Air Quality Assessment

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Contents

Executive Summary

Hilson Moran has been instructed by Wates Construction London Residential to undertake an air quality assessment for Phase 2 of the Abbey Area Regeneration project in the London Borough of Camden.

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational stages of the Proposed Development. The assessment has been undertaken in line with the relevant policy and guidance, and where necessary, outlines the required mitigation measures to minimise impacts.

A qualitative assessment of construction phase impacts has been carried out. There is a medium risk of dust soiling and fugitive PM_{10} emissions affecting human health from demolition (dust soiling only, low risk for human health), earthworks and a low risk from construction. Trackout holds a medium risk of dust soiling and low risk of fugitive PM_{10} emissions affecting human health. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases will be minimised. The residual effect of the construction phase on air quality is therefore not significant.

The road traffic generated by the Proposed Development does not breach the threshold detailed in the IAQM and EPUK Air Quality Planning Guidance and the provision of heating and hot water is achieved through non-combustion sources. Whilst detailed modelling of building emissions has been scoped out of the assessment, detailed modelling of the traffic implications have been carried out to illustrate the impact associated with existing receptors in the local area and demonstrate the suitability of the site for the short-term receptors introduced as part of the Proposed Development.

In summary, the results indicate the impact of the Proposed Development is classified as negligible for all existing receptors. Although one existing receptor (E10 - 28 College Crescent) exceeds the annual mean air quality objective marginally, under the worst-case scenario assuming no improvement in background concentration or vehicle emission factors, the Proposed Development has no impact on concentrations. The receptors associated with the proposed development all comply with the long-term NO_2 objective, however the short-term objective is more applicable considering the receptor type.

There are no predicted exceedances of the 1-hour mean NO_2 air quality objective at both existing and proposed receptors, with the impacts of the development being negligible and the site being suitable for the introduction of short-term receptors.

With respect to particulates, no exceedances are predicted as a result of the vehicle emissions on PM_{10} and $PM_{2.5}$ concentrations, and impacts are negligible and the site is suitable for the introduction of the proposed receptor type.

The overall residual effect for the operational phase is not significant.

It is worth noting that with the introduction of the Real Driving Emissions (RDE) testing and the emergence of cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which indicate lower emissions than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) that deliver improvements in vehicle emissions, in particular NO_X, ambient pollutant concentrations have the potential to be lower in the future. This is demonstrated by the sensitivity analysis.

The Proposed Development was found to be compliant in relation to Building and Transport Emissions, and is therefore air quality neutral. No mitigation or additional off-setting is required.

Overall, with the inclusion of standard mitigation measures as best practice (construction phase only), the proposals would be compliant with legislation and policy.

1. Introduction

Hilson Moran has been instructed by Wates Construction London Residential to undertake an air quality assessment for Phase 2 of the Abbey Area Regeneration project in the London Borough of Camden. The proposals are hereafter referred to as the 'Proposed Development' or 'Application Site'.

1.1. Proposed Development

Abbey Phase 2 is part of a larger 3 phase masterplan. At this stage, Phase 1 is completed and provides 141 homes, alongside some retail and office space. Phase 2 to which this air quality assessment report supports is in design development and aims to deliver improved and enhanced, fit for purpose facilities to replace the Abbey Community Centre and Belsize Priory Health Clinic which is currently located on the Phase 3 plot. It is understood that Phase 3 will contain further residential development.

The wider masterplan aims to improve the landscape and public realm across all phases, including enhancements to the junction of Abbey Road and Belsize Road.

1.2. Potential Impacts

This report presents the findings of the AQIA for both the operational and construction phases. During the construction phase, activities on the Site could give rise to dust, which, if transported beyond the site boundary, could have an adverse effect on local air quality. During the operational phase, consideration is given to the appropriateness of the site for the introduction of new receptors associated with the development. For both phases, the impacts are identified and the mitigation measures that should be implemented to minimise the impact these are described.

Furthermore, an Air Quality Neutral Assessment (AQNA) has been undertaken in accordance with the Mayor of London's Supplementary Planning Guidance.

A glossary of terms is provided in **Appendix A**.

2. Legislation, Policy and Guidance

The following Section provides a summary of the relevant legislation, planning policy and best practice guidance relevant to air quality and the assessment of impacts from development.

2.1. Air Quality Legislation and Policy

2.1.1. Air Quality Strategy for England, Scotland, Wales and Northern Ireland

The Government's policy on air quality within the UK is set out in the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland[1], most recently updated in July 2007. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that the European Union and International agreements are met in the UK.

The AQS covers the following air pollutants: ammonia (NH_3), benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), oxides of nitrogen (NO_X) (including nitrogen dioxide (NO_2)), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3) and polycyclic aromatic hydrocarbons (PAHs).

The AQS Sets standards and objectives for the listed pollutants for the protection of human health, vegetation and ecosystems. The standards are based on recommendations by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) based on current understanding and scientific knowledge about the effects of air pollution on health and the environment. The air quality objectives are policy based targets set by the UK Government that are often expressed as maximum concentrations not to be exceeded either without exception or with a limited number exceedances within a specified timescale.

For the pollutants considered in this assessment, there are both a long-term (*e.g*. annual mean) and short-term (*e.g*. one hour mean). In the case of NO_2, the short-term standard is for a 1-hour averaging period (no more than 18 exceedances of 200 $\mu g/m^3$ per year), whereas for PM_{10} it is a 24-our averaging period (no more than 35 exceedances of 50 $\mu g/m^3$ per year). The variation in time periods reflects the varying impacts on health of differing exposures to pollutants.

2.1.2. Air Quality Standards Regulations

The air quality objectives in the AQS are statutory in England with the Air Quality (England) Regulations 2000[2] and the Air Quality (England) (Amendment) Regulations 2002[3] for the purpose of Local Air Quality Management (LAQM).

The regulations require likely exceedances of the AQS objectives to be assessed in relation to:

'…*the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present*…'

The Air Quality Standards (Amendment) Regulations 2016[4] transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England, with the Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019[5] ensuring continuation of the transposition of the Directive. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as NO_2, PM_{10} and $PM_{2.5}$. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant AWS objectives and the limit value for $PM_{2.5}$ is a concentration of 20 $\mu g/m^3$. The relevant air quality objectives are presented in Table 2.1.

Table 2.1 Air Quality Objectives for Relevant Pollutants

Pollutant	Concentration	Measured as
NO_2	200 µg/m^3	1-hour mean, not to be exceeded more than 18 times a year (99.79%ile)
	40 µg/m^3	Annual mean
PM_{10}	50 µg/m^3	24-hour mean, not to be exceeded more than 35 times a year (90.41%ile)
	40 µg/m^3	Annual mean
$PM_{2.5}$	25 µg/m^3	Annual mean

2.1.3. Environment Act

Part IV of the Environment Act 1995[6] requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider both the air quality at the time of review and likely future air quality during the 'relevant period' and whether any air quality objectives prescribed in regulations are being achieved or are likely to be achieved in the future. Where the objectives are not likely to be achieved, an authority is required to designate an Air Quality Management Area (AQMA). For each designated AQMA the local authority is required to produce an Air Quality Action Plan (AQAP) that works to ensure compliance with the objectives by implementing a number of air quality improvement measures.

2.1.4. Environmental Protection Action

Section 79 of the Environmental Protection Act 1990 (as amended)[7] makes provision for the identification and control of statutory nuisances. The Act identifies statutory nuisance, in relation to air quality, as:

- '*Any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance*'; and,
- '*Any accumulation or deposit which is prejudicial to health or a nuisance*'.

As a result, the level at which a nuisance occurs is highly variable and dependent on perception with effects influenced by existing conditions and the degree of change that has occurred.

Where a statutory nuisance has been demonstrated the Local Authority must serve an abatement notice, non-compliance with which would constitute a legal offence. The abatement notice may prevent or restrict occurrence of re-occurrence of the nuisance or may, itself, undertake action to abate the nuisance and recover any associated expenses.

2.2. Planning Policy

A summary of the national, regional and local planning policy relevant to air quality and the Proposed Development is detailed below.

2.2.1. National

National Planning Policy Framework

The National Planning Policy Framework (NNPF)[8] sets out policies which will apply to the preparation of local plans and to development management decisions. This framework sets out the Government's economic, environmental and social planning policies for England. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

The NPPF sets out the Government's planning policies on the conservation and enhancement of the natural environment, with the following paragraphs relating to air quality:

- Paragraph 8c, which states '*to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy*';
- Paragraph 54, which states '*Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition*';
- Paragraph 103, which states '*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*';
- Paragraph 170e, which states '*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*';
- Paragraph 181, which states '*Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan*';
- Paragraph 183, which states '*The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities*'; and,
- Paragraph 205c, which states '*ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties*'.

2.2.2. Regional

Clearing the Air: The Mayor's Air Quality Strategy (2010)

The Mayor's Air Quality Strategy[9] is focused on delivering improvements to London's air quality and identifies road traffic as the largest contributor to air pollution. The strategy sets out a framework for improving air quality and details a number of measures to reduce emissions in London, these include:

- Development of electric vehicle infrastructure;
- Congestion charging and the London Low Emission Zone (LEZ);
- Smarter travel initiatives to encourage a shift to greener modes of transport;
- Funding and supporting car clubs (especially hybrid and electric cars);
- Maintaining roads in good repair to reduce the contribution of particulate matter from road surface wear;
- Smoothing traffic;
- Bus emissions programme, so that older buses have been fitted with particulate traps and diesel-electric hybrid buses are introduced as quickly as possible; and
- Publication and implementation of the London Best Practice Guidance for controlling dust and emissions from construction.

Regarding new developments, the Strategy plans to make use of the existing planning system to ensure that any new development does not have a negative impact on air quality in London by stating '*new developments in London shall as a minimum be 'air quality neutral' through the adoption of best practice in the management and mitigation of emissions*'. It also aims to implement the Construction Best Practice Guidance on all construction sites across London.

The London Plan: Spatial Development Strategy for Greater London (2016)

Planning policy in respect of development planning and air quality management is also presented in the adopted London Plan[10]. Policy 7.14 on improving air quality states that development proposals should:

- Minimise exposure to existing poor air quality, make provision for addressing air quality problems and where development is likely to be used by large numbers of people particularly vulnerable to poor air quality, set up design solutions, buffer zones and travel plans for promoting a greater use of sustainable transport modes;
- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance;
- Be at minimum 'air quality neutral' and not lead to further deterioration of existing poor air quality;
- Ensure that where provision needs to be made to reduce emissions from a development, this is generally made on-site; and
- Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

The London Plan (Intend to Publish): Spatial Development Strategy for Greater London (2019)

Planning policy in respect of development planning and air quality management is also presented in the 'Intend to Publish' version of the London Plan[11], which is a material consideration in the planning determination process. Policy SI1 on improving air quality states that,

- *To tackle poor air quality, protect health and meet legal obligations:*

1) *Development proposals should not:*
   i. *Lead to further deterioration of existing poor air quality;*
   ii. *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;*
   iii. *Create unacceptable risk of high levels of exposure to poor air quality.*
2) *In order to achieve the above requirements, as a minimum:*
   i. *Development proposals must be at least Air Quality Neutral;*
   ii. *Development proposals should use design solutions to prevent or minimise increase 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;*
   iii. *Major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of part 1;*
   iv. *Development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people, should demonstrate that design measures have been used to minimise exposure.*

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

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.*

- *In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance;*
- *Development proposals should ensure that where emissions need to be reduced to meet the requirements of Air Quality Neutral or to make the impact of the 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.*

2.2.3. Local

London Borough of Camden Local Plan (2017)

The Camden Local Plan[12] sets out the Council's planning policies. It ensures that Camden continues to have robust, effective and up to-date planning policies that respond to changing circumstances and the borough's unique characteristics and contribute to delivering the Camden Plan and other local priorities. The Local Plan covers the period from 2016-2031.

The policies of interest within the local plan include: Policy CC4 – Air Quality, which states:

'*The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.*

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

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 addition to Policy CC4, this Plan also actively supports the improvement of air quality in Camden by:

- Requiring all new development in the borough to be 'car-free' (see Policy T2 Parking and car-free development);
- Maintaining and increasing green infrastructure (see Policy A2 Open space);
- Reducing emissions associated with new development (see Policy CC1 Climate change mitigation); and,
- Supporting and encouraging sensitive energy efficiency improvements to existing buildings (see Policy CC1 Climate change mitigation).

Camden Draft Clear Air Action Plan (2019)

The Camden Draft Clean Air Action Plan[13] has been produced as part of the borough's duty to London Local Air Quality Management. It outlines the action they will take to improve air quality in Camden between 2019 and 2022. The Clean Air Action Plan (CAAP) is split across seven themes:

- Building Emissions;
- Construction Emissions;
- Transport Emissions;
- Communities and Schools;
- Delivery, Servicing and Freight;
- Public Health and Awareness; and,

- Lobbying.

The CAAP has been developed in recognition of the role local authorities have under the Environment Act to meet the air quality obligations. Camden's role in this includes:

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

The CAAP is support by a number of other plans and strategies (including Camden 2025, Our Camden Plan, Green Action for Change 2010 – 2020, Camden's Parking and Enforcement Plan, Camden's Transport Strategy 2019 – 2022 and the Joint Strategic Needs Assessment) with the overarching aim if improving air quality in the borough of Camden.

2.3. Guidance

A summary of the publications referred to in undertaking the air quality assessment is provided below.

2.3.1. London Local Air Quality Management Technical Guidance

The Mayor of London has published guidance for use by the London boroughs in their review and assessment work[14]. The guidance is referred to as LLAQM.TG(16) and has been appropriately used within this assessment.

2.3.2. Local Air Quality Management Review and Assessment Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities. This technical guidance, identified as LAQM.TG(16)[15], is for use by local authorities for their review and assessment work and has been applied where appropriate to this assessment.

2.3.3. Land-Use Planning and Development Control: Planning for Air Quality

Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance[16], which offers advice as to when and air quality assessment may or may not be required. The guidance document details what should be included within an assessment, how to determine the significance of air quality impacts and the likely mitigation measures required to minimise the impacts.

2.3.4. Guidance on the Assessment of Dust from Demolition and Construction

This document[17], published by the IAQM, provides guidance on how to assess the impact of construction activities on air quality associated with new developments. The methodology prescribed within the document allows the impacts to be categorised based on risk (with particular reference to dust and PM_{10} on sensitive human and ecological receptors) and, where applicable identify mitigation measures associated to the risk classification determined.

2.3.5. National Planning Practice Guidance

The National Planning Practice Guidance[18] outlines how the planning process can address potential air quality impacts associated with new development. It provides guidance on the level of detail required, how impacts can be mitigated and also provides information on how local authorities may take air quality as a specific consideration in a planning decision.

2.3.6. London Councils Guidance for Air Quality Assessments

The London Councils have published guidance[19] for undertaking air quality assessments in the London Boroughs, the majority of which have declared AQMA's. The guidance sets out suggested methodologies for undertaking air quality assessments and sets out criteria for determining the impacts of a new development on air quality.

2.3.7. Mayor of London's Supplementary Planning Guidance for the Control of Dust and Emissions during Construction and Demolition

The Supplementary Planning Guidance (SPG)[20] builds on the London Councils guidance to establish best practice when mitigating impacts on air quality during construction and demolition. The SPG, offers further detail and seeks to address emissions from Non-Road Mobile Machinery (NRMM) through the use of a Low Emission Zone, which was introduced in 2015.

The SPG provides a methodology for assessment the impacts on air quality of the construction and activities following the same procedure set out in the IAQM guidance. It identifies the potential impacts and risks to sensitive receptors and details the relevant control measures required to mitigate any adverse impacts.

2.3.8. Greater London Authority: Sustainable Design and Construction Supplementary Planning Guidance

Section 4.3 of this SPG[21] provides guidance on when an air quality assessment is required, looks at how transport measures can minimise emissions to air and sets out emissions standards/limits for combustion plant.

The SPG also contains guidance on assessing the air quality neutrality of a new development. Emission benchmarks for transport and buildings for NO_X and PM_{10} are detailed in the SPG.

Developments that do not exceed the calculated emission benchmarks are considered 'air quality neutral', however when the emission benchmarks are exceeded the development is not 'air quality neutral'. Where a development exceeds the benchmarks, additional mitigation or off-setting is required. This can be achieved by providing appropriate abatement including: green planting, upgrade or additional abatement to on-site combustion plant, retro-fitting of abatement technology for vehicles or flues and exposure reduction. Such measures can be achieved by condition or S106 contribution. The SPG states that air quality monitoring is not an eligible method for off-setting air quality impacts as this does not contribute to actual air quality improvements.

2.3.9. Camden planning Guidance – Amenity

The Camden Amenity Planning Guidance[22] was adopted in September 2011, but subsequently updated in March 2018. The planning guidance outlines what the Council requires in relation to air quality for a planning application, what an air quality assessment should cover, and what measures can be implemented to minimise pollutant and protect public exposure. This guidance has been used to inform this assessment where appropriate.

2.3.10. Camden planning Guidance – Air Quality

The Camden Planning Guidance on Air Quality[23] forms a Supplementary Planning Document that supports the policies contained within the Local Plan, providing information on key air quality issues within the borough. The guidance provides a background to air quality in the borough, requirements for air quality assessments and measures to minimise emissions to air.

2.3.11. Air Quality Neutral Planning Support Guidance

The Air Quality Neutral Planning Support Guidance[24] provides a methodology for assessing the air quality neutrality of Proposed Developments in London.

