hotel- Air Quality Assessment

Dear Glyn

Thank you for your recent enquiry to our Air Quality officer. She has asked me to send on her general comments to you.

Please note that in the absence of full scheme information being provided as per a formal planning application or pre-planning advice, the following is given as generally applicable information rather than scheme-specific advice. It should be read in conjunction with Camden's planning guidance (CPG Air Quality) and Local Plan (section CC4 Air Quality).

I regret that I am unable to enter into discussion about the information below. In order to obtain advice on your scheme and the applicable planning policy/guidance, I recommend asking the applicant to consider a pre-planning PPA.

- If a screening assessment (in practice, referring to LAEI 2016) suggests possible exceedances above the AQO less 5% (e.g. NO2 levels 38 or higher), a detailed AQA must be conducted.
- Applicants should use 2016 vehicle emission figures and not predict future improvements.
- In relation to background, applicants can use Defra background maps for base year (2018 data are currently fine here) or a nearby background site that we approve in advance. In practice, this means comparing Bloomsbury AMS and Defra, and using whichever is the higher (on the worst case principle).
- Applicants must not predict future improvements in their model – so stick to base year. (The exception is development year traffic movements, the only parameter where we will accept predicted data.)
- IAQM/EPUK guidance should not be used for the screening or detailed assessment. However, this guidance can be used to assess impacts of the demolition/construction works.
- Applicants should verify their model using monitoring data for the area therefore, should refer to nearby monitoring sources (monitoring stations and diffusion tubes – single locations are not recommended) that may assist them.
- In relation to AQN, if a development is formally car free it may still have vehicle trips associated with taxis, coaches, servicing and waste. These should be taken from the Transport Assessment and should be considered in the AQN if possible.
- Lastly, in poor air quality areas (LAEI 2016) the Council prefers zero emissions energy sources e.g. heat pumps wherever feasible. If gas boilers or any micro CHP are accepted, in practice they would need to meet the ultra-low NOx levels. Any CHP details must be included in the AQ assessment. Stack height and pollutant dispersion assessment to demonstrate appropriate pollutant dispersion must also be provided. This is to ensure compliance with policy 7.14 of the London Plan and to also provide an accurate/representative AQA. Lastly, any large CHP must comply with Appendix B of the Mayor's Sustainable Design and Construction SPG.

With thanks and regards,
Gabriel

1

Gabriel Berry-Khan
Senior Sustainability Officer (Planning)

Telephone: 020 7974 4550

From: Hodgkiss, Glyn <g.hodgkiss@cundall.com>
Sent: 09 July 2019 07:17
To: Ventura, Ana <Ana.Ventura@camden.gov.uk>; Air Quality <AirQuality@camden.gov.uk>
Subject: Regents Park Road Hotel- Air Quality Assessment

Dear Ana / Camden Environmental Health Team,

Cundall has been commissioned to carry out an air quality assessment in relation to the construction of a ground plus seven-storey building comprising a 67-room hotel with single residential unit and associated works in Regents Park Road. The proposed development will be essentially 'car-free'.

The proposed scheme falls within the borough-wide AQMA however, changes in traffic flows are unlikely to trigger the more stringent indicative criteria requiring an air quality assessment. I am currently proposing the following scope of work:

- Undertaking a detailing air quality assessment using the latest version of ADMS Roads Extra to investigate emissions from road and point sources to inform an assessment of exposure at the site;
- Using meteorological data from London City Airport;
- Using traffic data from the 2016 LAEI Inventory;
- Undertaking an Air Quality Neutral assessment;
- Undertaking a construction dust risk assessment following the latest IAQM and GLA Construction Dust guidance;
- Assessing impacts from any associated combustion plant in accordance with IAQM guidance;
- Using the latest IAQM/EPUK guidance to assess significance; and
- Where appropriate, recommending appropriate mitigation measures in line with IAQM/EPUK guidance and Local policy.

If you disagree with any elements of the proposed scope please let me know, otherwise I will proceed with the assumption it is acceptable.

Thank you for your assistance in this matter and feel free to call me with any further queries.

Kind Regards,

Glyn Hodgkiss

Glyn Hodgkiss
Principal Air Quality Consultant
Cundall

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Appendix C IAQM Construction Assessment Methodology

Screening (Step 1)

As ‘human receptors’ were identified within 50 m of the boundary of the site; and within 50 m of the route(s) to be used by construction vehicles on the public highway, up to 500 m from the site entrance, a detailed risk assessment was undertaken

Dust Emission (Step 2A)

The potential dust emission magnitude for different activities have been defined based on the criteria listed in Table C1.

Table C1 Potential Dust Emission Magnitude Criteria

Stage	Description	Large	Medium	Small
Demolition	Definitions for demolition are:	1. Total building volume >50,000 m^3 2. Potentially dusty construction material (e.g. concrete) 3. On-site crushing and screening 4. Demolition activities >20 m above ground level	5. Total building volume 20,000 m^3 – 50,000 m^3 6. Potentially dusty construction material (e.g. concrete) 7. Demolition activities 10 – 20 m above ground level	8. Total building volume <20,000 m^3 9. Construction material with low potential for dust release (e.g. metal cladding or timber) 10. Demolition activities <10 m above ground, demolition during wetter months
Earthworks	Earthworks will primarily involve excavating material, haulage, tipping, and stockpiling. This may also involve levelling the site and landscaping.	11. Total site area >10,000 m^2 12. Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) 13. >10 heavy earth moving vehicles active at any one-time formation of bunds >8 m in height 14. Total material moved >100,000 tonnes	15. Total site area 2,500 m^2 – 10,000 m^2 16. Moderately dusty soil type (e.g. silt) 17. 5-10 heavy earth moving vehicles active at any one-time formation of bunds 4 m – 8 m in height 18. Total material moved 20,000 tonnes – 100,000 tonnes	19. Total site area <2,500 m^2 20. Soil type with large grain size (e.g. sand) 21. <5 heavy earth moving vehicles active at any one-time formation of bunds <4 m in height 22. Total material moved <20,000 tonnes, earthworks during wetter months
Construction	The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s) / infrastructure, method of construction, construction materials, and duration of build.	23. Total building volume >100,000 m^3 24. On-site concrete batching and sandblasting	25. Total building volume 25,000 m^3 – 100,000 m^3 26. Potentially dusty construction material (e.g. concrete) 27. On-site concrete batching	28. Total building volume <25,000 m^3 29. Construction material with low potential for dust release (e.g. metal cladding or timber)

Stage	Description	Large	Medium	Small
Trackout	Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology, and duration. Only receptors within 50 m of the routes used by vehicles on the public highway and up to 500 m from the site entrances are considered to be at risk from the effects of dust.	30. >50 HDV (>3.5 tonnes) outward movements in any one day 31. Potentially dusty surface material (e.g. high clay content) 32. Unpaved road length >100 m	33. 10-50 HDV (>3.5 tonnes) outward movements in any one day 34. Moderately dusty surface material (e.g. high clay content) 35. Unpaved road length 50 m – 100 m	36. <10 HDV (3.5 tonnes) outward movements in any one day 37. Surface material with low potential for dust release 38. Unpaved road length <50 m

Sensitivity of the Area (Step 2B)

The sensitivity of the area takes account of a number of factors:

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

Table C2 provides guidance on the sensitivity of different types of receptor.

