AIR POLLUTION
SERVICES

Chapel House, Barton Manor, Bristol, BS2 0RL
Tel: 01179 112434. Email: contact@airpollutionservices.co.uk

Air Quality Assessment: Baldewynne Court, Tottenham, Haringey

Date: 9 May 2021

AIR POLLUTION SERVICES

Quality Assurance

Client:	Silcock Dawson & Partners	**Contact:**	Peter Lindsay
Reference:	P1080_1	**Date Published:**	9 May 2021

Rev.	Date	Description	Prepared	Reviewed	Authorised
01	09/05/2021	Draft	GB	KL	AC

Contact Details

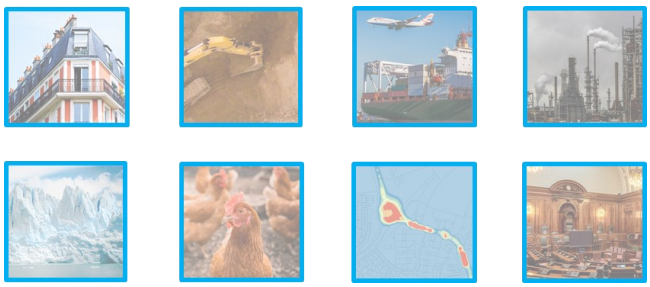
Contact Name: George Bratchel

Tel: 01179 112434

Email: contact@airpollutionservices.co.uk

AIR POLLUTION SERVICES

Experts in Air Quality, Odour and Climate Change



Executive Summary

The air quality impacts associated with the residential development at Baldewynne Court in Tottenham upon local air quality have been considered. The proposed development is not expected to lead to a significant change in vehicle traffic. The impacts of the proposed development have been found to be negligible and it will not lead to any exceedences of the air quality objectives, delay compliance with the limit values or result in worsening of air quality in relation to the World Health Organization guidelines.

The impacts of existing sources of pollution in the local area upon air quality for future occupants has also been considered. Concentrations of nitrogen dioxide and particulate matter (PM_{10} and $PM_{2.5}$) have been predicted at the proposed development. All predicted concentrations are below the air quality objectives and limit values and additional mitigation is therefore not required. The $PM_{2.5}$ concentration exceeds the World Health Organization guidelines across much of London, including at the proposed development.

Overall, the impacts of the proposed development will be 'not significant' and air quality for future occupants will be acceptable. It is thus not considered necessary to propose further mitigation measures. However, it is considered there may be benefits to future occupants if an indoor air quality strategy focusing on improving indoor air quality is established.

Contents

1. Introduction

1.1. Air Pollution Services (APS) has been commissioned by Silcock Dawson & Partners to assess the air quality impacts associated with proposed development at Baldewynne Court (herein the 'Proposed Development') in the London Borough of Haringey (LBH). The Proposed Development will consist of the removal of existing garages and the construction of two three-storey buildings that will include twelve residential properties. The application site location is shown in Figure 1.

Commented [KL1]: Silcock Dawson & Partners to confirm.

We believe this is correct. Please can you confirm.

Figure 1: Site location

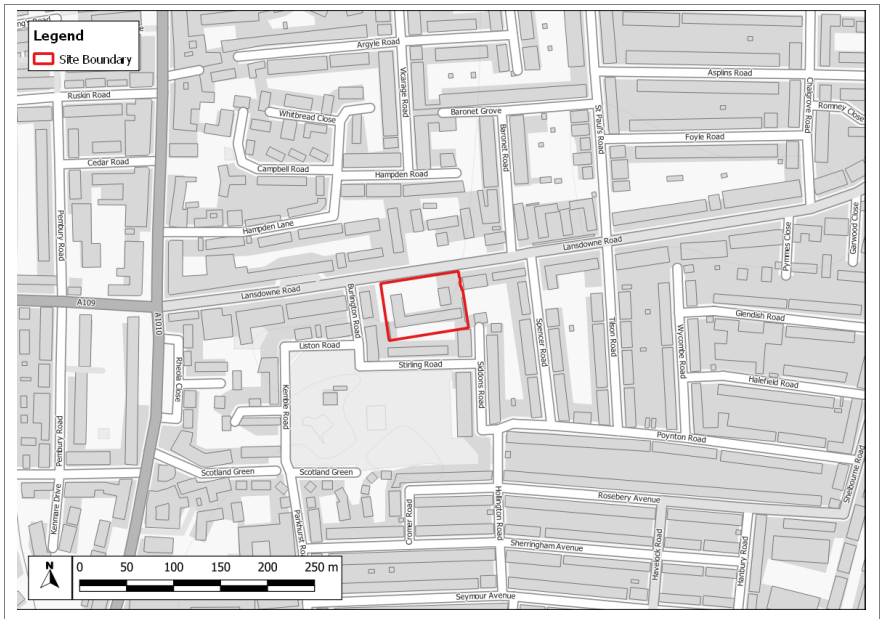


Figure notes: Contains OS data © Crown copyright and database right (2021).