3. Methodology

3.1. Scope of the Assessment

The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) at the London Borough of Camden to agree the scope of the assessment and the methodology to be applied;
- Review of the London Borough of Camden's latest review and assessment reports[25] and the air quality data for the area surrounding the Application Site, including the London Borough of Camden, Defra[26], the London Air Quality Network (LAQN)[27] and the London Atmospheric Emissions Inventory[28];
- Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality, and a review of the Proposed Development to establish the location of new sensitive receptors;
- Review of the traffic data provided by Stantec; and,
- Review of energy strategy and heating/hot water proposals provided by Norman Bromley Partnership.

The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase; and,
- Increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant.

The proposals do not include on-site energy generation through combustion sources, such as centralised gas-fired boilers or Combined Heat and Power (CHP) unit. The Proposed Development is not expected to generate traffic, as confirmed by the transport consultant Stantec. As a result, these aspects have been scoped out of the AQIA. The operational phase assessment will, however, consider the air quality associated with the Application site and, as a result, the appropriateness for the introduction of new sensitive receptors.

3.2. Construction Phase

Assessment of the risk of impact associated with the generation of dust during the construction phase of the Development and determination of subsequent mitigation measures necessary has been undertaken following Institute of Air Quality Management (IAQM) guidelines.

The assessment is based on a series of steps: screening the requirement for a detailed assessment, classification of the likely magnitude of dust emissions; characterisation of the area of influence and establishment of its sensitivity to dust; and establishment of the overall risk of impact. The risk of impact from dust emissions from the Development considers effects on human health, nuisance as a result of dust soiling and ecological receptors from four main activities: demolition; earthworks; construction; and trackout. The potential for dust emissions from each activity should be considered, unless any of them are not relevant to the Development.

The guidelines identify appropriate screening criteria for the identification of potential receptors, based on a conservative approach and in consideration of the exponential decline in both airborne concentrations and the rate of deposition with distance. A detailed assessment of the impact of dust from construction sites will be required where:

- A 'human receptor' is located within 350 m of the boundary of the site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance;
- An 'ecological receptor' is located within 50 m of the boundary of the site or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance.

The magnitude of dust emissions for each activity is classified as small, medium or large depending upon the scale of the works proposed, materials involved and level of activity required. The IAQM guidelines provide examples of how the magnitude of emission can be defined, which are identified in Table 3.1. The Development is unlikely to satisfy all criteria within the examples, therefore professional judgement and site specific information are used to identify appropriate emission magnitude.

Table 3.1 ***Dust Emission Magnitude*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Activity	Small	Medium	Large
Demolition	• Total building volume <20,000 m^3 • Construction material with low potential for dust release (*e.g.* metal cladding or timber) • Demolition activities <10 m above ground level • Demolition during wetter months	• Total building volume 20,000 - 50,000 m^3 • Potentially dusty construction material • Demolition activities 10-20 m above ground level	• Total building volume >50,000 m^3 • Potentially dusty construction material (*e.g.* concrete) • On-site crushing and screening • Demolition activities >20 m above ground
Earthworks	• Total site area <2,500 m^2 • Soil type with large grain size (*e.g.* sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4 m in height • Total material moved <20,000 tonnes • Earthworks during wetter months	• Total site area 2,500 - 10,000 m^2 • Moderately dusty soil type (*e.g.* silt) • 5 - 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 – 8 m in height • Total material moved 20,000 - 100,00 tonnes	• Total site area >10,000 m^2 • Potentially dusty soil type (*e.g.* clay) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8 m in height • Total material moved >100,000 tonnes
Construction	• Total building volume <25,000 m^3 • Construction material with low potential for dust (*e.g.* metal cladding or timber).	• Total building volume 25,000 - 100,000 m^3 • Potentially dusty construction material (*e.g.* concrete) • On-site concrete batching	• Total building volume >100,000 m^3 • On-site concrete batching, sandblasting

Activity	Small	Medium	Large
Trackout	• <10 HDV (>3.5t) outward movements* in any one day# • Surface material with low potential for dust release • Unpaved road length <50 m	• 10 - 50 HDV (>3.5t) outward movements* in any one day# • Moderately dusty surface material (*e.g.* high clay content) • Unpaved road length 50 - 100 m	• >50 HDV (>3.5t) outward movements* in any one day# • Potentially dusty surface material (*e.g.* high clay content) • Unpaved road length >100 m
* A vehicle movement is a one way journey, *i.e*. from A to B, and excludes the return journey. # HDV movements during a construction project vary over its lifetime, and the number of movements is the maximum not the average.			

Consideration is given to the likely sensitivity of the area to the impacts of dust, establishing a sensitivity of low, medium or high for dust soiling, human health and ecological receptors. The sensitivity of the area considers a number of factors, including the specific sensitivities of receptors in the area, the proximity and number of those receptors, local baseline conditions such as background concentrations and site specific factors.

The first step in identifying the sensitivity of the area is to establish the sensitivity of the receptor, based on the presence or level of activity associated with the area influenced by the Development. Professional judgement and site specific information are used to assign an appropriate level of receptor sensitivity using the principles outlined in Table 3.2. Following this, the sensitivity of the area can be established from Tables 3.3 to 3.5 based on the sensitivity of the receptor, number of receptors (in the case of human health and dust soiling) and the distance from source.

Table 3.2 Receptor Sensitivity Definitions *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Activity	Low	Medium	High
Dust Soiling	• Enjoyment of amenity would not reasonably be expected; • There is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; • Transient exposure, where people or property is only expected to be present for limited periods of time as part of the normal pattern of use; • Indicative examples include playing fields, farmland, footpaths, short-term car parks and roads.	• Users would expect to enjoy a reasonable level of amenity, but not reasonably at same level as in their home; • The appearance, aesthetics or value of property could be diminished by soiling; • Indicative examples include parks and places of work.	• Users can reasonably expect enjoyment of a high level of amenity; • The appearance, aesthetics or value of property would be diminished by soiling, and continuous or regularly extended periods of presence expected during normal pattern of land use; • Indicative examples include dwellings, museum and other culturally important collections, medium and long-term car parks and car showrooms.

Activity	Low	Medium	High
Human Health	• Locations where human exposure is transient; • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations where the people exposed are workers#, and exposure is over a time period relevant to the air quality objective for PM_{10}*; • Indicative examples include office and shop workers, but not those occupationally exposed to dust.	• Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}*; • Indicative examples include residential properties, hospitals, schools and residential care homes.
Ecological	• Locations with a location designation where the features may be affected by dust deposition, *e.g.* Local Nature Reserve.	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; • Locations with a national designation where the features may be affected by dust deposition, *e.g.* Site of Special Scientific Interest.	• Locations with an international or national designation and the designated features may be affected by dust soiling, *e.g.* Special Area of Conservation with acid heathland; • Location where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain.
* 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, following Defra guidance. # Workers are considered to be less sensitive than the general public as a whole because the most sensitive to the effects of air pollution, such as young children, are not normally workers.			

Table 3.3 ***Sensitivity of the Area to Dust Soiling Effects on People and Property*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Number of Receptors	Distance from Source			
		<20m	<50m	<100m	<350m
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 3.4 Sensitivity of the Area to Human Health Impacts** (Source: IAQM Guidance, v1.1 Updated June 2016)*

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source				
			<20 m	<50 m	< 100 m	<200 m	<350 m
High	>32 µg/m³	>100	High	High	High	Medium	Low
		10 – 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28 - 32 µg/m³	>100	High	High	Medium	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24 – 28 µg/m³	>100	High	Medium	Low	Low	Low
		10 – 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low	Low
		10 – 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low	Low
		1 – 10	Medium	Low	Low	Low	Low
	28 - 32 µg/m³	>10	Medium	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	24 – 28 µg/m³	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low	Low
		1 – 10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

***Table 3.5 Sensitivity of the Area to Ecological Impacts** (Source: IAQM Guidance, v1.1 Updated June 2016)*

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

3.2.1. Establishing Significance

The risk of dust related impacts from the Proposed Development is established from the sensitivity of the area and the likely dust emission magnitude. The risk should be established, on the worst-case area sensitivity and in the absence of mitigation, for each of the construction related activities (demolition, earthworks, construction and trackout) following the matrix in Table 3.6.

Table 3.6 ***Risk of Dust Impacts from Each Activity*** *(Source: IAQM Guidance, v1.1 Updated June 2016)*

Sensitivity of Area	Activity	Dust Emission Magnitude		
		Large	Medium	Small
High	Demolition	High Risk	Medium Risk	Medium Risk
	Earthworks	High Risk	Medium Risk	Low Risk
	Construction	High Risk	Medium Risk	Low Risk
	Trackout	High Risk	Medium Risk	Low Risk
Medium	Demolition	High Risk	Medium Risk	Low Risk
	Earthworks	Medium Risk	Medium Risk	Low Risk
	Construction	Medium Risk	Medium Risk	Low Risk
	Trackout	Medium Risk	Low Risk	Negligible
Low	Demolition	Medium Risk	Low Risk	Negligible
	Earthworks	Low Risk	Low Risk	Negligible
	Construction	Low Risk	Low Risk	Negligible
	Trackout	Low Risk	Low Risk	Negligible

The IAQM guidelines identify a range of mitigation measures intended to reduce the emission and effects of dust from construction sites, and identify their likely applicability to a development based on the level of impact risk attributed. Consideration is given to these in the development of mitigation measures, with the significance of the residual effect based on professional judgement.

3.3. Operational Phase

3.3.1. Road Traffic Emissions

Road traffic emissions are typically the main source of NO_X, PM_{10} and $PM_{2.5}$ concentrations resulting from developments.

To understand the NO_2, PM_{10} and $PM_{2.5}$ concentrations arising as a result of the development, a detailed assessment using the air dispersion model ADMS-Roads, Version 4.1.1.0 (release date 18/01/2018) has been undertaken. This model uses detailed road traffic information, surface roughness and local meteorological information to predict the impact on pollutant concentrations at specific receptor points. Table 3.7 summarises the air quality modelling parameters for road traffic.

Table 3.7 ***ADMS Roads Modelling Parameters***

Parameter	Local Area	Met. Measurement Site
Latitude	51.5	51.5
Surface Roughness	1	1
Monin-Obukhov Length (m)	30	30

The ADMS model uses meteorological data, including wind speed and direction, to determine how pollution is transported and diluted with distance from the source. For this assessment meteorological data from London City Airport for 2019 (to align with the baseline year) has been utilised as this is considered representative of the Site, although meteorological data from 2018 has been used in the verification process to represent the conditions associated with the monitoring as closely as possible.

The traffic data used in the air quality assessment is identified in Table 3.8 and the roads identified in **Figure 2**.

Table 3.8 Traffic Data Used in the Assessment

Link No.	Link Name	Speed (mph)	2019 Baseline		2022 Baseline	
			Total AADT	% HDV	Total AADT	% HDV
1	B509 Hilgrove Road	23.9	10,748	7.8%	11,234	7.8%
2	B509 Hilgrove Road	23.9	10,748	7.8%	11,234	7.8%
3	B509 Hilgrove Road	23.9	10,748	7.8%	11,234	7.8%
4	A41 Finchley Road	28.1	26,555	21.7%	27,756	21.7%
5	A41 Finchley Road	28.1	26,555	21.7%	27,756	21.7%
6	A41 Finchley Road	28.1	26,555	21.7%	27,756	21.7%
7	A41 Finchley Road	28.1	26,555	21.7%	27,756	21.7%
8	A41 Finchley Road	32	17,239	15.8%	18,019	15.8%
9	A41 Finchley Road	32	17,239	15.8%	18,019	15.8%
10	B511 College Crescent	21.7	17,103	7.6%	17,877	7.6%
11	Finchley Road	21.7	17,103	7.6%	17,877	7.6%
12	B511 College Crescent	21.7	17,103	7.6%	17,877	7.6%
13	B511 College Crescent	21.7	17,103	7.6%	17,877	7.6%
14	B509 Belsize Road	24.6	8,915	9.5%	9,318	9.5%
15	B509 Belsize Road	24.6	8,915	9.5%	9,318	9.5%
16	B509 Belsize Road	24.6	8,915	9.5%	9,318	9.5%
17	B509 Belsize Road	24.6	8,915	9.5%	9,318	9.5%
18	B507 Abbey Road	23.8	13,510	9.9%	14,122	9.9%
19	B507 Abbey Road	23.8	13,510	9.9%	14,122	9.9%
20	B507 Abbey Road	23.8	10,547	12.4%	11,024	12.4%
21	B507 Abbey Road	23.8	10,547	12.4%	11,024	12.4%
22	B509 Belsize Road	23.8	8,268	10.2%	8,642	10.2%
23	B509 Belsize Road	23.8	8,268	10.2%	8,642	10.2%
24	B509 Belsize Road	23.8	8,268	10.2%	8,642	10.2%
25	B509 Belsize Road	23.8	8,268	10.2%	8,642	10.2%
26	B509 Belsize Road	23.8	8,268	10.2%	8,642	10.2%

Model Scenarios

For the assessment, the following scenarios have been modelled:

- 2018 – Verification;
- 2019 – Baseline; and
- 2022 – Baseline with Committed Developments.

The above scenarios utilise emission factors and background concentrations from 2019, *i.e.* no improvement in the baseline position, with the exception of the model verification which was based on 2018 emission factors and background concentrations.

A sensitivity analysis has been undertaken for the following scenarios:

- 2022 – Baseline with Committed Developments.

The sensitivity analysis utilises emission factors and background concentrations from 2022, representing the proposed opening year for the development. This approach assumes some improvements will occur and is considered to be the most reasonable and likely outcome.

Vehicle Emission Factors

Vehicle emission factors for input into ADMS-Roads have been calculated using the EFT version 9.0 (published May 2019), available on the Defra website[29]. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2017 and 2030. For the predictions of future year emissions, the toolkit takes into account factors such as anticipated advances in vehicle technology and changes in fleet composition, such that vehicle emissions are assumed to reduce over time. There is good evidence from real-world testing of EURO 6 (VI) compliant vehicles of substantial improvements in vehicle emissions comparted to earlier EURO categories, in particular with respect to NO_X emissions. Total pollutant concentrations are, therefore, likely to be lower in 2022 than in 2019.

Emission factors for NO_X, PM_{10} and $PM_{2.5}$ for all modelled scenarios under the non-sensitivity analysis have been calculated using Defra's EFT calculator. All scenarios use 2019 emission factors, presenting a worst-case scenario.

By assuming no improvement in emission factors between 2019 and 2022 is an extreme worst case approach, therefore under the sensitivity analysis emission factors from 2022 have been utilised. Although there had previously been some uncertainty over how representative future emission factors are using Defra's EFT calculator, particular in relation to NO_X, the current EFT is most likely to over-predict drive-cycle average NO_X emissions from EURO 6 (VI) diesel cars and therefore adjustment factors are no longer required.

Defra's EFT calculator has also been used to calculate the emission factors for PM_{10} and $PM_{2.5}$.

Selection of Background Concentrations

Background concentrations for NO_2, PM_{10} and $PM_{2.5}$ have been obtained from Defra's website, which provides background concentrations mapped at a grid resolution of 1 x 1 km for the whole of the UK. Estimated background concentrations are available for all years between 2017 and 2030, and the maps assumed that background concentrations will reduce (*i.e*. improved) over time.

The Defra background concentrations have been selected for use in the modelling as the 2018 results are slightly higher than the concentrations identified by local urban background monitoring from the Frognal Way diffusion tube run by the London Borough of Camden.

For the non-sensitive analysis, 2019 background concentrations will be applied to the baseline and future (2022) assessment scenarios as a worst case approach – this aligns with the emission factors utilised.

For the sensitivity analysis, 2022 background concentrations will be applied to the future year scenario to align with the emission factors utilised.

Background concentrations for each of the receptors are included in Appendix B.

Model Verification

The ADMS-Roads dispersion model has been validated by the software developer and is considered to be fit for purpose, however local model validation, *i.e.* in the vicinity of the Proposed Development, has not been undertaken. Therefore, to validate the model and to determine how well the model is performing at a local level, comparing the modelling results with local monitoring data is undertaken. The verification process aims to minimise model uncertainty and error by adjusting the modelled results by a factor to offer greater confidence in the final results. This is undertaken in accordance with the methodology specified in Chapter 7, Section 4 of LAQM.TG16.

Details of the verification factor calculations are presented in Appendix C. An adjustment factor of 1.74 was obtained during the verification process, which indicated that the model was under-predicting. This factor was applied to the modelled road-NO_X outputs prior to conversion to annual mean NO2 concentrations utilising the NO_X to NO_2 calculator (version 7.1, released April 2019) provided by Defra[30].

No local roadside monitoring data was available for PM_{10} and $PM_{2.5}$, therefore the adjustment factor calculated for NO_X has been applied to both the modelled PM_{10} and $PM_{2.5}$ concentrations prior to adding to the appropriate background concentration. This approach is in accordance with LAQM. TG16.

3.3.2. Combustion Plant Emissions

The M&E Consultant (Norman Bromley) have confirmed that the development have allowed for the provision of heating and hot water through non-combustion sources, with both delivered through heat pumps. There will also be no allowance for any on-site diesel generators.

As a result, consideration of impacts associated with building emissions are not required and have therefore been excluded from the assessment. Furthermore, with non-combustion sources replacing existing combustion sources, the overall effect from the building is likely to be positive in relation to building related emissions.

3.3.3. Significance Criteria

The EPUK and IAQM provide guidance for establishing the significance of air quality impacts arising as a result of the Proposed Development. The magnitude of impact on individual receptors is dependent upon the long-term average pollutant concentrations at the receptor in the assessment year and the percentage change relative to the Air Quality Assessment Level (AQAL), as identified in Table 3.9.

Table 3.9 Impact Descriptors

Long-term Average Concentration at Receptor in Assessment Year	Percentage Change in Concentration to AQAL*			
	1	2-5	6-10	>10
75% of less of AQAL	Negligible	Negligible	Slight	Moderate
76 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Substantial	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

* Where the % change is <0.5% the change is described as 'Negligible' regardless of concentration.