Table C2 Sensitivities of People to Dust Soiling Effects, Health Effects of PM_{10}, and Sensitivities of Receptors to Ecological Effects

Description	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Sensitivities of People to Dust Soiling Effects	1. Users can reasonably expect enjoyment of a high level of amenity 2. The appearance, aesthetics, or value of their property would be diminished by soiling 3. The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land 4. Indicative examples include dwellings, museums, and other culturally important collections, medium, and long-term car parks, and car showrooms	5. Users would expect a to enjoy a reasonable level of amenity, but would not reasonably expect a to enjoy the same level of amenity as in their home 6. The appearance, aesthetics, or value of their property could be diminished by soiling 7. The people or property wouldn't reasonably be expected a to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land 8. Indicative examples include parks and places of work	9. The enjoyment of amenity would not reasonably be expected; or 10. Property would not reasonably be expected a to be diminished in appearance, aesthetics, or value by soiling 11. There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land 12. Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short-term car parks, and roads
Sensitivities of People to the Health Effects of PM_{10}	13. Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day) 14. Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment	15. Locations where the people exposed are workers d, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). 16. Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation	17. Locations where human exposure is transient. 18. Indicative examples include public footpaths, playing fields, parks, and shopping streets

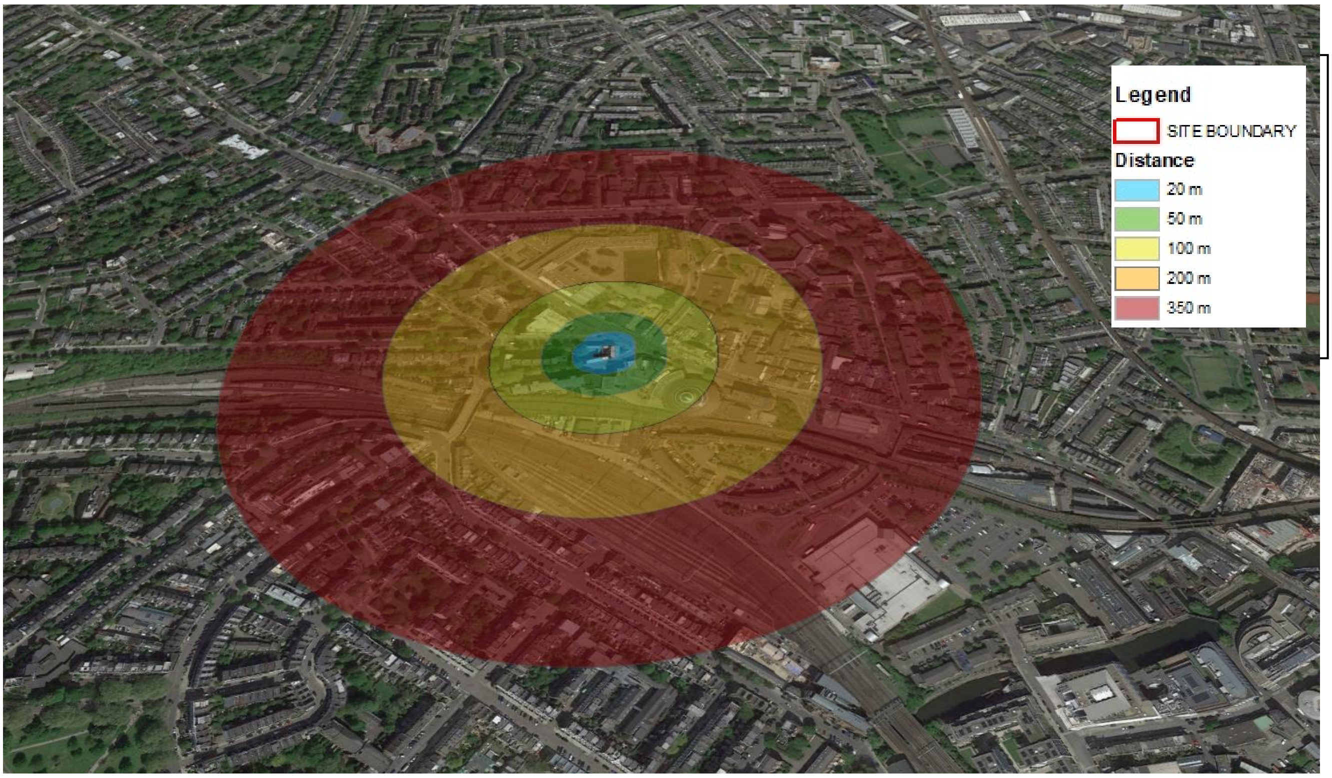
Description	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Sensitivities of Receptors to Ecological Effects	19. Locations with an international or National designation and the designated features may be affected by dust soiling 20. Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain 21. Indicative examples include a Special Area of Conservation designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings	22. Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown 23. Locations with a National designation where the features may be affected by dust deposition 24. Indicative example is a Site of Special Scientific Interest with dust sensitive features	25. Locations with a local designation where the features may be affected by dust deposition. 26. Indicative example is a local Nature Reserve with dust sensitive features

Full details of the sensitivities of receptors are provided in the IAQM Guidance document.

Table C3, Table C4, and Table C5 show how the sensitivity of the area has been determined for dust soiling, human-health, and ecosystem impacts respectively.

The distance bandings applied to the site are illustrated in Figure 11.

Figure 11 Construction Dust Buffer Zones



These tables take account of several factors which may influence the sensitivity of the area. The highest level of sensitivity from each table has been recorded.

Table C3 Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table C4 Sensitivity of the Area to Human-Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration ($\mu g/m^3$)	Number of Receptors [d]	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<28	>10	Low	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low	Low

Table C5 Sensitivity of the Area to Ecological Impact

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

The highest level of sensitivity from each table has been recorded. Professional judgement has been used to determine alternative sensitivity categories with consideration of additional factors, such as any pre-existing screening between the source and the receptors, the season during which the works will take place, and duration of the potential impact.

Risk of Impact Definition

The dust emission magnitude (Step 2A) was combined with the sensitivity of the area (Step 2B) to determine the risk of impact with no mitigation applied. Table C6 – Table C9 provide the method of assigning the level of risk of each activity and used to determine the level of site-specific mitigation.

Table C6 Risk of Impact – Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	High risk	Low risk	Low risk
Low	Low risk	Low risk	Negligible

Table C7 Risk of Impact – Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table C8 Risk of Impact – Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible

Table C9 Risk of Impact – Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High risk	Medium risk	Medium risk
Medium	Medium risk	Low risk	Low risk
Low	Low risk	Low risk	Negligible

Appendix D IAQM Local Air Quality Assessment Screening Criteria

Comparison Against IAQM Criteria

IAQM's guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' (updated in January 2017) was issued to ensure that air quality is adequately considered in the land-use planning and developmental control process.

It provides a decision-making process which assists with the understanding of air quality impacts and implications because of development proposals. It provides a framework for air quality considerations within local development control processes, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes a method for screening the requirement for an air quality assessment, the undertaking of an air quality assessment, the determination of the air quality impact associated with a development proposal and whether this impact is significant.