The guidelines do not, however, provide a set method for establishing the significance of impact. Whilst the establishment of the impact magnitude on individual receptors can be identified as negligible, slight, moderate or substantial, the significance of the overall effect is dependent on a number of factors. Therefore, professional judgement will be applied to determine the likely significance of effects, with the following factors considered:

- The existing and future air quality in the absence of the development, notably whether the Air Quality Objectives are likely to be met or the scale of exceedances in the long-term and short-term concentrations;
- The extent of current and future population exposure to the impacts, notably the number of properties and/or people present and the scale of impact (e.g. whether the majority of the local population is subject to substantial or slight magnitude impacts);
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts, such as establishing a worst-case scenario for sensitive receptors.

In addition, the London Council's guidance for air quality assessment[31] provides a flow chart for assessing the significance of air quality impacts. These are illustrated in Table 3.10.

Table 3.10 London Council's Flow Chart Method for Assessing the Significance of Air Quality Impacts

Effect of Development	Outcome
Will development interfere with or prevent implementation of measures in the AQAP?	Air Quality is an overriding consideration.
Is development likely to cause a worsening of air quality or introduce new exposure into the Air Quality Management Area (AQMA)?	Air Quality of a highly significant consideration.
Would the development contribute to air quality exceedances or lead to the designation of a new AQMA?	Air Quality is a highly significant consideration.
Is the development likely to increase emissions of or increase/introduce new exposure to PM_{10}?	Air Quality is a significant consideration.

The London Councils guidance for air quality assessments has published the Air Pollution Exposure Criteria (APEC) specifically for new exposure to determine the significance of new exposure to poor air quality and level of mitigation required. The APEC criteria are identified in Table 3.11.

Table 3.11 London Council's Significance Criteria

APEC Level	Applicable Range Annual Average NO_2	Applicable Range PM_{10}	Recommendation
A	>5% below national objective	Annual Mean: >5% below national objective 24-hour Mean: >1 day less than the national objective	No air quality grounds for refusal, however mitigation of any emissions should be considered.

APEC Level	Applicable Range Annual Average NO_2	Applicable Range PM_{10}	Recommendation
B	Between 5% below or above national objective	Annual Mean: Between 5% below or above national objective. 24-hour Mean: Between 1 day above or below the national objective.	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered – *e.g.* maximise distance from pollution source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
C	>5% above national objective	Annual Mean: > 5% above national objective 24-hour Mean: >1 day more than the national objective	Refusal on air quality grounds should be anticipated unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

3.4. Air Quality Neutral Assessment

In line with the Sustainable Design and Construction SPG (2014), an Air Quality Neutral Assessment (AQNA) is required for all new developments. The AQNA compares NO_X and PM_{10} emission for buildings and transport against calculated benchmarks. NO_X and PM_{10} emission for buildings and transport have been calculated based on the information in Table 3.12.

Table 3.12 Input Parameters for AQNA

Parameter	Value Used
Gross Internal Area (m^2)	1,862 (Health & Community Centre – D1- Use Class)
Energy Centre Total NO_X Emissions (kg/year)	0
Annual Development Generated Vehicle Trips	8 per day for 365 days per year – 2,920

The NO_X and PM_{10} emissions calculated using the information in Table 3.12 are compared to the benchmarks provided in Table 3.13. For the transport emissions, the use proposed class (D1 (a) Medical & Health Services) included in the Proposed Development do not have Transport Emission Benchmarks specifically assigned:

- Use Classes D1 and D2, the AQN guidance identifies that a benchmark cannot be derived, therefore we have applied this as B1 with the office use likely to have a similar transport requirement.

Should a benchmark be exceeded (*i.e.* is in deficit), mitigation will be required either locally or by off-setting emissions elsewhere.

Table 3.13 Emission Benchmarks for AQNA

Land Use Class	Benchmark Category	NO_X Benchmark (kg/yr)	PM_{10} Benchmark (kg/yr)
D1 (a) Medical & Health Services*	Buildings	80.1	4.6
	Transport	21.2	3.8

*Inclusive of community centre

3.5. Sensitive Receptors

Defra provides guidance on locations where the air quality objectives should apply and Table 3.14 and professional judgement have been used to select receptors where likely significant exposure to pollutant concentrations may occur.

Table 3.14 Examples of where the Air Quality Neutral Objectives may or may not apply

Averaging Period	Objectives Should Apply	Objectives Should Generally Not Apply
Annual Mean	All locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short term.
24-hour Mean	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other locations where public exposure is expected to be short term.
1-hour Mean	All locations where the annual mean and 24 -hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets) Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-minute Mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	-

The modelled receptors used within the study area are identified in Appendix B and illustrated in **Figure 3**.

3.6. Limitations and Assumptions

Professional judgement has been used in the completion of the construction phase dust assessment for the Proposed Development.

It is assumed that the information provided by the transport consultants (Stantec) and M&E engineers (Norman Bromley) is accurate.

The ADMS Roads dispersion model has been used in this assessment to assess the impact of development generated traffic. The dispersion models rely on input data, such as traffic data and predicted emissions data, *etc*., which may have uncertainties associated with them. The models simplify complex environments and does not always accurately reflect local micro-climatic conditions which may ultimately affect the predicted pollutant concentrations.

The assessment has been undertaken on a worst case basis, assuming no improvement in emission factors or concentrations between 2019 and the operational year of 2022. A sensitivity analysis has been undertaken, whereby emission factors and background concentrations for 2022 have been utilised to demonstrate how the results would alter as a result of improvements in vehicle emissions and background concentrations.

The Defra background concentrations indicate air quality conditions at ground level. These ground level concentrations have been applied to all receptors, including those at height. As a result, the concentrations are likely to be lower at the receptors at height than predicted, but the assessment presents the worst case scenario and is therefore appropriate.

As discussed in Section 3.4, where Use Classes within the development do not have transport emission benchmark within the AQN Guidance, professional judgement has been applied to attribute an appropriate benchmark to provide a worst case assessment.

Hilson Moran consider the assumptions made in the assessment to be reasonable and robust.

4. Baseline Conditions

4.1. Defra 2017 Background Maps

The UK Air Information Resource (AIR) is operated by Defra and includes computer modelled predictions of background concentrations of air pollutants over the whole of the UK with a grid resolution of 1 km^2. Background concentrations are those levels that would be expected to be observed away from specific sources of air pollutants, such as roads and industrial installations. The background information for relevant pollutants in the grid squares covering the development are provided in Table 4.1.

Table 4.1 Defra 2017 Background Pollutant Data Relevant to the Proposed Development

Grid Square	Pollutant	Pollutant Concentration (µg/m³)				
		2018	2019	2020	2021	2022
525500 184500	NO_2	26.97	25.42	23.76	22.98	22.20
	NO_X	43.50	40.14	36.73	35.27	33.84
	PM_{10}	17.23	16.94	16.65	16.49	16.32
	$PM_{2.5}$	11.78	11.56	11.35	11.21	11.08
526500 184500	NO_2	30.94	29.14	27.14	26.25	25.36
	NO_X	52.24	47.99	43.57	41.78	40.04
	PM_{10}	18.31	18.02	17.72	17.55	17.38
	$PM_{2.5}$	12.33	12.10	11.88	11.75	11.61
526500 183500	NO_2	30.07	28.29	26.40	25.53	24.66
	NO_X	50.26	46.15	42.04	40.31	38.64
	PM_{10}	17.91	17.62	17.33	17.16	16.99
	$PM_{2.5}$	12.08	11.87	11.66	11.52	11.38
525500 183500	NO_2	29.91	28.26	26.44	25.56	24.67
	NO_X	50.34	46.53	42.55	40.79	39.06
	PM_{10}	18.36	18.06	17.76	17.59	17.43
	$PM_{2.5}$	12.35	12.14	11.93	11.79	11.65

4.2. Local Air Quality Information

Between 1998 and 2000, the LBC undertook its first round of review and assessment for air quality. Following this review, it was concluded that a borough wide AQMA warranted designation due to exceedances of the AQS objectives for annual mean of NO_2 and PM_{10} concentrations and 24-hour PM_{10} concentrations, predominantly brought about by road transport emissions. The Proposed Development lies within the existing AQMA (see **Figure 4**) and in close proximity to an Air Quality Focus Area (AQFA). Since then, exceedances of the objective for annual mean concentrations of NO_2 have persisted in many locations (most pronounced at roadside).

4.2.1. Local Air Quality Monitoring Data

LBC operates four continuous monitoring stations and undertakes passive diffusion tube monitoring at 14 locations. The relevant monitoring locations are presented in **Figure 5**.

Nitrogen Dioxide

Table 4.2 and Table 4.3 presents the annual mean NO_2 concentrations and the number of exceedances of the 1-hour NO_2 objective, respectively for the most representative continuous monitors.

The annual mean NO_2 objective has been exceeded at all monitoring locations between 2012 and 2016. The Urban Background monitor at Bloomsbury fell within the annual mean NO_2 objective for 2017 and 2018, however the kerbside monitor at Swiss Cottage continued to exceed the annual mean NO_2 objective.

As can be seen from Table 4.3, the monitoring data has been compliant with the 1-hour mean NO_2 objective between in all years monitored at London Bloomsbury. Swiss Cottage indicates exceedance of the 1-hour mean objective in 2012 and 2013 and then again in 2016, complying with the objective for the first time in 2014 and 2015 and again in 2017 and 2018.

Table 4.2 Continuous Monitoring – Annual Mean NO_2

Site ID	X, Y	Type	Annual Mean (µg/m^3)						
			2012	2013	2014	2015	2016	2017	2018
London Bloomsbury	530123, 182014	UB	**55**	**44**	**45**	**48**	**42**	38	36
Swiss Cottage	526629, 184391	K	**70**	**63**	**66**	**61**	**66**	**53**	**54**

Bold indicates an exceedance of the annual mean objective.
Data capture was greater than 90% at all monitoring locations in 2018, with 92% for Bloomsbury and 95% for Swiss Cottage.
Notes: UB = Urban Background, K = Kerbside

Table 4.3 Continuous Monitoring – 1-Hour Mean NO_2

Site ID	X, Y	Type	Number of Exceedances of 1-Hour Mean NO_2 Objective Threshold of 200 µg/m^3 (<18 exceedances/yr)						
			2012	2013	2014	2015	2016	2017	2018
London Bloomsbury	530123, 182014	UB	1	0	0	0	0	0	0
Swiss Cottage	526629, 184391	K	**43**	**42**	14	11	**37**	1	2

Bold indicates an exceedance of the annual mean objective.
Data capture was greater than 90% at all monitoring locations in 2018, with 92% for Bloomsbury and 95% for Swiss Cottage.
Notes: UB = Urban Background, K = Kerbside

Table 4.4 presents a summary of the diffusion tube monitoring collected by LBC between 2012 and 2018.

The Urban Background monitor at Frognal Way (CA7) does not exceed the annual mean NO_2 objective over the monitoring period. However, the other monitors in the study area all exceed the objective between 2012 and 2017, and only the monitor at Emmanuel Primary (CA25) falls beneath the objective over the monitoring period.

Table 4.4 Diffusion Tube Monitoring – Annual Mean NO_2

Site ID	X, Y	Type	Annual Mean (µg/m³)						
			2012	2013	2014	2015	2016	2017	2018
CA7 Frognal Wy	526213, 185519	UB	28.89	31.95	28.55	27.78	27.91	32.26	22.1
CA15 Swiss Cottage	526633, 184392	K	**72.66**	**83.08**	**74.34**	**69.28**	**73.86**	-	**62.3**
CA17 47 Fitzjohn's Rd	526547, 185125	R	**61.20**	**65.24**	**60.30**	**55.80**	**56.38**	-	**48.1**
CA25 Emmanuel Primary	525325, 185255	R	**45.94**	**57.91**	**48.36**	**47.70**	**52.18**	**55.16**	39.8
Bold indicates an exceedance of the annual mean objective. Data capture in 2018 was 92% for CA7 Frognal Way and CA25 Emmanuel Primary, and 83% for 47 Fitzjohn's Road. The data capture was only 42% for CA15 Swiss Cottage, therefore care needs to be given when using this data. Notes: UB = Urban Background, K = Kerbside, R = Roadside									

Particulate Matter

Table 4.5 and Table 4.6 presents the annual mean PM_{10} concentrations and the number of exceedances of the 24-hour PM_{10} objective, respectively for the most representative continuous monitors.

Annual mean PM_{10} concentrations (Table 4.5) at both monitoring locations have been well below the air quality objective since 2012. As can be seen from Table 4.6, the measured data also indicates compliance with the short term air quality objective for PM_{10} for both sites.

Table 4.5 Continuous Monitoring – Annual Mean PM_{10}

Site ID	X, Y	Type	Annual Mean (µg/m³)						
			2012	2013	2014	2015	2016	2017	2018
London Bloomsbury	530123, 182014	UB	19	18	20	22	20	19	17
Swiss Cottage	526629, 184391	K	23	21	22	20	21	20	21
Bold indicates an exceedance of the annual mean objective. Data capture for 2018 was 88% for Bloomsbury and 96% for Swiss Cottage. Notes: UB = Urban Background, K = Kerbside									

Table 4.6 Continuous Monitoring – 24-Hour Mean PM_{10}

Site ID	X, Y	Type	Number of Exceedances of 24-Hour Mean NO_2 Objective Threshold of 50 µg/m^3 (<35 exceedances/yr)						
			2012	2013	2014	2015	2016	2017	2018
London Bloomsbury	530123, 182014	UB	10	4	11	6	9	6	1
Swiss Cottage	526629, 184391	K	21	8	12	8	7	8	4

Bold indicates an exceedance of the annual mean objective.
Data capture for 2018 was 88% for Bloomsbury and 96% for Swiss Cottage.
Notes: UB = Urban Background, K = Kerbside

Table 4.7 presents the annual mean $PM_{2.5}$ concentrations for the Bloomsbury and Swiss Cottage continuous monitors. Annual mean $PM_{2.5}$ concentrations (Table 4.7) at both monitoring locations have been well below the air quality objective since 2015.

Table 4.7 Continuous Monitoring – Annual Mean $PM_{2.5}$

Site ID	X, Y	Type	Annual Mean (µg/m^3)						
			2012	2013	2014	2015	2016	2017	2018
London Bloomsbury	530123, 182014	UB	-	-	-	11	12	13	10
Swiss Cottage	526629, 184391	K	-	-	-	12	15	16	11

Bold indicates an exceedance of the annual mean objective.
Data capture for 2018 was 92% for Bloomsbury and 88% for Swiss Cottage.
Notes: UB = Urban Background, K = Kerbside

4.2.2. London Atmospheric Emissions Inventory

The LAEI includes dispersion model results for the whole of London for 2016 (updated July 2019) and 2020 (updated in April 2017). Estimated ground level annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$ in the vicinity of the Application Site are presented in **Figures 6** to **8**.

Figure 6 presents the 2016 LAEI baseline concentrations for annual mean NO_2 in the vicinity of the Application site. This indicates elevated ground level concentrations in excess of 50 µg/m^3 along the adjoining roads (Belsize Road and Abbey Road). Within the Application Site boundary, baseline annual mean NO_2 concentrations are generally around the 40 µg/m^3 concentration with the highest being 43.4 µg/m^3. Due to the resolution of the model, some of the concentrations associated with the roads of around 50 µg/m^3 also fall within the site, however using professional judgement it is not considered likely that these would be experience in the Application Site boundary.

Defra's LAQM.TG(16) guidance provides an approach by which to determine compliance with the 1-hour mean objective for NO_2. It suggests that where annual mean NO_2 concentrations do not exceed 60 µg/m^3 then it is likely that exceedances of the 1-hour mean concentrations do not occur. As identified above the 2016 LAEI baseline data demonstrates that annual mean NO_2 concentrations do not exceed 60 µg/m^3 within the Application Site boundary, and therefore it is unlikely that the 1-hour mean AQS objective at the Proposed Development would be exceeded.

Figure 7 presents the 2016 LAEI baseline concentrations for annual mean PM_{10} in the vicinity of the Application Site. This indicates ground level concentrations are between 25 and 30 µg/m^3 along the adjoining roads. Within the Application Site boundary the estimated annual mean PM_{10} concentrations are generally below 25 µg/m^3, and where elevations associated with adjoining roads fall within the site these are all below 30 µg/m^3.

Figure 8 presents the 2016 LAEI baseline concentrations for annual mean $PM_{2.5}$ in the vicinity of the Application Site. This indicates ground level concentrations around 16 µg/m^3 along adjoining roads of Belsize Road and Abbey Road. Within the Application Site boundary the estimated mean $PM_{2.5}$ concentrations are generally below 15 µg/m^3.

Based upon GLA forecasts on expected emission reductions, **Figures 9, 10** and **11** (taken from the 2020 LAEI mapped data) estimated ground level annual mean concentrations for NO_2, PM_{10} and $PM_{2.5}$ in 2020 are predicted to be lower than those presented in **Figures 6, 7** and **8** for 2016. With the introduction of the Real Driving Emissions (RDE) testing and the likely improvement in cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which are substantially cleaner than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) delivering improvements in vehicle emissions, in particular NO_X, then ambient pollutant concentrations could potentially be lower in 2020 than predicted by the 2016 LAEI baseline. However, it is important to note that such improvements would depend upon traffic growth, congestion and the implementation of government/local authority air quality initiatives and policy.

5. Effects Appraisal and Site Suitability

5.1. Construction

5.1.1. Assessment of Potential Dust Emission Magnitude

The likely magnitude of dust emissions from the Proposed Development for the four main activities has been assessed, as identified in Table 5.1.

Table 5.1 Predicted Magnitude of Dust Emissions from Proposed Development

Activity	Magnitude	Justification
Demolition	Small	There is a small amount of demolition activity proposed, this includes a pedestrian footbridge (35m^3) and two ramps (10m^3 each). The total volume of material to be demolished is 55m^3, which is well below the small threshold of 20,000m^3 set out in the IAQM guidance. The material to be demolished is concrete and therefore has the potential for dust releases. The height of the bridge does not exceed 10m, therefore all demolition works will occur below this threshold. Based on this information, it is reasonable to categorise the dust emission magnitude as small.
Earthworks	Medium	Although the site area is 10,860 m^2, however the area in which the development is taking place is much smaller, at 935.6m^2. The soil type is potentially dusty, no bunds are proposed. Earthworks will be limited to site levelling and for the establishment of foundations, therefore excavated material is estimated at 600m^3, which equates to approximately 212 tonnes (well below 20,000 tonnes set out for the small threshold). A maximum of two excavators and two earth moving vehicles will be used during this stage i.e. less than five as set out in the IAQM threshold for small. However, due to the site area it has been classified as Medium.
Construction	Small	The total building volume is 20,045m^2 (below 25,000m^2 as set out in the IAQW Guidance small threshold). The material to be used in the construction stage includes steel, brick and timber cladding, composite floor decking and plasterboard partitions – the dust release potential is low.
Trackout	Medium	Considering the size of the Proposed Development, the outward movements of vehicles is as follows: • 32t Tipper: 20 muck away deliveries per day during first 8 weeks • Skip loader: 2 deliveries per week during first 10 weeks • Articulated vehicles: 1 delivery per day • 18t flatbed: 1 deliveries per day for duration of project • 3.5t van: 6 deliveries per day for duration of project Based on the above information the maximum number of outward HDV movements is 30, which is below the threshold of 50. The proposed haul roads are expected to be kept to a minimum (*i.e.* <50 m) but will be concrete to minimise dust resuspension.

5.1.2. Sensitivity of the Area

A wind rose for London City Airport for 2019 is provided in Appendix D, which indicates that the prevailing wind direction is from the south-west. Therefore, existing receptors that are located to the north-east are most likely to fall within the area of influence from dust emissions generated by the construction phase. The extent of the zone of influence from construction dust is identified in **Figure 12**.

The majority of dust generated by the construction stage is likely to be deposited in close proximity to the source. Surrounding the Application Site, the majority of existing buildings are residential in nature, with terrace houses lining both sides of Belsize Road and various apartment buildings present both within the development site and in the wider area along Belsize Road, Abbey Road and Rowley Way on the far side of the railway line. However, as the wider masterplan site incorporates the two apartment blocks overlooking Abbey Road, there are more than 100 receptors within 20 m of the development. In reality, these buildings on site will fall c. 50 m from the majority of the construction works based on the footprint of the new building, however this has little effect on the sensitivity of the area from dust soiling as there would still be more than 100 residential receptors within 50 m of the works. For human health, considering the buildings on site as falling within 20 m of the works represents a worst case scenario.

There are no ecological receptors located within 50 m of the Application Site, or within 50 m of the likely construction traffic route for 500 m from the site boundary, and therefore consideration of these receptors has been scoped out.

The background PM_{10} concentration within the Application Site is less than 24 µg/m^3, which is well below the annual mean air quality objective.

The sensitivity of the area to each of the previously identified impact types associated with the Proposed Development are identified in Table 5.2.

Table 5.2 Sensitivity of Receptors to Dust Emission Effects

Impact Type	Sensitivity of Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Medium	Medium	Medium	Medium
Ecological	N/A	N/A	N/A	N/A

5.1.3. Risk of Impact

To determine the risk of impacts prior to the implementation of mitigation the dust emission magnitude and the sensitivity of the area have been combined. Table 5.3 below summaries the potential risk of impacts during the construction phase.

Table 5.3 Risk of Dust Related Impacts from the Proposed Development

Impact Type	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Medium Risk	Low Risk	Medium Risk
Human Health	Low Risk	Medium Risk	Low Risk	Low Risk
Ecological	N/A	N/A	N/A	N/A

The risk of dust related impacts from the Proposed Development on existing receptors in the vicinity of the Application Site is Medium to Low Risk for dust soiling and Medium to Low Risk for human health, without the implementation of mitigation.

5.1.4. Construction Road Traffic and Non-Road Mobile Machinery (NRMM)

The greatest impact on air quality due to construction traffic and NRMM is likely to be along roads in the vicinity of the Application Site. It is likely that construction traffic will enter the Application Site via Belsize Road, but the volume of construction traffic will be low compared to the existing traffic flows.

Based on the current local air quality in the area, the proximity of sensitive receptors to the roads likely to be used by construction vehicles, the impacts are therefore considered to be slight adverse without the implementation of mitigation.

5.2. Operational Phase

Full results of the dispersion modelling are presented in **Appendix E** and a summary is provided below.

The proposals for the site include for new receptor types, associated with the health centre and community uses. As a result, a number of the air quality objectives do not generally apply for the specified land uses (as set out in Table 3.14) with the long-term air quality objectives not applicable to the proposed use of the site. As a result, the short-term objectives are more applicable for receptors introduced by the Proposed Development. The surrounding receptors do, however, include residential receptors for which the long-term objectives apply.

5.2.1. Impact Assessment

Annual Mean NO_2 Concentration

The objective for annual mean NO_2 concentrations is 40 µg/m^3. In the 2019 baseline, the annual mean NO_2 concentrations at existing sensitive receptor locations fall within the objective with the exception of one, which is sensitive receptor E10 (28 College Crescent) where the predicted concentration is 40.6 µg/m^3.

In 2022, concentrations at existing receptors remains similar to the 2019 baseline with all existing receptors falling within the air quality objective with the exception of sensitive receptor E10 (28 College Crescent). The concentration at this location is 41.0 µg/m^3. As the traffic related to the development falls within the thresholds for detailed assessment, the additional traffic has a negligible influence on flows and, as a result, no influence on predicted annual mean NO_2 concentrations. Therefore, the Proposed Development has a negligible impact.

All of the annual mean NO_2 concentrations in 2022 for receptors within the Proposed Development fall within the air quality objective, with the highest predicted annual mean NO_2 concentration being 37.8 µg/m^3 at proposed receptor P1 (Western corner of site along Abbey Road). All receptors would be classified as APEC A, with concentrations falling more than 5% under the air quality objective. However, the proposed receptors are not considered to be long-term receptors with the short-term objective more applicable.

Hourly Mean NO_2 Concentration

The objective for hourly mean NO_2 concentrations is 200 µg/m^3 to be exceeded no more than 18 times a year. Following the approach within Defra's LAQM.TG(16), which suggests that where annual mean NO_2 concentrations do not exceed 60 µg/m^3 then it is likely that exceedances of the 1-hour mean concentrations do not occur, all existing and proposed receptors are considered unlikely to be exposed to exceedances of the hourly mean NO_2 concentration. Therefore, impacts associated with the short-term NO_2 objective in 2019 and 2022 are negligible.

Annual Mean PM_{10} Concentration

The objective for annual mean PM_{10} concentrations is 40 µg/m^3. In the 2019 baseline, the annual mean PM_{10} concentrations at existing sensitive receptor locations all fall within the air quality objective. The highest concentration is 19.9 µg/m^3 at a sensitive receptor E10 (28 College Crescent).

In 2022, concentrations at existing receptors remains similar to the 2019 baseline with all existing receptors falling within the air quality objective. The highest concentration remains 19.9 µg/m^3 at sensitive receptor E10 (28 College Crescent). As the traffic related to the development falls within the thresholds for detailed assessment, the additional traffic has a negligible influence on flows and, as a result, no influence on predicted annual mean PM_{10} concentrations. Therefore, the Proposed Development has a negligible impact.

All of the annual mean PM_{10} concentrations in 2022 for receptors within the Proposed Development fall within the air quality objective, with the highest predicted annual mean PM_{10} concentration being 19.6 µg/m^3 at proposed receptors P1 and P2 (Western boundary along Abbey Road) and P5 and P6 (South-Eastern boundary of site along Belsize Road). All receptors would be classified as APEC A, with concentrations falling more than 5% under the air quality objective. However, the proposed receptors are not considered to be long-term receptors with the short-term objective more applicable.

Daily Mean PM_{10} Concentration

The objective for daily mean PM_{10} concentrations is 50 µg/m^3 to be exceeded no more than 35 times a year. In 2019 the daily mean PM_{10} concentrations at all existing receptors comply with the objective, with the greatest exceedance being 3 occasions at receptors E2 (129 Belsize Road), E7 (Centre Heights, Finchley Road), E9 (The Quarters, Finchley Road) and E10 (28 College Crescent).

The results indicate that concentrations at both existing and new receptors will comply with the objective in 2022, with the greatest number of exceedances indicated to be 3 at existing receptors E2 (129 Belsize Road), E7 (Centre Heights, Finchley Road), E9 (The Quarters, Finchley Road) and E10 (28 College Crescent) and all of the proposed receptors. All receptors are classified as APEC A, with predicted exceedances more than 1 day less than the air quality objective. The impact on daily mean PM_{10} concentrations at existing receptors is considered negligible.

Annual Mean $PM_{2.5}$ Concentration

The objective for annual mean $PM_{2.5}$ concentrations is 25 µg/m^3. In the 2019 baseline, the annual mean $PM_{2.5}$ concentrations at existing sensitive receptor locations all fall within the air quality objective. The highest concentration is 13.3 µg/m^3 at a sensitive receptor E10 (28 College Crescent).

In 2022, concentrations at existing receptors remains similar to the 2019 baseline with all existing receptors falling within the air quality objective. The highest concentration remains 13.3 µg/m^3 at sensitive receptor E10 (28 College Crescent). As the traffic related to the development falls within the thresholds for detailed assessment, the additional traffic has a negligible influence on flows and, as a result, no influence on predicted annual mean $PM_{2.5}$ concentrations. Therefore, the Proposed Development has a negligible impact.

All of the annual mean $PM_{2.5}$ concentrations in 2022 for receptors within the Proposed Development fall within the air quality objective, with the highest predicted annual mean $PM_{2.5}$

concentration being 13.1 µg/m^3 at all proposed receptors except P4 (Southern Boundary along Belsize Road). However, this is not considered to be a long-term receptor.

5.2.2. Sensitivity Analysis

The following sensitivity test is also included in the assessment:

2022 Background Concentrations and Emission Factors have been used to indicate an improvement in emissions and background concentrations over time.

The results of the sensitivity test are given in **Appendix F**.

In summary, the sensitivity test using the 2022 background concentrations and emission factors gives lower concentrations at all existing and new receptors for both long-term and short-term pollutant concentrations.

The greatest difference is seen in the long-term NO_2 concentrations, which are all predicted to be fall within the annual mean AQS objective of 40 µg/m^3. The highest concentration at an existing receptor is predicted to be 32.1 µg/m^3. The impact associated with the Proposed Development remains negligible, with none of the long-term receptors observing an increase in concentration as a result of the Proposed Development as previously discussed.

Within the Proposed Development, all concentrations for all receptors fall within the annual mean AQS objective for NO_2. Under this scenario, all receptors fall within APEC A. However, the proposed receptors are not considered to be long-term receptors with the short-term objective more applicable.

In terms of the 1-hour mean objective for NO_2, there remains no predicted exceedances at any existing or new receptors following the approach within Defra's LAQM.TG(16). The annual mean concentrations of PM_{10} and $PM_{2.5}$ remain within the AQS objective for all receptors and within the objective for daily mean PM_{10}. Impacts, therefore, remain negligible.

5.2.3. Air Quality Neutral Assessment

A summary of the findings of the AQNA are presented in Table 5.4 below.

Table 5.4 Summary of AQNA

Category	Parameter	NO_X Emissions (kg/annum)	PM_{10} Emissions (kg/annum)
Building Emissions	Benchmark	80.1	4.6
	Development	0	0
	Difference	**-80.1**	**-4.6**
Transport Emissions	Benchmark	21.2	3.8
	Development	8.3	1.5
	Difference	**-12.9**	**-2.3**

The Proposed Development is air quality neutral in relation to building and transport emissions, no mitigation or additional off-setting is required.

6. Mitigation and Residual Effects

6.1. Construction Phase

6.1.1. Mitigation

The IAQM guidelines provide an indication of the mitigation measures that would be appropriate for inclusion within the Proposed Development, based on the level of risk of dust related impacts identified for each of the activities. Consequently, the following mitigation measures should be incorporated into the Proposed Development, and delivered through the implementation of a Construction Environment Management Plan (CEMP).

Mitigation measures that are generic to each of the activities, and therefore should be implemented for the duration of the construction related works where applicable are identified in Table 6.1, whilst activity specific mitigation measures are identified in Table 6.2.

Table 6.1 Mitigation to be Implemented during the Construction Phase

Development Element	Mitigation Measures
Communication	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site. Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/ engineer or the site manager. Display the head or regional office contact information on the site boundary.
Planning	Development and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority at Planning Condition stage. The level of detail will depend on the risk, and should include as a minimum the measures listed in this table, which includes additional measures identified in the Mayor of London's dust guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken. Make the complaints log available to the local authority when asked. Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out during prolonged dry or windy conditions. Regular checks of buildings within 100 m of the site boundary should be carried out to check for soiling due to dust with cleaning carried out where necessary.

Development Element	Mitigation Measures
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. Avoid site runoff of water or mud. The construction site should be bunded to prevent runoff. Keep site fencing, barriers and scaffolding clean using wet methods. The water used should be collected and maximise the use of recycled and non-potable water. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover. Require a change of shoes and clothes by staff and visitors before going off-site to reduce the transport of dust or provide cleaning facilities such as showers or boot cleaners.
Operating Vehicle/ Vehicle Movements	Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards. For HGVs, the standard is EURO IV for PM and for heavier vans and mini buses it is Euro III. Ensure all vehicles switch off engines when stationary – no idling vehicles. Avoid the use of diesel or petrol powered generators and use mains electricity or batter powered equipment where practicable. Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing).
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, *e.g*. suitable local exhaust ventilation systems. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. Use enclosed chutes and conveyors and covered skips. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. Regularly inspect the site area for spillages; 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. Vacuum or sweep regularly to prevent the build-up of fin waste dust material, which has spilled on the site and is designated as waste that is no longer fit for use. Inform the Environment Agency, London Fire and Emergency Planning Authority (LFEPA) or the Health Protection Agency (HPA) if harmful substances are spilled.

Development Element	Mitigation Measures
Waste Management	Avoid bonfires and burning of waste materials. Developments should produce a waste and/or recycling plan. The Environment Agency suggests that a waste plan includes a number of best practice procedures identified in the dust guidance document.

Table 6.2 Activity Specific Mitigation Measures to be Implemented during the Construction Phase

Development Element	Mitigation Measures
Demolition	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground. Avoid explosive blasting, using appropriate manual or mechanical alternatives. Bag and remove any biological debris or damp down such material before demolition.
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable. Use hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable. Only remove the cover in small areas during work and not all at once.
Construction	Avoid scabbling (roughening of concrete surfaces) if possible. 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. 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. For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. Record all inspections of haul routes and any subsequent action in a site log book. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.

Development Element	Mitigation Measures
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever sit size and layout permits. Access gates to be located at least 10 m from receptors where possible.

6.1.2. Residual Effects

The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice is not significant.

The residual effects of emissions to air from construction vehicles and NRMM on local air quality is not significant following the implementation of the recommended mitigation measures.

6.2. Operational Phase

6.2.1. Mitigation

The results indicate that the impact of the Proposed Development at all existing receptors for all pollutants are classified as negligible, and therefore do not warrant mitigation.

Within the Proposed Development, all of the predicted NO_2 concentrations are below the AQS objective of 40 µg/m^3. The receptors are all classified as APEC A, with mitigation not required, although the receptors are not considered to be long-term receptors with the short-term objective more applicable. The sensitivity analysis, which is considered to provide a more realistic prediction of air quality with the improvement in background concentrations considered in this scenario in line with the improvements seen at the local monitoring stations, demonstrates that concentrations remain below the AQS objective and classified as APEC A, therefore not requiring mitigation.

Exceedances of the hourly mean NO_2 objective of 200 µg/m^3 are considered to be unlikely under all scenarios, and therefore negligible and mitigation is not required.

With respect to particulates, the operation of the Proposed Development is not predicted to result in exceedances and impacts are identified as negligible, and therefore mitigation is not required.

Overall, the assessment, taking predicted reductions in background concentration into account as local monitoring demonstrates a decreasing trend, indicates that site specific mitigation is not required.

6.2.2. Residual Effects

The overall residual effect for the operational phase is not significant.

7. Conclusion

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational stages of the Proposed Development. The assessment has been undertaken in line with the relevant policy and guidance, and where necessary, outlines the required mitigation measures to minimise impacts.

A qualitative assessment of construction phase impacts has been carried out. There is a medium risk of dust soiling and fugitive PM_{10} emissions affecting human health from demolition (dust soiling only, low risk for human health), earthworks and a low risk from construction. Trackout holds a medium risk of dust soiling and low risk of fugitive PM_{10} emissions affecting human health. Through good site practice and the implementation of suitable mitigation measures, the impact of dust and PM_{10} releases will be minimised. The residual effect of the construction phase on air quality is therefore not significant.

The road traffic generated by the Proposed Development does not breach the threshold detailed in the IAQM and EPUK Air Quality Planning Guidance and the provision of heating and hot water is achieved through non-combustion sources. Whilst detailed modelling of building emissions has been scoped out of the assessment, detailed modelling of the traffic implications have been carried out to illustrate the impact associated with existing receptors in the local area and demonstrate the suitability of the site for the short-term receptors introduced as part of the Proposed Development.