The guidance also provides some clarification as to when air quality constitutes a material consideration and highlights the links to other relevant issues (for example traffic speed reduction measure and the use of alternative technology to provide energy) and the importance of the understanding of these with the input from other discipline specialists. The 'creeping baseline' is another issue raised about cumulative impacts.

The guidance note is widely accepted as the most appropriate reference method for this purpose. This guidance refers to the Town and Country Planning (Development Management Procedure) Order (England) 2010 [(Wales) 2012] definition of a 'major' development when scoping assessments required for the planning process.

A 'major' development includes developments where:

- The number of dwellings is 10 or above;
- The residential development is carried out of a site of more than 0.5ha where the number of dwellings is unknown;
- The provision of more than 1,000m^2 commercial floor space; or,
- Development carried out on land of 1ha or more.

There are two types of air quality impacts to be considered:

- The impact of existing sources in the local area on the Proposed Development (governed by background pollutant levels and proximity to sources of air pollution); and,
- The impacts of the Proposed Development on the local area.

Regarding the changes in air quality or exposure to air pollution, the guidance indicates that each local authority will be likely to have their own view on the significance of this; these are to be described in relation to whether a National Air Quality Objective (NAQO)predicted to be met, or at risk of not being met. Exceedances of these objectives are considered as significant, if not mitigated.

As part of the impact of the Proposed Development on the local area, a two-staged assessment is recommended as per current guidance.

Stage 1: Determines whether an air quality assessment is required. In order to proceed to Stage 2, it requires any of the criteria under (A) coupled with any of the criteria under (B) in Table F1 to apply.

Stage 2: Where an assessment is deemed appropriate, this may take the form of a Simple Assessment or a Detailed Assessment, using suitable guidance provided in Table D2.

Table D1 Stage 1 Criteria

Criteria to Proceed to Stage 2
A. If any of the following apply: • 10 or more residential units of a site area of more than 0.5ha • More than 1,000 m^2 of floor space for all other uses or a site area greater than 1ha
B. Coupled with any of the following: • The development has more than 10 parking spaces • The development will have a centralised energy facility or other centralised combustion process **Note:** Consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Table D2 Indicative Criteria for Requiring an Air Quality Assessment

The Development will	Indicative Criteria to Proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors. **(LDV = cars and small vans <3.5t gross vehicle weight).**	A change of LDV flows of: • More than 100 AADT within or adjacent to an Air Quality Management Area (AQMA) • More than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. **(HDV = goods vehicles + buses >3.5t gross vehicle weight).**	A Change of HDV flows of: • More than 25 AADT within or adjacent to an AQMA • More than 100AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. Traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: • More than 25 AADT within or adjacent to an AQMA • More than 100AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. **NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping.**	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

The Development will	Indicative Criteria to Proceed to an Air Quality Assessment
	Conversely, where existing NO_2 concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

Impact Descriptors for Individual Receptors

The IAQM guidance contains a two Stage process for determining the likely significant effects of the impacts on air quality:

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

A framework for describing the impacts is set out in IAQM guidance and summarised in Table D3 below.

Table D3 Impact Descriptors

Long-term average concentration at receptor in assessment year	**% Change in concentration relative to Air Quality Assessment Level (AQAL)**			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

For air quality impacts arising from surrounding sources on new occupants of a development, then the impacts are best described in relation to whether an air quality objective will not be met or is at risk of not being met. Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provisions is made to reduce their exposure by some means.

Changes of less than 0.5%, will be described as Negligible.

Appendix E Results of Screening Assessment

Table E1 Indicative Criteria for Requiring a Detailed Air Quality Assessment

Where the Development will:	Indicative Criteria to Proceed to an Air Quality Assessment	Information Relevant to the Proposed Development
2. Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors.	IAQM Guidance states a change of LDV flows of: • More than 100 AADT within or adjacent to an Air Quality Management Area (AQMA) • More than 500 AADT elsewhere.	The development will generate less than 100 daily vehicle trips, therefore further assessment of increased transport emissions was scoped out of further assessment (dispersion modelling)
3. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.	A Change of HDV flows of: • More than 25 AADT within or adjacent to an AQMA • More than 100 AADT elsewhere.	No increase in HDV flows is predicted
4. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA	No realignment of >5m proposed
5. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. Traffic lights, or roundabouts.	No new junctions proposed
6. Introduce or change a bus station.	Where bus flows will change by: • More than 25 AADT within or adjacent to an AQMA • More than 100 AADT elsewhere.	No bus station proposed
7. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).	No underground car parking proposed
8. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion.	Air source heat pumps have been used instead of gas fired boilers and CHP plant. Emissions from the emergency backup diesel sprinkler pump were assessed in accordance with IAQM guidance. This unit will be operated for up to 30 minutes per week as part of regular safety checks. Although the emission rate exceeded 5mg/sec NO_X, further screening using EA methodology confirmed that the emissions were not significant (see Appendix K).

Appendix F Technical Data for Backup Diesel Sprinkler Pump

JU6H-UF50
Stationary Fire Pump Engine Driver
EMISSION DATA
EPA 40 CFR Part 60

6 *Cylinders*
Four *Cycle*
Lean *Burn*
Turbocharged

500 PPM SULFUR #2 DIESEL FUEL									
RPM	BHP [3]	FUEL GAL/HR (L/HR)	GRAMS / HP- HR				EXHAUST	
			NMHC	NOx	CO	PM [4]	°F (°C)	CFM (m^3/min)
2100	210	12.3 (47)	0.17	4.96	0.41	0.15	1034 (557)	1204 (34)
2350	210	12.9 (49)	0.20	4.70	0.46	0.15	977 (525)	1359 (38)

Notes:

1) *6068TF220 Base Engine Model manufactured by John Deere Corporation. For John Deere Emissions Conformance to EPA 40 CFR Part 60 see Page 2 of 2.*
2) *The Emission Warranty for this engine is provided directly to the owner by John Deere Corporation. A copy of the John Deere Emission Warranty can be found in the Clarke Operation and Maintenance Manual.*
3) *Engines are rated at standard conditions of 29.61in. (7521 mm) Hg barometer and 77°F (25° C) inlet air temperature. (SAE J1349)*
4) *PM is a measure of total particulate matter, including PM_{10}.*

CLARKE

FIRE PROTECTION PRODUCTS
3133 EAST KEMPER ROAD
CINCINNATI, OH 45241

C131851 REV.C
01NOV 07 KRW

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Appendix G Information Supplied by Transport Consultant

Table G1 Tempro Growth Factors

Year	Tempro Growth Factor (Average Day)
2016 to 2019	1.050
2016 to 2023	1.103

Table G2 Estimated Daily Vehicle Trips

Vehicle Type	Estimated Daily Trips
Taxi/Motorcycle	8
Daily Servicing/Waste	12
Totals	20

Appendix H Model Verification Road Links and Monitoring Locations

Overview

HS2 Ltd has published a series of annual reviews of air quality covering the years 2016 to 2019[48]. These annual reports focused on reporting monitoring data for air quality around highways, including a selection of sites in LBC near the Proposed Development.