In summary, the results indicate the impact of the Proposed Development is classified as negligible for all existing receptors. Although one existing receptor (E10 28 College Crescent) exceeds the annual mean air quality objective marginally, under the worst-case scenario assuming no improvement in background concentration or vehicle emission factors, the Proposed Development has no impact on concentrations. The receptors associated with the proposed development all comply with the long-term NO_2 objective, however the short-term objective is more applicable considering the receptor type.

There are no predicted exceedances of the 1-hour mean NO_2 air quality objective at both existing and proposed receptors, with the impacts of the development being negligible and the site being suitable for the introduction of short-term receptors.

With respect to particulates, no exceedances are predicted as a result of the vehicle emissions on PM_{10} and $PM_{2.5}$ concentrations, and impacts are negligible and the site is suitable for the introduction of the proposed receptor type.

The overall residual effect for the operational phase is not significant.

It is worth noting that with the introduction of the Real Driving Emissions (RDE) testing and the emergence of cleaner vehicle technologies (in particular EURO 6 (VI) a, b, c and d fleet categories – which indicate lower emissions than the previous EURO 5 (V), and the uptake of electric/hybrid vehicles) that deliver improvements in vehicle emissions, in particular NO_X, ambient pollutant concentrations have the potential to be lower in the future. This is demonstrated by the sensitivity analysis.

The Proposed Development was found to be compliant in relation to Building and Transport Emissions, and is therefore air quality neutral. No mitigation or additional off-setting is required.

Overall, with the inclusion of standard mitigation measures as best practice (construction phase only), the proposals would be compliant with legislation and policy.