The diffusion tubes were supplied by Gradko Environmental and the diffusion tube preparation used was 20% triethanolamine (TEA) in de-ionised water. Results were bias adjusted and annualised in accordance with procedures outlined in LAQM.TG (16).

Model verification was undertaken using a combination of relevant monitoring locations outlined in the HS2 air quality review and LBC's Annual Status Report for 2019. Some adjustment of site location coordinates included within the HS2 report was undertaken using a combination of Google Street View images and local ordnance survey mapping data.

Traffic data were taken from the 2016 LAEI[49]. The modelled road network included all links within 200m of the Proposed Development and each of the monitoring locations included within the verification.

The sampling locations are illustrated in Figure 12 and the monitoring results used for model verification are summarised in Table H1.

[48] https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2#annual-monitoring-reports
[49] London Atmospheric Emissions Inventory (2016). See: https://data.london.gov.uk/air-quality. Accessed 14/07/2019.

Figure 12 Monitoring Locations and LAEI Road Links Used in Verification of the Model

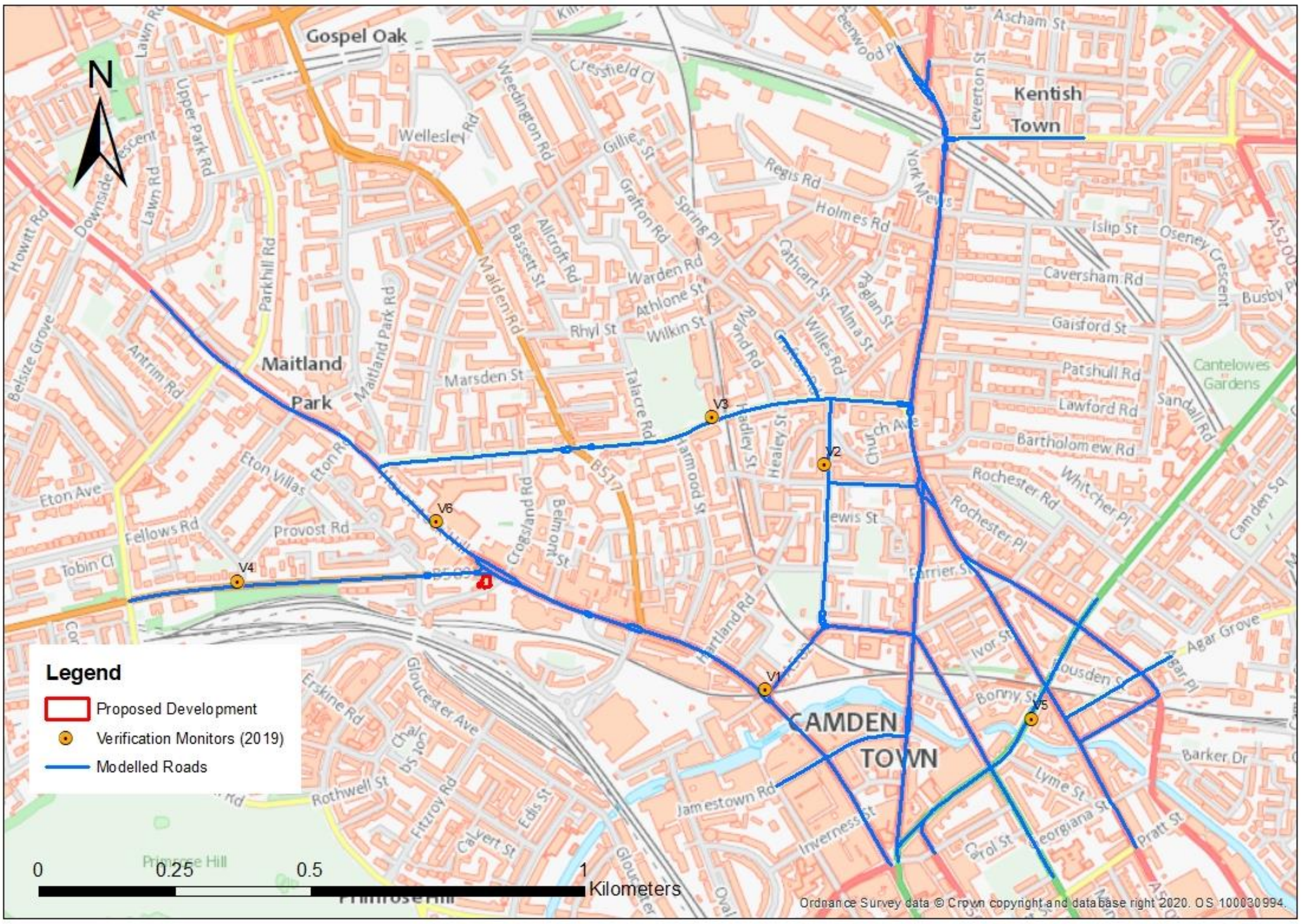


Table H1 Sampling Locations

Site	Receptor Name/Description	Site Classification	Operator	Easting	Northing	Receptor Height (m)	2019 Annualised and Bias Adjusted NO_2 Value µg/m^3
V1	Junction of Chalk Farm Road and Castlehaven Road	Roadside	HS2	528684.5	184182.1	2.5	54.6
V2	Castlehaven Road	Roadside	HS2	528791.3	184594.8	2.5	31.5
V3	Prince of Wales Road	Roadside	HS2	528585.6	184681.9	2.5	33.8
V4	Adelaide Road	Roadside	HS2	527714.9	184380.5	2.7	39.9
V5	Camden Road	Roadside	LBC	529172.9	184129.3	2.5	55.6
V6	Haverstock School	Roadside	LBC	528081.0	184490.0	2.2	32.3

Appendix I Model Verification Details

Model Verification

Model verification is the process of comparing monitored and modelled pollutant concentrations for the same year, at the same locations, and adjusting modelled concentrations wherever necessary to be consistent with monitoring data. This increases the robustness of modelling results.

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

- Traffic data uncertainties
- Background concentration estimates
- Meteorological data uncertainties
- Sources not explicitly included within the model, for example car parks and bus stops
- Overall model limitations, including treatment of roughness and meteorological data, treatment of speeds), and:
- Uncertainty in monitoring data, particularly diffusion tubes

Verification is the process by which uncertainties such as those described above are investigated and minimised. Disparities between modelling and monitoring results are likely to arise as result of a combination of all of these aspects.

Using the guidance provided in Chapter 7 of LAQM.TG (16), the modelled output has been verified against the monitoring data obtained by LBC, the closest locations to the Proposed Development.

The performance of the dispersion model was assessed by comparing the modelled concentrations with measured concentrations. Meteorological data, monitored concentrations, vehicle emission rates and traffic data for 2019 were all used in the model verification process.

The model adjustment was undertaken using methodology which requires the determination of the ratio between the measured and modelled road contributed NO_x at each comparison site. The ratio between them, referred to as the adjustment factor, is applied to the modelled road contributed NOx. The modelled NO_2 is then determined using the Defra NO_x/NO_2 calculator.

Table I1 presents a summary of the model performance prior to bias adjustment. The model verification is based on Defra EFT V10.1 emission factors.