Figures

Figure 1 Site Location

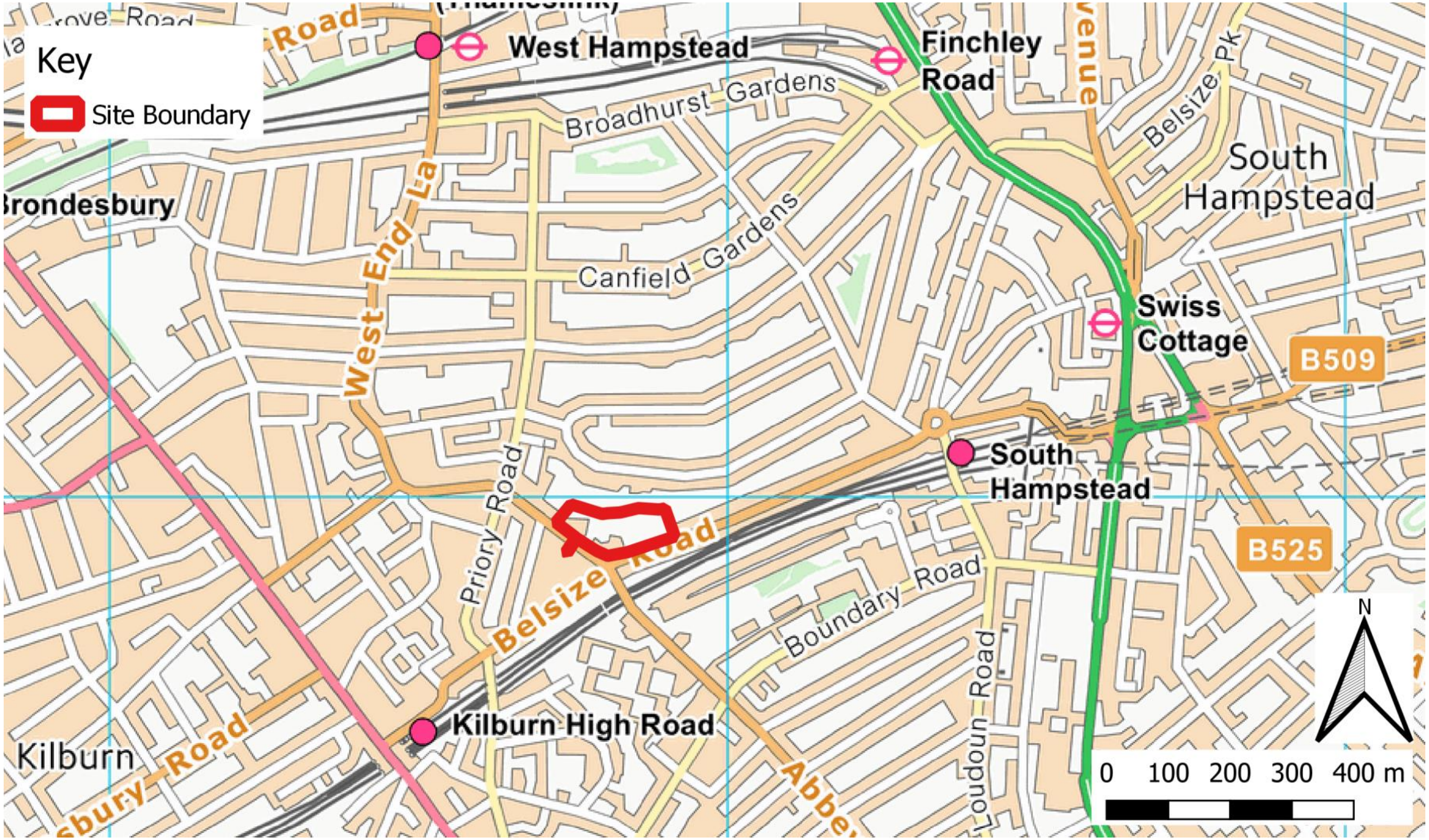


Figure 2 Modelled Roads within the Assessment

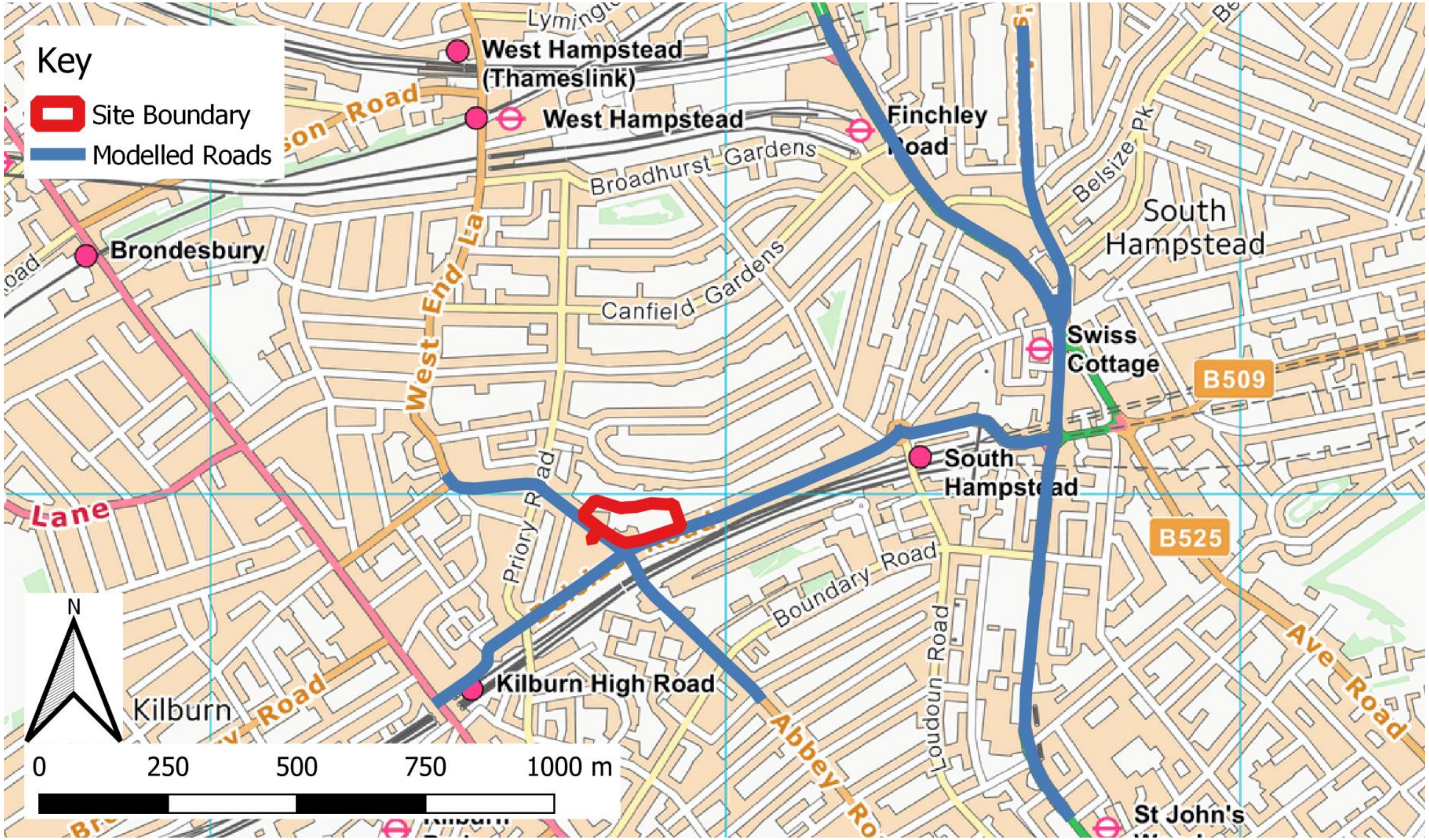


Figure 3 Modelled Receptors within the Assessment

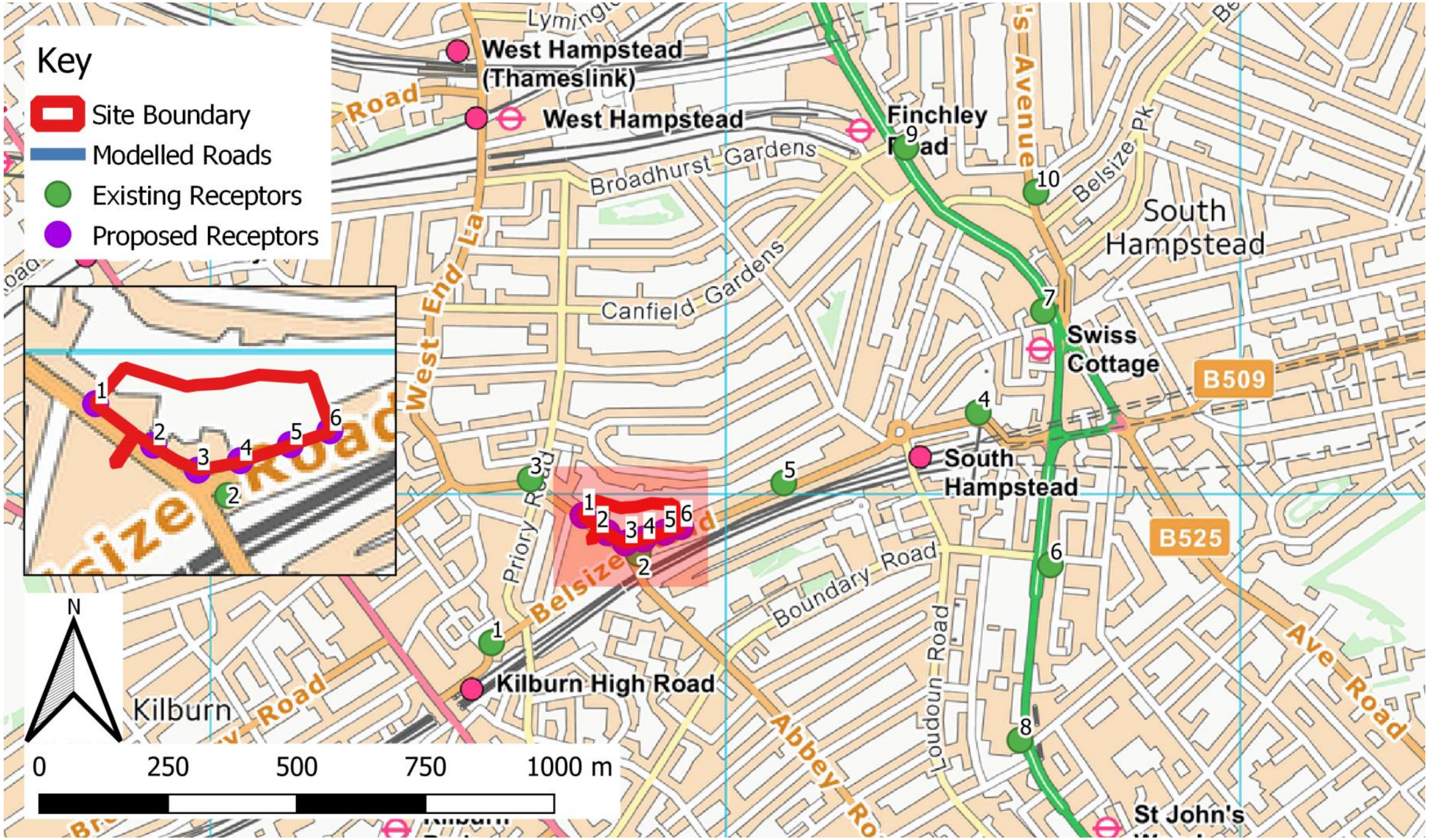


Figure 4 AQMA and LAEI Air Quality Focus Areas

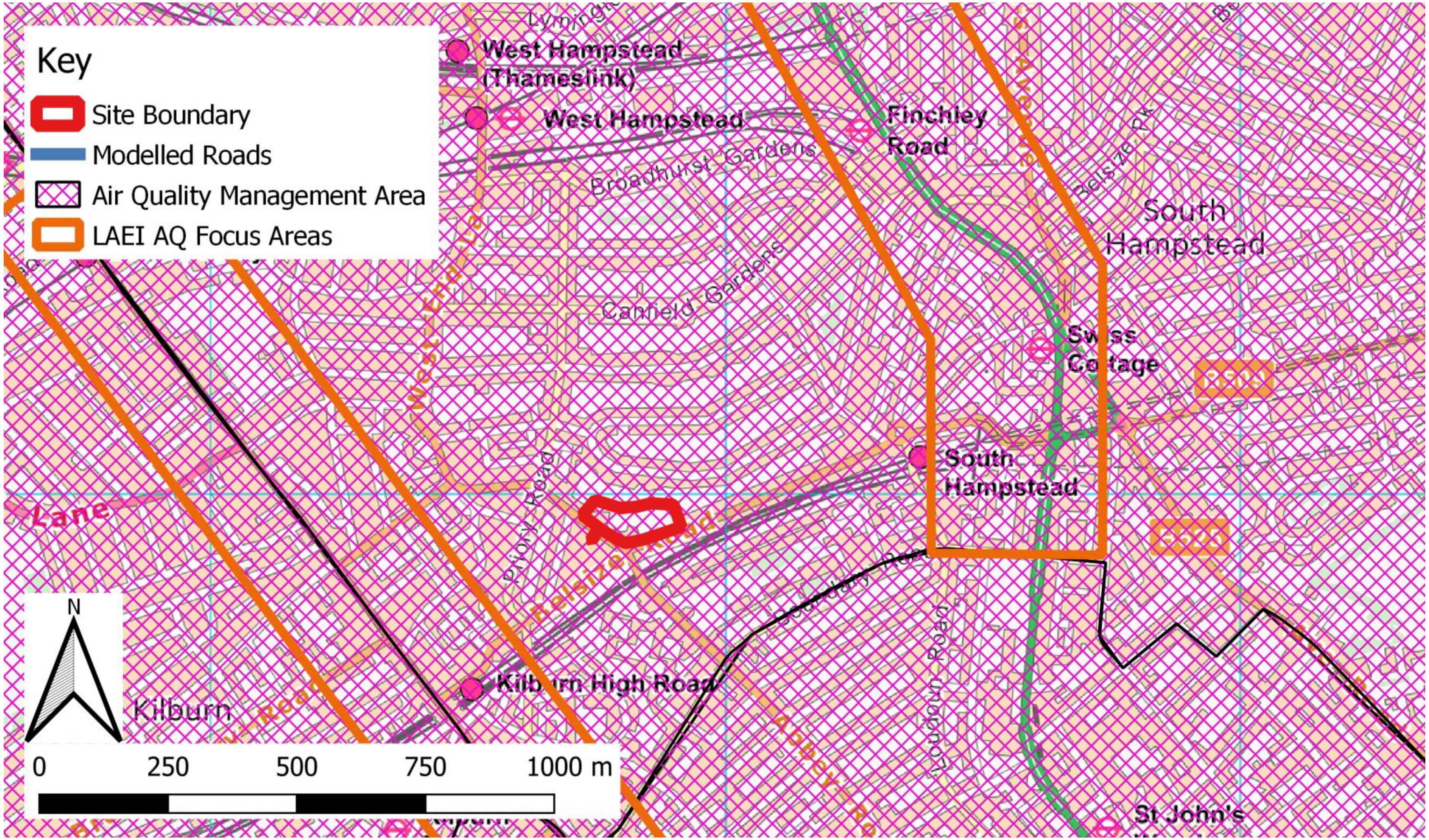


Figure 5 Local Air Quality Monitoring Network

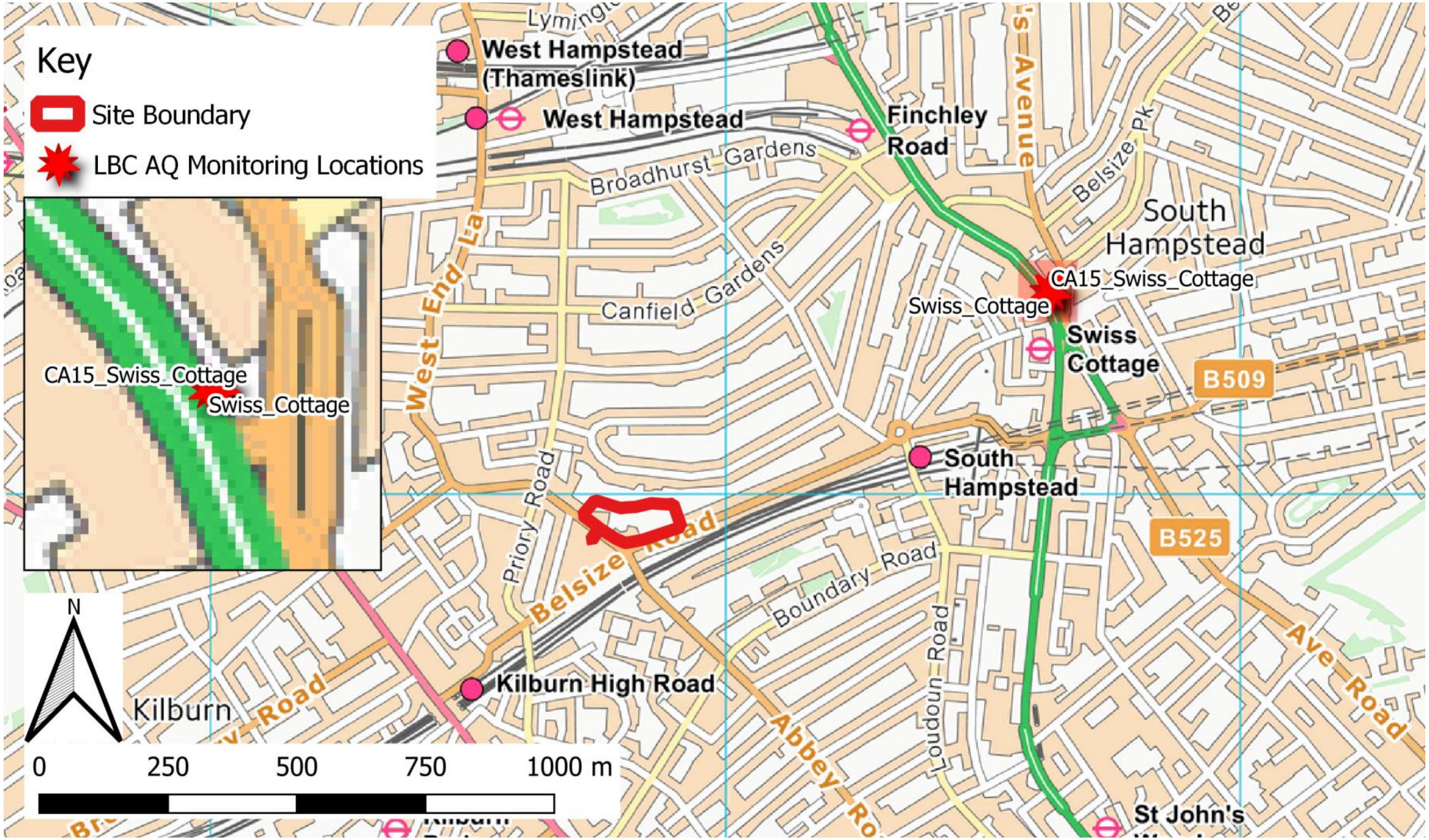


Figure 6 2016 LAEI Baseline Data – Annual Mean NO_2 ($\mu g/m^3$)

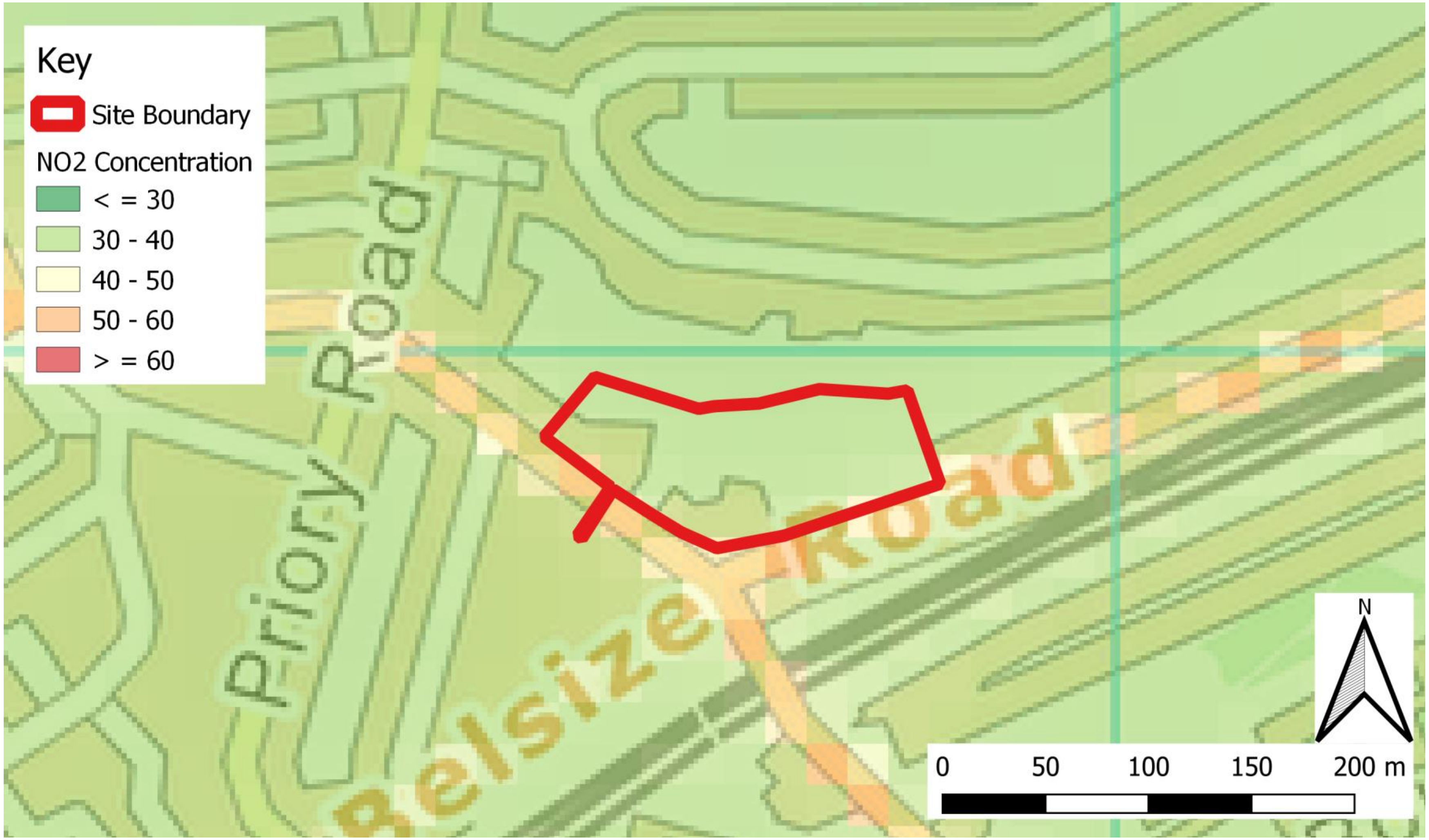


Figure 7 2016 LAEI Baseline Data – Annual Mean PM_{10} ($\mu g/m^3$)

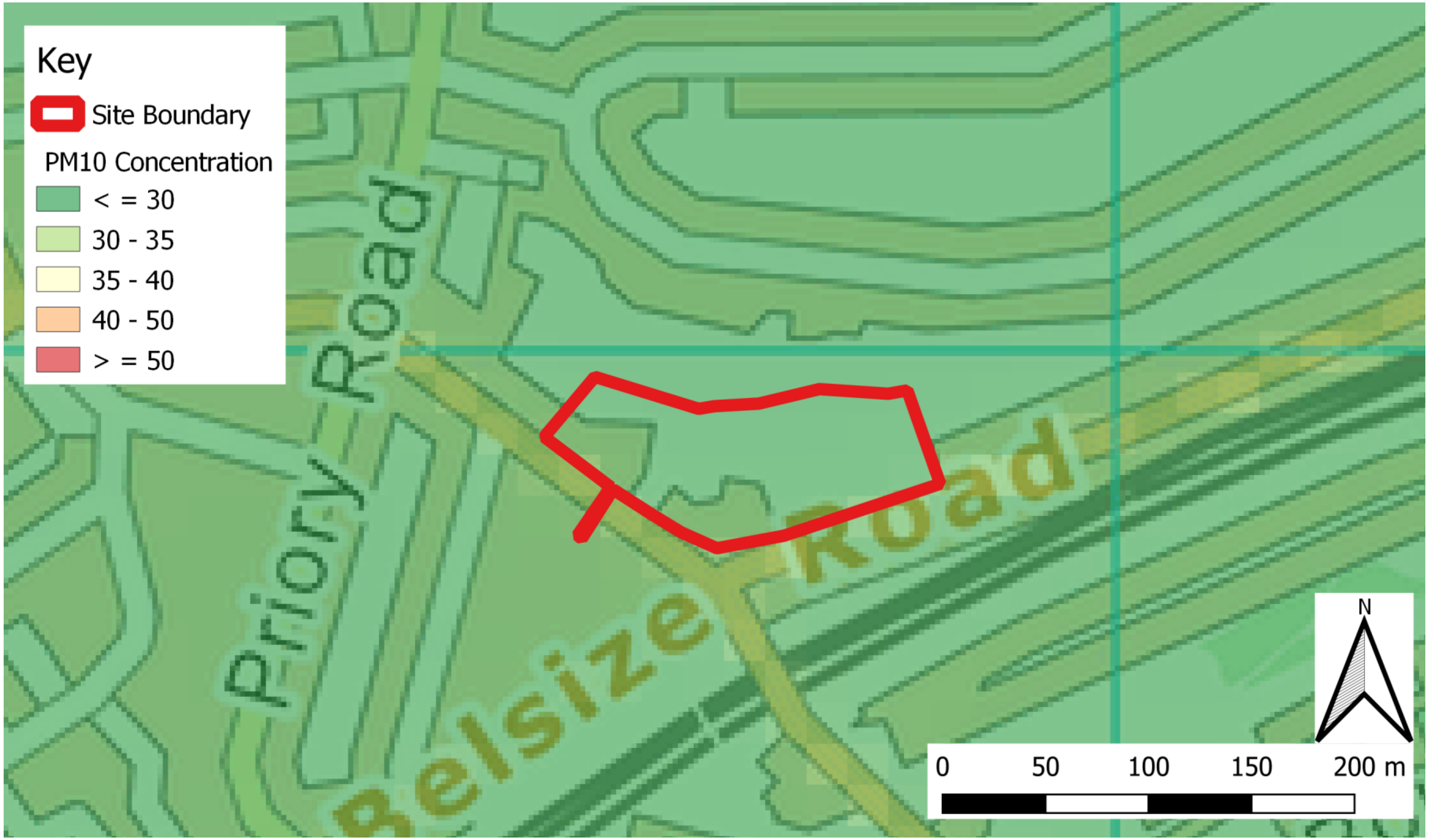


Figure 8 2016 LAEI Baseline Data – Annual Mean $PM_{2.5}$ ($\mu g/m^3$)

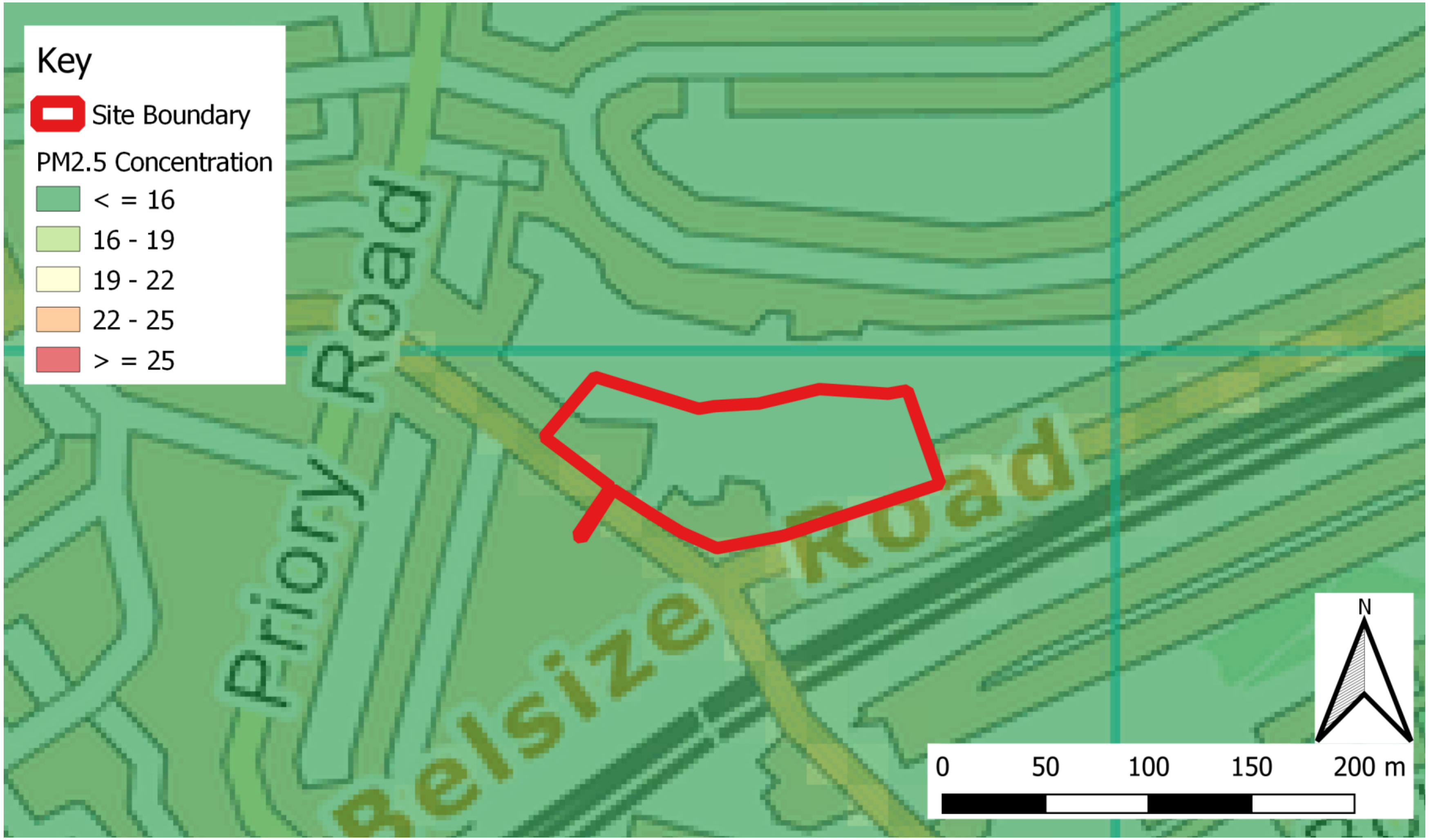


Figure 9 2020 LAEI Baseline Data – Annual Mean NO_2 (µg/m^3)

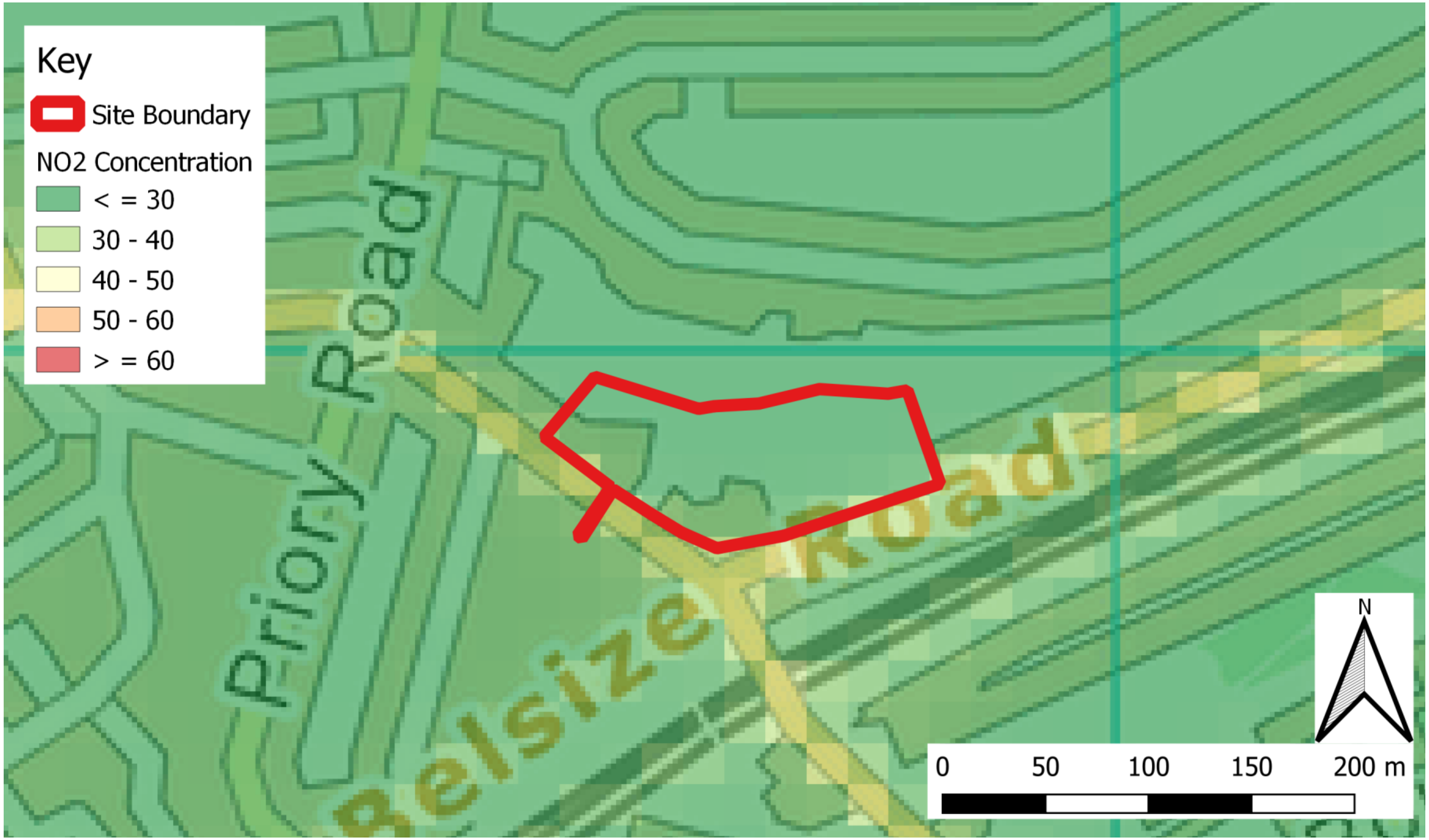


Figure 10 2020 LAEI Baseline Data – Annual Mean PM_{10} (µg/m³)