Table I1 Model Performance Prior To Bias Adjustment

Ref	Tube Ref	Description	Monitored NO_2 (µg/m^3)	Modelled NO_2 (µg/m^3)	% Difference (Modelled-Measured) / Measured
V1	HS2-000020BMS	Junction of Chalk Farm Road and Castlehaven Road	46.9	32.4	-30.9
V2	HS2-000020BPC	Castlehaven Road	32.1	28.0	-12.9
V3	HS2-000020BPD	Prince of Wales Road	30.0	24.5	-18.5
V4	HS2-000020BQ5	Adelaide Road	37.6	37.1	-1.4
V5	CA23	Camden Road	52.5	28.1	-46.5
V6	CTLEN1	Haverstock School	32.3	38.3	18.5

These comparisons show that the model underpredicted annual mean concentrations of NO_2. Model verification was therefore carried out and an adjustment factor calculated and applied in all scenarios, in accordance with the methodology prescribed in LAQM.TG (16). A regression analysis was undertaken of modelled and measured road NO_x concentrations at these locations. The derived adjustment factor (1.709) was then applied to the modelled road NO_x concentrations to adjust for model bias. The comparison of modelled with measured values was then repeated and the results are shown in Table I2.

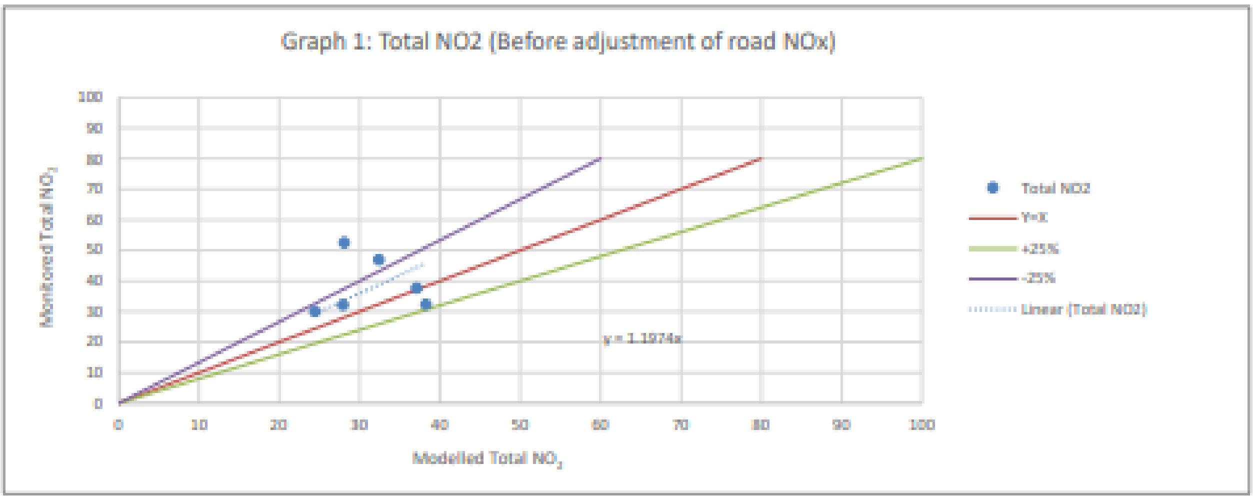
Table I2 Model Performance After Bias Adjustment

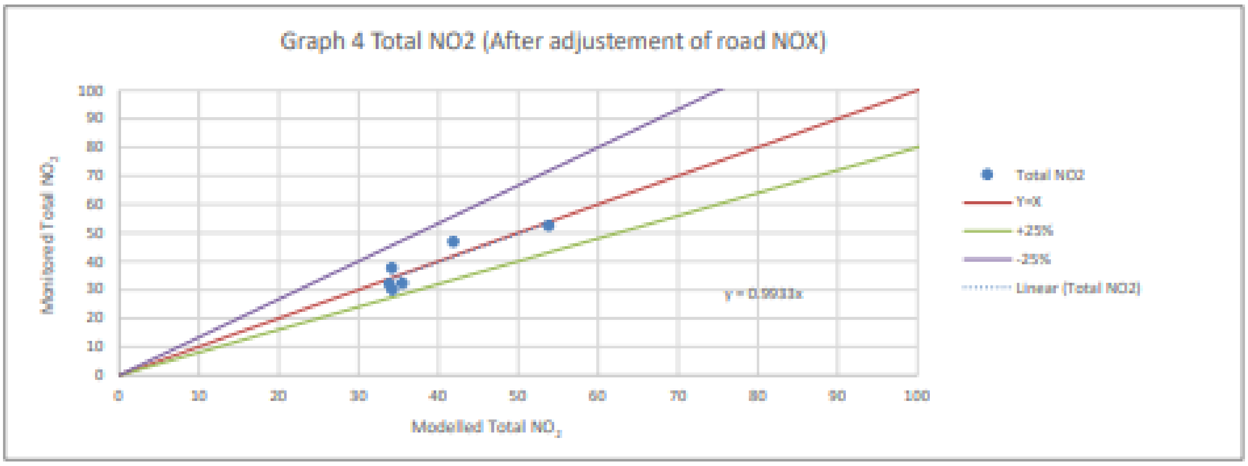
Ref	Tube Ref	Description	Monitored NO_2 (µg/m^3)	Modelled NO_2 (µg/m^3)	% Difference (Modelled-Measured) / Measured
V1	HS2-000020BMS	Junction of Chalk Farm Road and Castlehaven Road	46.9	41.9	-10.7
V2	HS2-000020BPC	Castlehaven Road	32.1	33.9	5.5
V3	HS2-000020BPD	Prince of Wales Road	30.0	34.2	14.1
V4	HS2-000020BQ5	Adelaide Road	37.6	34.2	-9.1
V5	CA23	Camden Road	52.5	53.8	2.6
V6	CTLEN1	Haverstock School	32.3	35.5	9.9

The accuracy of the adjusted model was also considered via the calculation of the Root Mean Square Error (RMSE) and fractional bias.

With the unadjusted model results, the RMSE was 12.2 µg/m^3, while with the adjusted model results this was reduced to 3.4 µg/m^3 so the adjustment has reduced the average error or uncertainty in the model results. LAQM.TG (16) states that ideally, an RMSE within 10% of the air quality objective would be derived, which equates to 4 µg/m^3 for the annual average NO_2 objective. In this respect, the model results are therefore considered robust. The agreement before and after adjustment is illustrated in Figure 13.

Figure 13 Model Verification



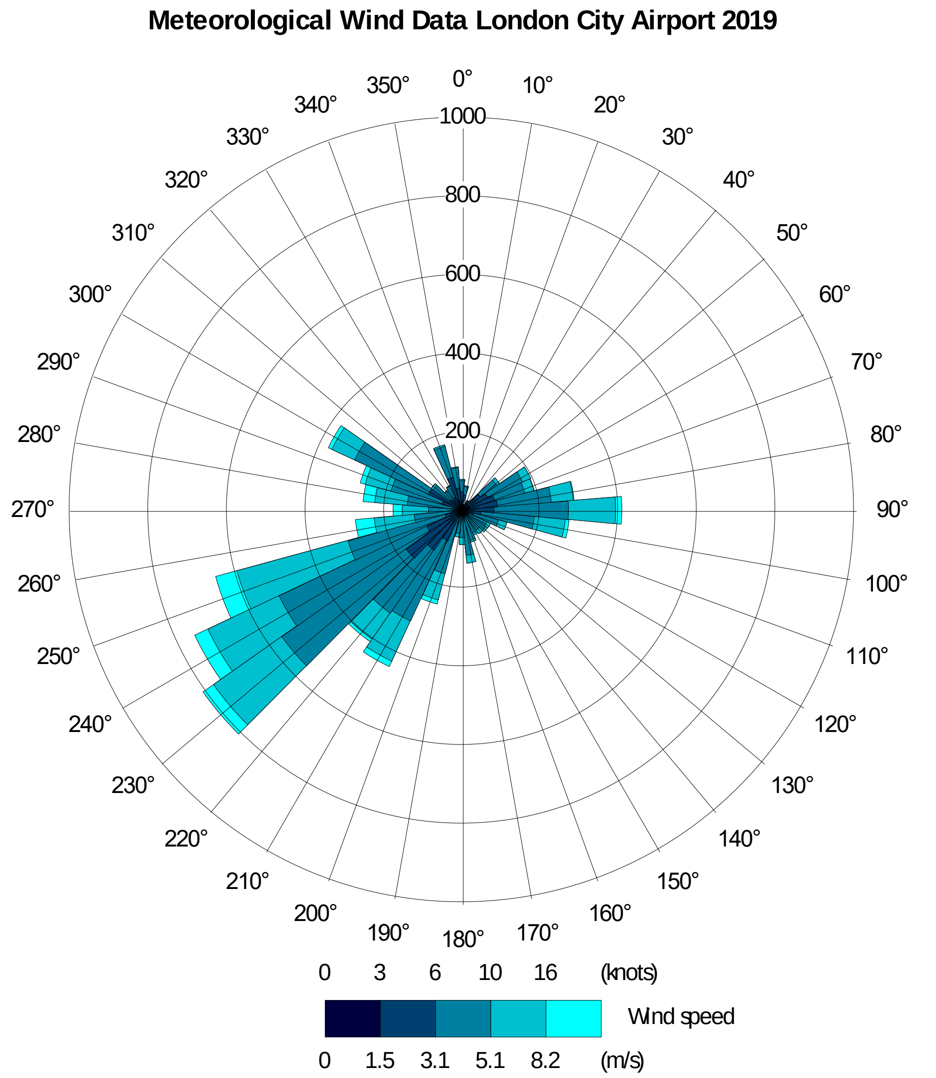


The fractional bias was 0.21 with the unadjusted model, which shows a slight tendency to under-predict, and <0.01 with the adjusted model, which shows that the under prediction has been mostly removed.

The final adjusted total NO_2 concentration predicted at the diffusion tubes sites is within ±25% of the measured values and is therefore considered satisfactory.

In accordance with Defra guidance, the road contributed NO_x adjustment factor was also applied to the road contributed PM concentration. The total PM_{10} and $PM_{2.5}$ concentrations are derived by adding the adjusted road contribution value to the Defra background concentrations. 2019 Wind Rose for London City Airport.

Appendix J 2019 Wind Rose for London City Airport



Appendix K Combustion Plant Calculations

Proposed Backup Generator Specification

Relevant technical data for the proposed backup generator are presented in Table K1.

Table K1 Backup Generator Specifications

Input Required	Units	Parameters
Rate of emission of NO_x	g/s	0.296
Stack height above ground	m	Effective height assumed 0m as worst case
Operation Hour	Hour / annum	26

Process Contribution Screening Calculation

Plant emissions were calculated using the methodology from Defra and EA's air emission risk assessment. The environmental concentration of NO_x released into the air is known as the process contribution (PC).

The short-term and long-term PCs to air were calculated following the EA's risk assessment methodology. PC to air is measured in micrograms per cubic meter, µg/m^3. To calculate the PC to air, the dispersion factors, in micrograms per cubic metre per gram per second, are multiplied by the release rate, in grams per second.

Emissions of oxides of nitrogen (NO_x) should be recorded as nitrogen dioxide (NO_2) in the assessment:

- For short-term PC, assume only 50% of emissions of NO_x convert to NO_2 in the environment;
- For long-term PC, assume all NO_x converts to NO_2.

The effective height of release was treated as 0 metres, assuming the emission would be released at a point that is less than 3 metres above the ground or building on which the stack is located. The dispersion factors for effective height of release at 0m are presented in Table K2.

Table K2 Dispersion Factor

Effective height of release in meter	Annual Dispersion Factor	Hourly Dispersion Factor
0 m	148	3900

The release rate was calculated by multiplying the gas flow (m^3/s) by the substance concentrations (mg/m^3) divided by 1,000. The estimations of PC are presented in Table K3.

Table K3: PC Screening Calculation results

Averaging period	Max PC (µg/m^3)	% AQO	Criteria	PC to air
LT	0.13	0.325	1%	Below criteria
ST	1.71	0.856	10%	Below criteria

Appendix L Dispersion Modelling Results

Long-Term NO_2 Concentrations- Emissions from Road Traffic

The effect of the operation phase road traffic emissions is presented in Table L1.

Table L1 NO_2 Annual Mean Concentrations at Modelled Receptors During the Operation Phase

Receptor ID	Receptor Height (m)	Annual Mean NO_2 Concentrations μg/m^3		
		2019 Background with 2019 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2023 Emissions
P1a	1.5	39.4	39.9	35.5
P1b	5.8	34.0	34.3	31.9
P1c	9.0	31.3	31.5	30.2
P1d	12.2	30.1	30.2	29.4
P1e	15.4	29.5	29.6	29.0
P1f	18.6	29.2	29.3	28.8
P1g	21.8	29.0	29.1	28.7
P1h	1.5	32.8	33.0	31.1
P2a	5.8	31.7	31.9	30.4
P2b	9.0	30.8	30.9	29.8
P2c	12.2	30.0	30.1	29.3
P2d	15.4	29.5	29.6	29.0
P2e	18.6	29.2	29.3	28.8
P2f	21.8	29.0	29.1	28.7
P2g	1.5	32.6	32.8	30.9
P2h	5.8	31.6	31.8	30.3
P3a	9.0	30.7	30.8	29.8
P3b	12.2	30.0	30.1	29.3
P3c	15.4	29.5	29.6	29.0
P3d	18.6	29.2	29.3	28.8
P3e	21.8	29.0	29.1	28.7
P3f	1.5	32.1	32.3	30.7
P4a	5.8	31.3	31.5	30.2
P4b	9.0	30.6	30.7	29.7
P4c	12.2	29.9	30.0	29.3
P4d	15.4	29.5	29.6	29.0
P4e	18.6	29.2	29.3	28.8
P4f	21.8	29.0	29.1	28.7
P5a	1.5	39.1	39.6	35.4
P5b	5.8	33.9	34.2	31.9
P5c	9.0	31.3	31.4	30.1

Receptor ID	Receptor Height (m)	Annual Mean NO_2 Concentrations µg/m^3		
		2019 Background with 2019 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2023 Emissions
P5d	12.2	30.1	30.2	29.4
P5e	15.4	29.5	29.6	29.0
P5f	18.6	29.2	29.3	28.8
P5g	21.8	29.0	29.1	28.7

Results are presented for 3 different scenarios:

g) 2019 Background with 2019 traffic flows and 2019 emission factors (intermediate case)
h) 2019 Background with traffic flows factored to 2023 and 2019 emission factors (worst case)
i) 2019 Background with traffic flows factored to 2023 and 2023 emission factors (best case)

Interpretation of worst-case data indicates that concentrations of NO_2 are likely to meet the annual mean NO_2 objective at all receptors on all levels of the Proposed Development.