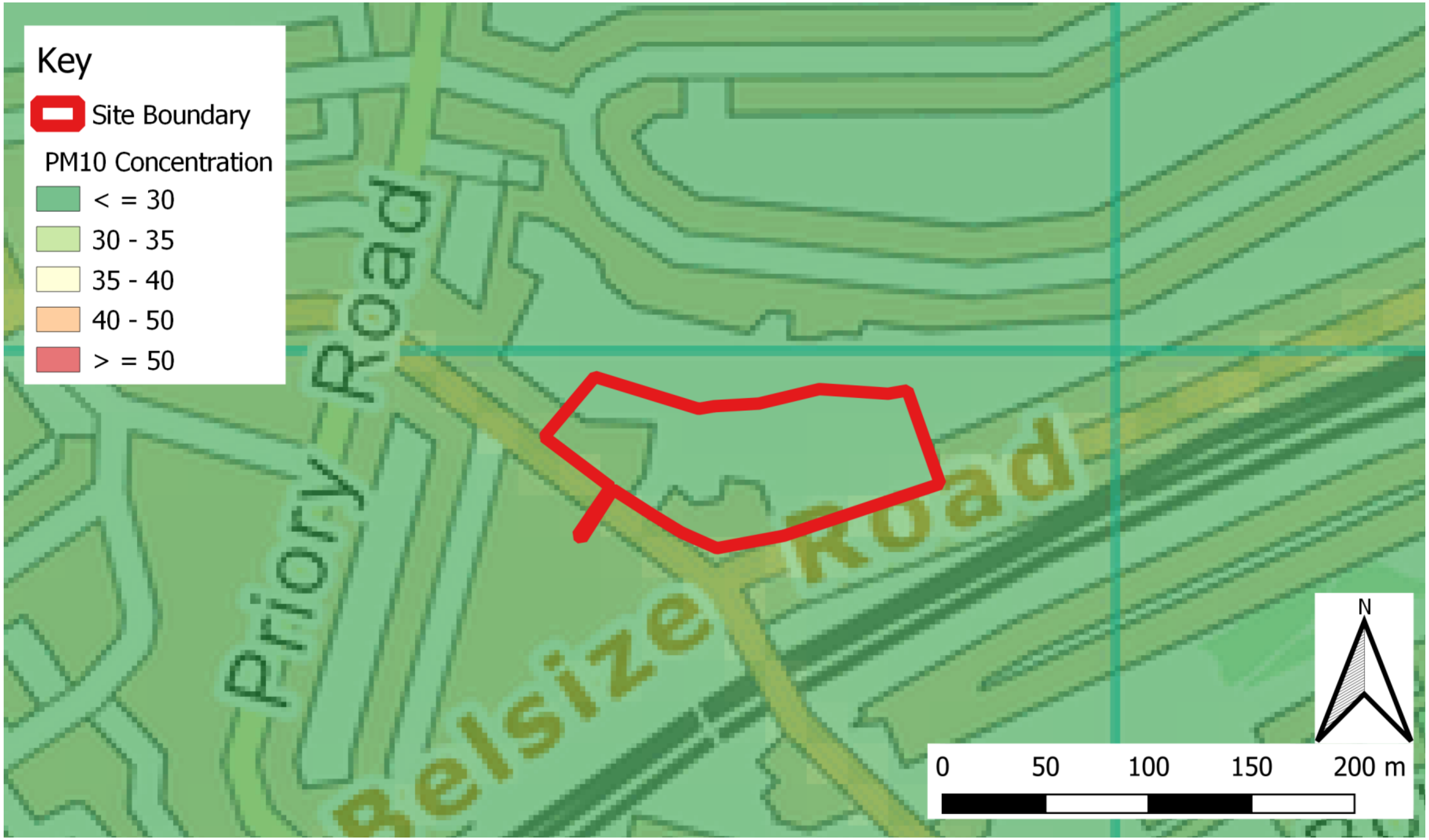


Figure 11 2020 LAEI Baseline Data – Annual Mean $PM_{2.5}$ ($\mu g/m^3$)

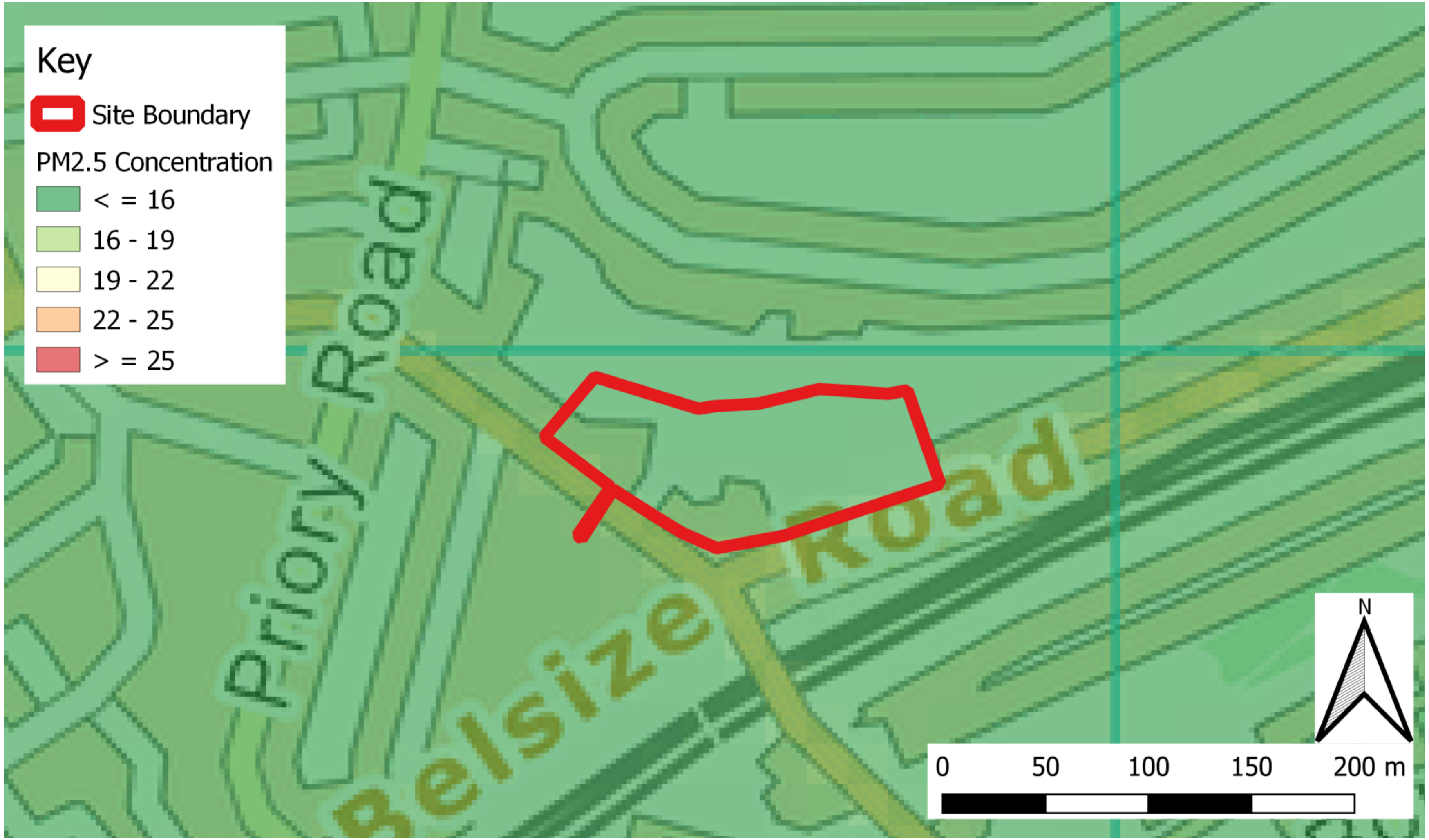
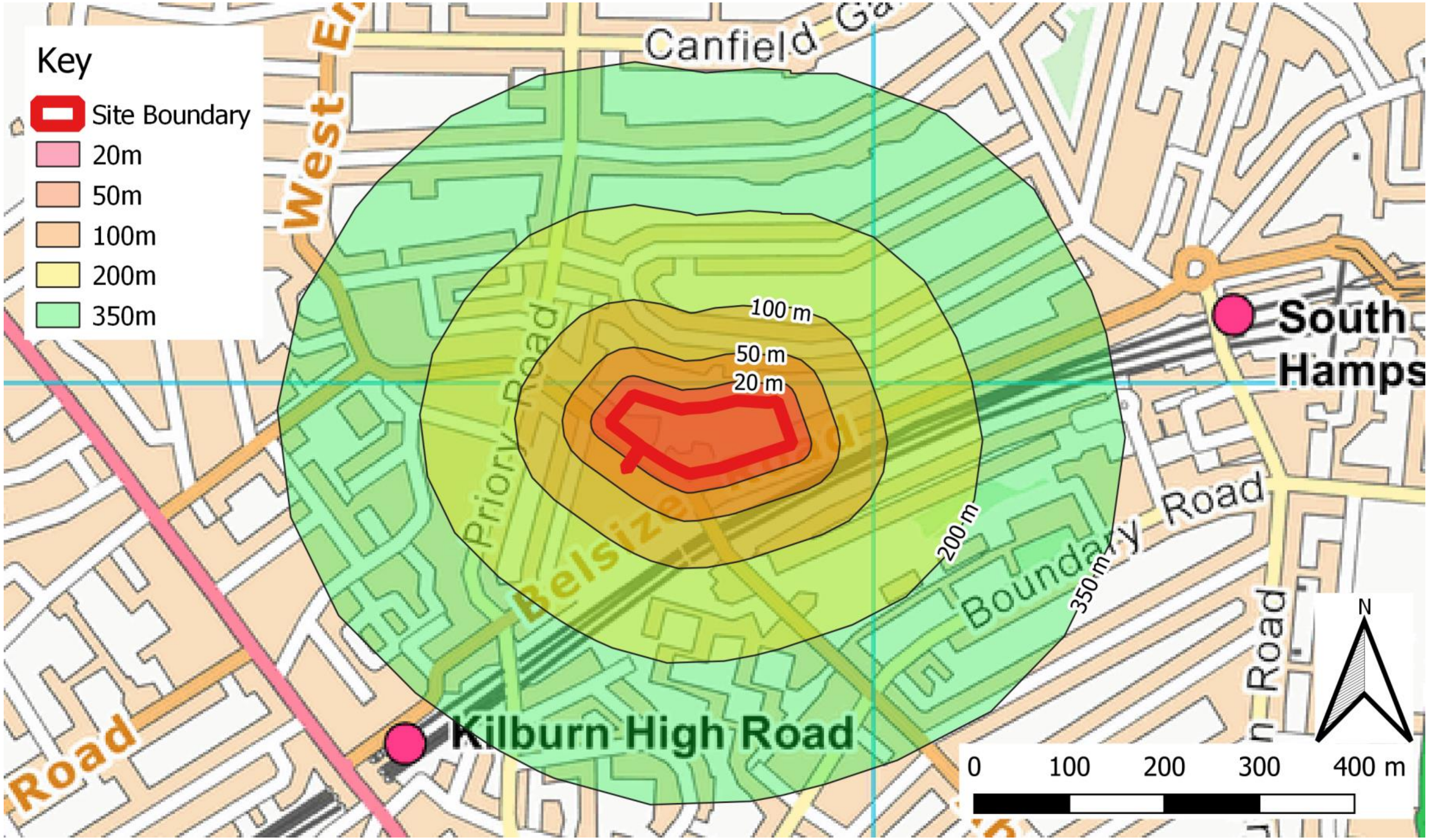


Figure 12 Construction Dust Zone of Influence



Appendix A Glossary of Terms

Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24 hours), expressed as a mean daily flow across all 365 days of the year.
Adjustment	Application of a correction factor to modelled results to account for uncertainties in the model.
Air Quality Objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air Quality Standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
Conservative	Tending to over-predict the impact rather than under-predict.
Data capture	The percentage of all the possible measurements for a given period that were validly measured.
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Dust	Dust comprises particles typically in the size range 1-75 micrometre (μm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials.
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle / Heavy Goods Vehicle
LAQM	Local Air Quality Management
Model adjustment	Following model verification, the process by which modelled results are amended. This corrects for systematic error.
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
Trackout	The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/ demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.
$\mu g/m^3$ (micrograms per cubic metre)	A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Appendix B Modelled Receptors & Defra Background Concentrations

Receptor				2019			2022		
ID	Type	X, Y	Z (m)	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
E1	Long-term	525500,183500	4.5	29.9	18.4	12.4	24.7	17.4	11.7
E2	Long-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7
E3	Long-term	525500,184500	3.0	27.0	17.2	11.8	22.2	16.3	11.1
E4	Long-term	526500,184500	0.0	30.9	18.3	12.3	25.4	17.4	11.6
E5	Long-term	526500,184500	0.0	30.9	18.3	12.3	25.4	17.4	11.6
E6	Long-term	526500,183500	1.5	30.1	17.9	12.1	24.7	17.0	11.4
E8	Long-term	526500,183500	1.5	30.1	17.9	12.1	24.7	17.0	11.4
E7	Long-term	526500,184500	4.5	30.9	18.3	12.3	25.4	17.4	11.6
E9	Long-term	526500,184500	4.5	30.9	18.3	12.3	25.4	17.4	11.6
E10	Long-term	526500,184500	0.0	30.9	18.3	12.3	25.4	17.4	11.6
P1	Short-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7
P2	Short-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7
P3	Short-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7
P4	Short-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7
P5	Short-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7
P6	Short-term	525500,183500	1.5	29.9	18.4	12.4	24.7	17.4	11.7

Appendix C Model Verification

The comparison of modelled concentrations with local monitored concentrations is a process termed 'verification'. Model verification investigates the discrepancies between modelled and measured concentrations. Discrepancies occur due to model uncertainties, such as:

- Estimates of background pollutant concentrations;
- Meteorological data uncertainties;
- Traffic data uncertainties;
- Model input parameters; and,
- Overall limitation of the dispersion model.

NO_2 is produced in the atmosphere by the reaction of nitric acid (NO) with ozone. Therefore, model verification for nitrogen oxides (NO_X = NO + NO_2) the primary pollutant is appropriate. This has been undertaken in accordance with Chapter 7 of LAQM.TG(16).

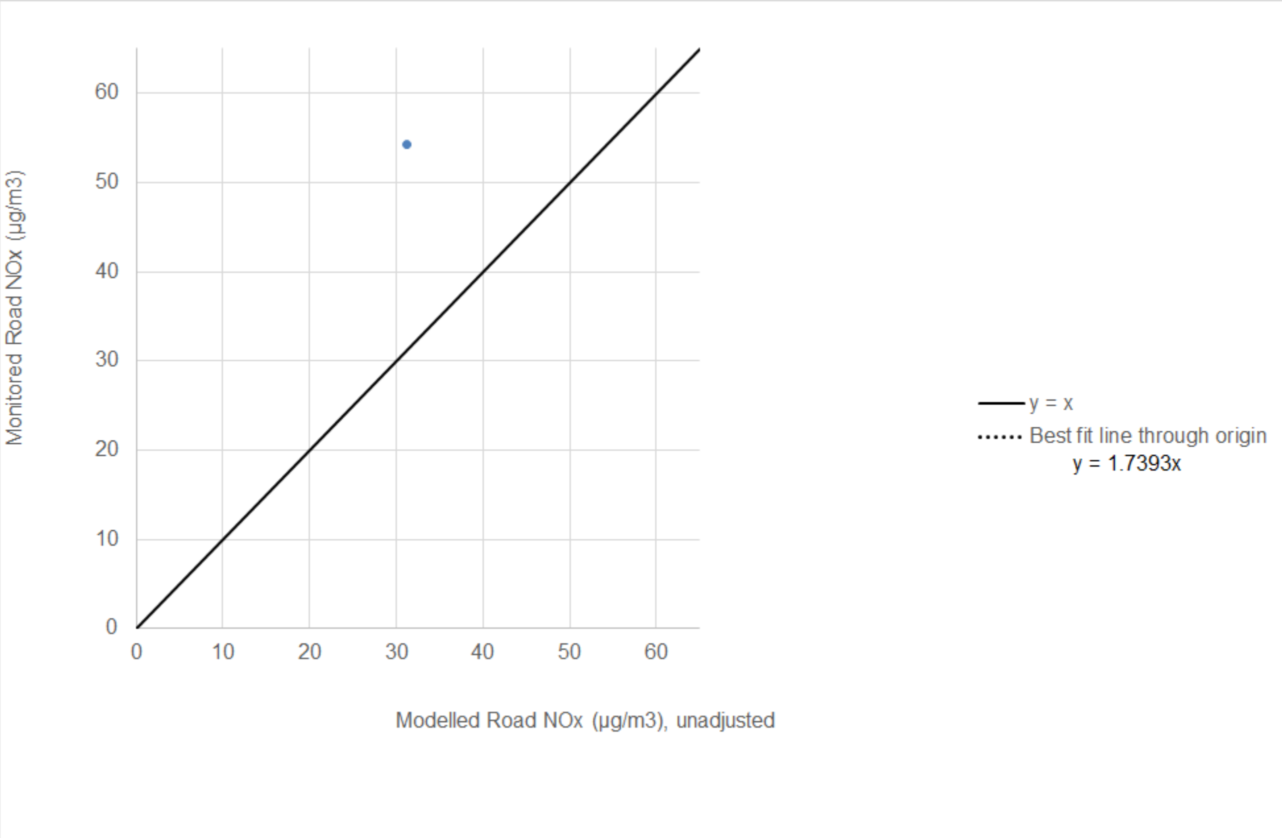
The model has been run to predict the 2018 annual mean road-NO_X contribution at the monitoring location given below. The model outputs of road- NO_X for the location has been compared with the 2018 'measured' road-NO_X, which was determined using the NO_X to NO_2 calculator and the NO_2 concentration data from the London Borough of Camden monitoring.

Details of the data used in the verification process is in the table and figure below.

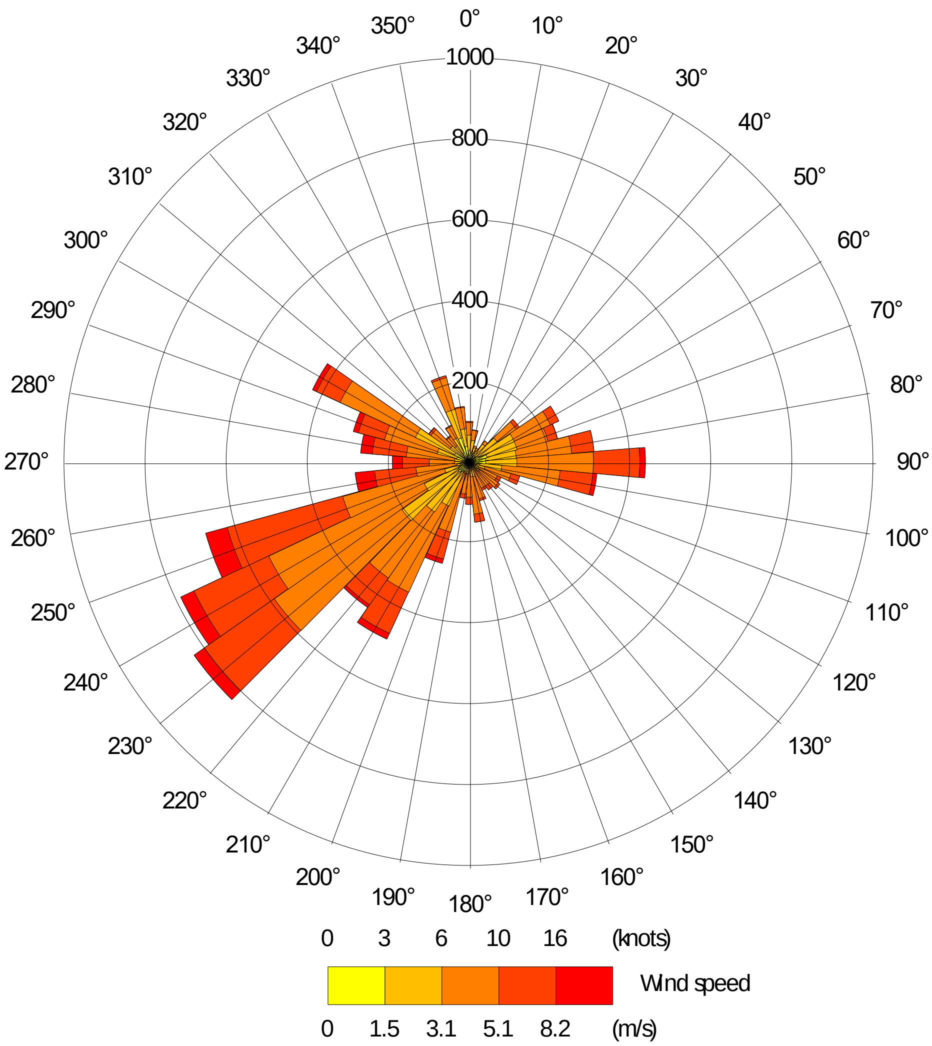
Location	2018 Monitored Total NO_2 (µg/m^3)	Background NO_2 (µg/m^3)	2018 Monitored Road Contribution NO_X (µg/m^3)	2018 Modelled Road Contribution NO_X (µg/m^3)	Ratio of monitored/ modelled NO_X road contribution
CD1 Swiss Cottage	54	30.94	54.25	31.19	1.7393

The adjustment factor calculated is 1.74.

For PM_{10} and $PM_{2.5}$ there are no relevant local monitoring data against which the model could be verified. Consequently, the verification factors determined above for adjusting the road-NO_X contribution has been applied to the predicted road-PM_{10} and road-$PM_{2.5}$ contributions, consistent with guidance set out in LAQM.TG(16).


Monitored Road NOx (µg/m3)
60
50
40
30
20
10
0
0
10
20
30
40
50
60
Modelled Road NOx (µg/m3), unadjusted
y = x
Best fit line through origin
y = 1.7393x

Appendix D 2019 Wind Rose for London City Airport



Appendix E Operational Results (2019 Baseline and Emission Factors)

Annual Mean NO_2 Results

Receptor Id	2019 Baseline (µg/m³)	2022		Change (µg/m³)	Impact
		Without Devt (µg/m³)	With Devt (µg/m³)		
E1	32.5	32.6	32.6	±0.0	Negligible
E2	36.5	36.8	36.8	±0.0	Negligible
E3	32.2	32.4	32.4	±0.0	Negligible
E4	35.5	35.7	35.7	±0.0	Negligible
E5	35.2	35.4	35.4	±0.0	Negligible
E6	34.8	35.0	35.0	±0.0	Negligible
E8	34.2	34.4	34.4	±0.0	Negligible
E7	37.9	38.2	38.2	±0.0	Negligible
E9	38.2	38.6	38.6	±0.0	Negligible
E10	40.6	41.0	41.0	±0.0	Negligible
P1	-	-	37.8	-	APEC A
P2	-	-	37.5	-	APEC A
P3	-	-	37.2	-	APEC A
P4	-	-	36.8	-	APEC A
P5	-	-	37.4	-	APEC A
P6	-	-	37.7	-	APEC A

Annual Mean PM_{10} Results

Receptor Id	2019 Baseline (µg/m³)	2022		Change (µg/m³)	Impact
		Without Devt (µg/m³)	With Devt (µg/m³)		
E1	18.8	18.8	18.8	±0.0	Negligible
E2	19.4	19.5	19.5	±0.0	Negligible
E3	18.0	18.1	18.1	±0.0	Negligible
E4	19.1	19.1	19.1	±0.0	Negligible
E5	19.0	19.0	19.0	±0.0	Negligible
E6	18.7	18.8	18.8	±0.0	Negligible
E8	18.6	18.7	18.7	±0.0	Negligible
E7	19.4	19.5	19.5	±0.0	Negligible
E9	19.5	19.6	19.6	±0.0	Negligible
E10	19.9	19.9	19.9	±0.0	Negligible
P1	-	-	19.6	-	APEC A
P2	-	-	19.6	-	APEC A

Receptor Id	2019 Baseline (µg/m³)	2022		Change (µg/m³)	Impact
		Without Devt (µg/m³)	With Devt (µg/m³)		
P3	-	-	19.5	-	APEC A
P4	-	-	19.5	-	APEC A
P5	-	-	19.6	-	APEC A
P6	-	-	19.6	-	APEC A

Daily Mean PM_{10} Results

Receptor Id	2019 Baseline (Exceedances)	2022		Change (Days)	Impact
		Without Devt (Exceedances)	With Devt (Exceedances)		
E1	2	2	2	±0.0	Negligible
E2	3	3	3	±0.0	Negligible
E3	1	1	1	±0.0	Negligible
E4	2	2	2	±0.0	Negligible
E5	2	2	2	±0.0	Negligible
E6	2	2	2	±0.0	Negligible
E8	2	2	2	±0.0	Negligible
E7	3	3	3	±0.0	Negligible
E9	3	3	3	±0.0	Negligible
E10	3	3	3	±0.0	Negligible
P1	-	-	3	-	APEC A
P2	-	-	3	-	APEC A
P3	-	-	3	-	APEC A
P4	-	-	3	-	APEC A
P5	-	-	3	-	APEC A
P6	-	-	3	-	APEC A

Annual Mean $PM_{2.5}$ Results

Receptor Id	2019 Baseline (µg/m³)	2022		Change (µg/m³)	Impact
		Without Devt (µg/m³)	With Devt (µg/m³)		
E1	12.6	12.6	12.6	±0.0	Negligible
E2	13.0	13.0	13.0	±0.0	Negligible
E3	12.3	12.3	12.3	±0.0	Negligible
E4	12.8	12.8	12.8	±0.0	Negligible
E5	12.7	12.8	12.8	±0.0	Negligible
E6	12.6	12.6	12.6	±0.0	Negligible
E8	12.5	12.5	12.5	±0.0	Negligible

Receptor Id	2019 Baseline (µg/m³)	2022		Change (µg/m³)	Impact
		Without Devt (µg/m³)	With Devt (µg/m³)		
E7	13.0	13.0	13.0	±0.0	Negligible
E9	13.0	13.1	13.1	±0.0	Negligible
E10	13.3	13.3	13.3	±0.0	Negligible
P1	-	-	13.1	-	No
P2	-	-	13.1	-	No
P3	-	-	13.1	-	No
P4	-	-	13.0	-	No
P5	-	-	13.1	-	No
P6	-	-	13.1	-	No

Appendix F Sensitivity Analysis Results (2022 Baseline and Emission Factors)

Annual Mean NO_2 Results

Receptor Id	2019 Baseline (µg/m³)	2022 Without Devt (µg/m³)	2022 With Devt (µg/m³)	Change (µg/m³)	Impact
E1	32.5	26.4	26.4	±0.0	Negligible
E2	36.5	29.2	29.2	±0.0	Negligible
E3	32.2	25.7	25.7	±0.0	Negligible
E4	35.5	28.5	28.5	±0.0	Negligible
E5	35.2	28.3	28.3	±0.0	Negligible
E6	34.8	27.7	27.7	±0.0	Negligible
E8	34.2	27.4	27.4	±0.0	Negligible
E7	37.9	29.9	29.9	±0.0	Negligible
E9	38.2	29.9	29.9	±0.0	Negligible
E10	40.6	32.1	32.1	±0.0	Negligible
P1	-	-	29.8	-	APEC A
P2	-	-	29.6	-	APEC A
P3	-	-	29.5	-	APEC A
P4	-	-	29.2	-	APEC A
P5	-	-	29.6	-	APEC A
P6	-	-	29.8	-	APEC A

Annual Mean PM_{10} Results

Receptor Id	2019 Baseline (µg/m³)	2022 Without Devt (µg/m³)	2022 With Devt (µg/m³)	Change (µg/m³)	Impact
E1	18.8	17.8	17.8	±0.0	Negligible
E2	19.4	18.5	18.5	±0.0	Negligible
E3	18.0	17.1	17.1	±0.0	Negligible
E4	19.1	18.1	18.1	±0.0	Negligible
E5	19.0	18.1	18.1	±0.0	Negligible
E6	18.7	17.8	17.8	±0.0	Negligible
E8	18.6	17.7	17.7	±0.0	Negligible
E7	19.4	18.5	18.5	±0.0	Negligible
E9	19.5	18.6	18.6	±0.0	Negligible
E10	19.9	18.9	18.9	±0.0	Negligible
P1	-	-	18.6	-	APEC A
P2	-	-	18.6	-	APEC A

Receptor Id	2019 Baseline ($\mu g/m^3$)	2022		Change ($\mu g/m^3$)	Impact
		Without Devt ($\mu g/m^3$)	With Devt ($\mu g/m^3$)		
P3	-	-	18.5	-	APEC A
P4	-	-	18.5	-	APEC A
P5	-	-	18.6	-	APEC A
P6	-	-	18.6	-	APEC A

Daily Mean PM_{10} Results

Receptor Id	2019 Baseline (Exceedances)	2022		Change (Days)	Impact
		Without Devt (Exceedances)	With Devt (Exceedances)		
E1	2	1	1	±0.0	Negligible
E2	3	2	2	±0.0	Negligible
E3	1	1	1	±0.0	Negligible
E4	2	1	1	±0.0	Negligible
E5	2	1	1	±0.0	Negligible
E6	2	1	1	±0.0	Negligible
E8	2	1	1	±0.0	Negligible
E7	3	2	2	±0.0	Negligible
E9	3	2	2	±0.0	Negligible
E10	3	2	2	±0.0	Negligible
P1	-	-	2	-	APEC A
P2	-	-	2	-	APEC A
P3	-	-	2	-	APEC A
P4	-	-	2	-	APEC A
P5	-	-	2	-	APEC A
P6	-	-	2	-	APEC A

Annual Mean $PM_{2.5}$ Results

Receptor Id	2019 Baseline ($\mu g/m^3$)	2022		Change ($\mu g/m^3$)	Impact
		Without Devt ($\mu g/m^3$)	With Devt ($\mu g/m^3$)		
E1	12.6	11.9	11.9	±0.0	Negligible
E2	13.0	12.2	12.2	±0.0	Negligible
E3	12.3	11.5	11.5	±0.0	Negligible
E4	12.8	12.0	12.0	±0.0	Negligible
E5	12.7	12.0	12.0	±0.0	Negligible
E6	12.6	11.8	11.8	±0.0	Negligible
E8	12.5	11.8	11.8	±0.0	Negligible

Receptor Id	2019 Baseline (µg/m³)	2022		Change (µg/m³)	Impact
		Without Devt (µg/m³)	With Devt (µg/m³)		
E7	13.0	12.2	12.2	±0.0	Negligible
E9	13.0	12.3	12.3	±0.0	Negligible
E10	13.3	12.5	12.5	±0.0	Negligible
P1	-	-	12.3	-	No
P2	-	-	12.3	-	No
P3	-	-	12.3	-	No
P4	-	-	12.2	-	No
P5	-	-	12.3	-	No
P6	-	-	12.3	-	No

References

1 Department for Environment, Food and Rural Affairs (DEFRA) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

2 The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

3 The Air Quality (England) (Amendment) Regulations 2002- Statutory Instrument 2002 No.3043

4 The Air Quality Standards (Amendment) Regulations 2016- Statutory Instrument 2016 No. 1184

5 The Air Quality (Amendment of Domestic Regulations) (EU Exit) Regulations 2019 – Statutory Instrument 2019 No. 74.

6 The Environment Act 1995

7 The Environmental Protection Act 1990.

8 Ministry of Housing, Communities and Local Government (February 2019). National Planning Policy Framework.

9 Mayor of London: Cleaning London's air, The Mayor's Air Quality Strategy (December 2010)

10 Mayor of London (March 2016) The London Plan: Spatial Development Strategy for Greater London Consolidated with alterations since 2011.

11 Mayor of London (December 2019) The London Plan – Intend to Publish: Spatial Development Strategy for Greater London.

12 London Borough of Camden. Local Plan (Adopted 2017).

13 London Borough of Camden. Draft Clean Air Action Plan (2019-2022).

14 Mayor of London (May 2016) London Local Air Quality Management (LLAQM) Technical Guidance (LLAQM.TG(16))

15 Defra (2018) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG16

16 Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality

17 Institute of Air Quality Management (Version 1.1 Updated June 2016). Guidance on the Assessment of Dust from Demolition and Construction

18 Ministry of Housing, Communities and Local Government (2019). National Planning Practice Guidance – Air Quality. Updated November 2019.

19 London Councils (January 2007). Air Quality and Planning Guidance – Revised Version.

20 Mayor of London (July 2014): The Control of Dust and Emissions during Construction and Demolition – Supplementary Planning Guidance.

21 Greater London Authority (April 2014): Sustainable Design and Construction - Supplementary Planning Guidance

22 London Borough of Camden. Amenity (September 2011 – updated March 2018).

23 London Borough of Camden (2019) Camden Planning Guidance – Air Quality. March 2019.

24 AQC & ENVIRON UK Ltd (2014). Air Quality Neutral Planning Guidance.

25 London Borough of Camden. 2018 Air Quality Status Report.

26 Defra Local Air Quality Management (LAQM) Support Pages. Available at: http://laqm.defra.gov.uk/. [Accessed on 25/02/2020].

27 London Air Quality Network. Available at: http://www.londonair.org.uk/LondonAir/Default.aspx. [Accessed on 25/02/2020].

28 London Atmospheric Emissions Inventory (LAEI). Available at: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013. [Accessed on 25/02/2020].

29 Defra (2019) Defra Emission Factor Toolkit (v9.0) Available at https://laqm.defra.gov.uk/review-and-assessment/tools/emission-factors-toolkit.html, accessed on 25/02/2020.

30 Defra (2019) Defra NO_X to NO_2 Calculator (v7.1). Available at https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc, accessed on 25/02/2020.

31 London Councils (2007) Air Quality and Planning Guidance. Revised version – January 2007.