Long Term PM_{10} Concentrations: Operation Phase Road Traffic Emissions

Modelled PM_{10} concentrations in all scenarios meet the annual men PM_{10} objectives at all receptor locations.

Table L2 PM_{10} Annual Mean Concentrations at Modelled Receptors During the Operation Phase

Receptor ID	Receptor Height (m)	Annual Mean PM_{10} Concentrations µg/m^3 (days exceedance of 50 µg/m^3 in brackets)		
		2019 Background with 2019 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2023 Emissions
P1a	20.3 (4)	20.4 (4)	20.5 (4)	20.3 (4)
P1b	19.7 (3)	19.8 (3)	19.8 (3)	19.7 (3)
P1c	19.4 (3)	19.5 (3)	19.5 (3)	19.4 (3)
P1d	19.3 (3)	19.3 (3)	19.3 (3)	19.3 (3)
P1e	19.2 (3)	19.2 (3)	19.2 (3)	19.2 (3)
P1f	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)
P1g	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)
P1h	19.6 (3)	19.6 (3)	19.6 (3)	19.6 (3)
P2a	19.5 (3)	19.5 (3)	19.5 (3)	19.5 (3)
P2b	19.4 (3)	19.4 (3)	19.4 (3)	19.4 (3)
P2c	19.3 (3)	19.3 (3)	19.3 (3)	19.3 (3)
P2d	19.2 (3)	19.2 (3)	19.2 (3)	19.2 (3)
P2e	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)
P2f	19.1 (2)	19.2 (2)	19.2 (2)	19.1 (2)
P2g	19.6 (3)	19.6 (3)	19.6 (3)	19.6 (3)
P2h	19.5 (3)	19.5 (3)	19.5 (3)	19.5 (3)
P3a	19.4 (3)	19.4 (3)	19.4 (3)	19.4 (3)
P3b	19.3 (3)	19.3 (3)	19.3 (3)	19.3 (3)

Receptor ID	Receptor Height (m)	Annual Mean PM_{10} Concentrations µg/m^3 (days exceedance of 50 µg/m^3 in brackets)		
		2019 Background with 2019 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2023 Emissions
P3c	19.2 (3)	19.2 (3)	19.2 (3)	19.2 (3)
P3d	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)
P3e	19.1 (2)	19.2 (2)	19.2 (2)	19.1 (2)
P3f	19.5 (3)	19.5 (3)	19.6 (3)	19.5 (3)
P4a	19.4 (3)	19.4 (3)	19.5 (3)	19.4 (3)
P4b	19.3 (3)	19.4 (3)	19.4 (3)	19.3 (3)
P4c	19.3 (3)	19.3 (3)	19.3 (3)	19.3 (3)
P4d	19.2 (3)	19.2 (3)	19.2 (3)	19.2 (3)
P4e	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)
P4f	19.1 (2)	19.2 (2)	19.2 (2)	19.1 (2)
P5a	20.3 (4)	20.3 (4)	20.4 (4)	20.3 (4)
P5b	19.7 (3)	19.8 (3)	19.8 (3)	19.7 (3)
P5c	19.4 (3)	19.4 (3)	19.5 (3)	19.4 (3)
P5d	19.3 (3)	19.3 (3)	19.3 (3)	19.3 (3)
P5e	19.2 (3)	19.2 (3)	19.2 (3)	19.2 (3)
P5f	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)
P5g	19.2 (2)	19.2 (2)	19.2 (2)	19.2 (2)

Long Term $PM_{2.5}$ Concentrations: Operation Phase Road Traffic Emissions

Modelled $PM_{2.5}$ concentrations in all scenarios meet the annual men PM_{10} objectives at all receptor locations.

Table L3 $PM_{2.5}$ Annual Mean Concentrations at Modelled Receptors During the Operation Phase

Receptor ID	Receptor Height (m)	Annual Mean $PM_{2.5}$ Concentrations µg/m^3		
		2019 Background with 2019 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2023 Emissions
P1a	1.5	13.6	13.7	13.6
P1b	5.8	13.0	13.0	12.9
P1c	9.0	12.6	12.6	12.6
P1d	12.2	12.5	12.5	12.5
P1e	15.4	12.4	12.4	12.4
P1f	18.6	12.3	12.3	12.3
P1g	21.8	12.3	12.3	12.3
P1h	1.5	12.8	12.8	12.8
P2a	5.8	12.7	12.7	12.7
P2b	9.0	12.5	12.6	12.5
P2c	12.2	12.4	12.5	12.4
P2d	15.4	12.4	12.4	12.4
P2e	18.6	12.3	12.3	12.3
P2f	21.8	12.3	12.3	12.3
P2g	1.5	12.8	12.8	12.8
P2h	5.8	12.7	12.7	12.6
P3a	9.0	12.5	12.6	12.5
P3b	12.2	12.4	12.5	12.4
P3c	15.4	12.4	12.4	12.4
P3d	18.6	12.3	12.3	12.3
P3e	21.8	12.3	12.3	12.3
P3f	1.5	12.7	12.7	12.7
P4a	5.8	12.6	12.6	12.6
P4b	9.0	12.5	12.5	12.5
P4c	12.2	12.4	12.5	12.4
P4d	15.4	12.4	12.4	12.4
P4e	18.6	12.3	12.3	12.3
P4f	21.8	12.3	12.3	12.3
P5a	1.5	13.6	13.6	13.5
P5b	5.8	12.9	13.0	12.9
P5c	9.0	12.6	12.6	12.6
P5d	12.2	12.5	12.5	12.5
P5e	15.4	12.4	12.4	12.4

Receptor ID	Receptor Height (m)	Annual Mean $PM_{2.5}$ Concentrations μg/m^3		
		2019 Background with 2019 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2019 Emissions	2019 Background with 2023 traffic flows and 2023 Emissions
P5f	18.6	12.3	12.3	12.3
P5g	21.8	12.3	12.3	12.3

Interpretation of worst-case data indicates that concentrations of PM_{10} and $PM_{2.5}$ are likely to meet the annual mean objective for PM_{10} and $PM_{2.5}$ at all receptors on all levels of the Proposed Development.

Appendix M Mitigation Measures for Construction

Primary measures are those that will be implemented at all times; Secondary measures will be implemented as necessary (in agreement with the local authority), while n/a measures are not required for a given level of risk.

Table M.1 Construction Mitigation Measures- Site Management

Site Management	Low Risk	Medium Risk	High Risk
1. Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary.	Primary		
2. Display the head or regional office contact information.	Primary		
3. Record and respond to all dust and air quality pollutant emissions complaints.	Primary		
4. Make a complaint log available to the local authority.	Primary		
5. Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority.	Primary		
6. Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry, or windy conditions.	Primary		
7. Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.	Primary		
8. Develop and implement a **stakeholder communications plan** that includes community engagement before work commences on-site.	n/a	Primary	
9. Develop a **dust management plan**.	n/a	Primary	
10. Hold regular liaison meetings with other high-risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.	n/a		Primary

Table M2 Construction Mitigation Measures- Preparing and Maintaining the Site

Preparing and Maintaining the Site	Low Risk	Medium Risk	High Risk
11. Plan site layout: machinery and dust causing activities will be located away from receptors.	Primary		
12. Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on-site.	Primary		
13. Avoid site runoff of water or mud.	Primary		
14. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	Secondary	Primary	
15. Keep site fencing, barriers, and scaffolding clean using wet methods.	Secondary	Primary	
16. Remove materials from site as soon as possible.	Secondary	Primary	
17. Cover, seed, or fence stockpiles to prevent wind whipping.	Secondary	Primary	
18. Agree monitoring locations with the local authority.	n/a	Primary	
19. Where possible, commence baseline monitoring at least three months before phase begins.	n/a	Primary	
20. Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.	n/a	Primary	
21. Carry out regular dust soiling checks of buildings within 100 m of site boundary and cleaning to be provided.	n/a	Secondary	Primary
22. Install green walls, screens, or other green infrastructure to minimise the impact of dust and pollution.	n/a	Secondary	
23. Provide showers and ensure a change of shoes and clothes are required before going off-site to reduce transport of dust.	n/a		Secondary

Table M3 Construction Mitigation Measures- Operating Vehicle/Machinery and Sustainable Travel

Operating Vehicle/Machinery and Sustainable Travel	Low Risk	Medium Risk	High Risk
24. Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone.	Primary		
25. Ensure all non-road mobile machinery (NRMM) comply with the standards set within the SPG.	Primary		
26. Ensure all vehicles switch off engines when stationary – no idling vehicles.	Primary		
27. Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment.	Primary		
28. Implement a **Travel Plan** that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	n/a	Secondary	Primary
29. Produce a **Construction Logistics Plan** to manage the sustainable delivery of goods and materials.	n/a	Primary	
30. Impose and signpost a maximum-speed-limit of 10 mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority).	Secondary		Primary

Table M4 Construction Mitigation Measures- Operations

Operations	Low Risk	Medium Risk	High Risk
31. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Primary		
32. Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water).	Primary		
33. Use enclosed chutes, conveyors, and covered skips.	Primary		
34. Minimise drop heights from conveyors, loading shovels, hoppers, and other loading, or handling equipment, and use fine water sprays on such equipment.	Primary		
35. Ensure equipment is readily available on-site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	n/a	Primary	

Table M5 Construction Mitigation Measures- Waste Management Activities

Waste Management	Low Risk	Medium Risk	High Risk
36. Reuse and recycle waste to reduce dust from waste materials	Primary		
37. Avoid bonfires and burning of waste materials.	Primary		

Table M6 Construction Mitigation Measures- Demolition Activities

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

Table M7 Construction Mitigation Measures- Earthworks Activities

Measurement Specific to Earthworks	Low Risk	Medium Risk	High Risk
42. Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.	n/a	Secondary	Primary
43. Use Hessian, mulches, or trackifiers where it is not possible to re-vegetate or cover with topsoil.	n/a	Secondary	Primary
44. Only remove secure covers in small areas during work and not all at once.	n/a	Secondary	Primary

Table M8 Construction Mitigation Measures- Construction Activities

Measurement Specific to Construction	Low Risk	Medium Risk	High Risk
45. 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.	Secondary	Primary	
46. Avoid scabbling (roughening of concrete surfaces) if possible	Secondary		Primary
47. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	n/a	Secondary	Primary
48. For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	n/a	Secondary	

Table M9 Construction Mitigation Measures- Trackout Activities

Measures Specific To Trackout	Low Risk	Medium Risk	High Risk
49. Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.	Secondary	Primary	
50. Avoid dry sweeping of large areas.	Secondary	Primary	
51. Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.	Secondary	Primary	
52. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site).	Secondary	Primary	
53. Record all inspections of haul routes and any subsequent action in a site log book.	Secondary	Primary	
54. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned.	n/a	Primary	
55. Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;	n/a	Primary	
56. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size, and layout permits.	n/a	Primary	
57. Access gates to be located at least 10 m from receptors where possible.	n/a	Primary	
58. Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site.	n/a	Secondary	Primary

Appendix N Site Monitoring Protocol

Best practice monitoring methods that may be required by local planning authority are set out in the SPG Appendix 8.

The required monitoring protocol is also summarised below.

Table N1 Monitoring Protocol

Risk	Protocol
Low Risk	1. Take into account the impact of air quality and dust on occupational exposure standards to minimise worker exposure and breaches of AQO that may occur outside the site boundary, such as by visual assessment 2. Keep an accurate log of complaints from the public, and the measures taken to address any complaints
Medium Risk **As for Low Risk sites PLUS**	3. Determine prevailing wind direction across the site using data from a nearby weather station 4. Set up a line across the site according to the direction of the prevailing wind and operate a minimum of two automatic particulate monitors to measure PM_{10} concentrations at either end of the transect – either inside or outside the site boundary. These instruments should provide data that can be downloaded in real-time by the local authority 5. Identify which location(s) need to be monitored and set up an automatic particulate monitor at each of these to measure representative PM_{10} concentrations. These instruments should provide data that can be downloaded in real-time by the local authority 6. Supplement PM_{10} monitoring with hand-held monitors to get on-the-spot readings at selected points, such as close to sensitive receptors 7. Consider also monitoring dust deposition and soiling rate as these can be used to indicate nuisance
High Risk **As for Medium Risk sites PLUS**	8. Set up a weather station on-site to measure local wind direction and speed 9. Carry out a visual inspection of site activities, dust controls and site conditions and record in a daily dust log; 10. Identify a responsible trained person on-site for dust monitoring who can access real-time PM_{10} data from automatic monitors (e.g., at hourly, or 15-minute intervals). Ensure that adequate quality assurance/quality control is in place 11. Agree a procedure to notify the local authority, so that immediate, and appropriate measures can be put in place to rectify any problem. Alert mechanisms could include email, texts, or alarm systems

Appendix O Non-Road Mobile Machinery (NRMM)

Developers and contractors should meet compliance with 2015 emission standards for NRMM. SPG Appendix 7 Figure 7.1 summarises the requirement of NRMM emissions for 2015.

From 1 September 2015 NRMM of net power between 37 kW and 560 kW

- Used in London will be required to meet the standards set out below. This will apply to both variable and constant speed engines for both NO_x and Particulate Matter. These standards will be based upon engine emissions standards set in EU Directive 97/68/EC and its subsequent amendments.
- NRMM used on the site of any major development within Greater London will be required to meet Stage IIIA of the Directive as a minimum; and
- NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum.

The requirements set out above may be met using the following techniques;

- Reorganisation of NRMM fleet
- Replacing equipment (with new or second-hand equipment which meets the policy)
- Retrofit abatement technologies
- Re-engineering

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