Scope of assessment

1.2. The Pollution Team at LBH were contacted to discuss and agree the scope. The Pollution Team declined a telephone discussion, and the proposed approach was emailed to the Pollution Team[1]. No confirmation or reply regarding the approach was received prior to this report being completed.

1.3. Due to the size and scale of the Proposed Development, a construction dust risk assessment (GLA, 2014a) will be required for the Proposed Development as it meets the criteria for being a 'major' development, as defined by the Greater London Authority (GLA). Furthermore, Air Quality Neutral

[1] Pollution@haringey.co.uk

(AQN) (GLA, 2014b) and Air Quality Positive (AQP) assessments have been completed and presented within this report follow the requirements set out by the GLA.

1.4. During the construction phase emissions of dust to air can occur. Emissions will vary substantially from day to day, depending on the level of activity and the specific operations being undertaken, along with the influence of the weather conditions. The scale of these impacts depends on the dust suppression and other mitigation measures applied. The assessment will consider the level of risk of potential impacts and define a set of mitigation measures required.

1.5. The Proposed Development is in a dense urban area close to Lansdowne Road. It is located within an Air Quality Management Area (AQMA) declared by LBH. The main concerns relating to air quality are the impact that the Proposed Development might have on sensitive receptors in the local area and the conditions for future occupants and users of the Proposed Development.

1.6. The expected traffic trip generation is expected to be minimal for the Development Site. The trip generation associated with the development will be screened against the criteria set out by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) for human health and IAQM for the potential for impacts on sensitive ecological sites. The impacts on sensitive receptors in the local area of the development are expected to be insignificant. However, impacts of existing road traffic on the future occupants will need to be assessed in detail.

1.7. The Proposed Development will not include any centralised combustion plant for heat or power generation; there is therefore unlikely to be any significant building related emissions from the Proposed Development.

1.8. This assessment describes the existing and future air quality at the Proposed Development and in the local area. Consideration has been given to nitrogen dioxide (NO_2) and particulate matter (both PM_{10} and $PM_{2.5}$) as these are the pollutants of most concern.

1.9. This report does not consider the impacts of air quality on the health implications associated with Covid-19, as there remains too much uncertainty at this stage to consider this explicitly.

2. Legislation, Policy and Guidance Documents

2.1. This section sets out the planning policy which is a material consideration in determining planning applications, legislation, guidance documents and other sources of useful information.

Planning Policy

National Planning Policy Framework

2.2. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities & Local Government, 2019a) sets out planning policy for England. It includes advice on when air quality should be a material consideration in development control decisions. Relevant sections are set out below:

Paragraph 170: *"Planning policies and decisions should contribute to and enhance the natural and local environment by: 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"*

Paragraph 180: *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development".*

Paragraph 181: *"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: *"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."*

Paragraph 54: *"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."*

Local Planning Policy

Local Development Plan

2.3. The LBH Development Plan is currently made up of Strategic Policies (London Borough of Haringey, 2013), Development Management Policies (London Borough of Haringey , 2017), Site Allocations (London Borough of Haringey, 2017), Tottenham Area Action Plan and London Plan (GLA, 2021). Development Management Policies include three policies that refer to air quality. These include:

Policy DM1- Delivering High Quality Design

"…Development proposals must ensure a high standard of privacy and amenity for the development's users and neighbours. The Council will support proposals that:…

Address issues of vibration, noise, fumes, odour, light pollution and microclimatic conditions likely to arise from the use and activities of the development."

Policy DM19 – Nature Conservation:

"A Development proposals on sites which are, or are adjacent to, internationally designated sites, Sites of Special Scientific Interest, Local Nature Reserves, Sites of Importance for Nature Conservation or Ecological Corridors, should protect and enhance the nature conservation value of the site.

B Development that has a direct or indirect adverse impact upon important ecological assets, either individually or in combination with other development, will only be permitted where: a The harm cannot be reasonably avoided; and b It has been suitably demonstrated that appropriate mitigation can address the harm caused."

Policy DM23 – Environmental Protection:

"All development proposals should consider air quality and be designed to:

A Improve or mitigate the impact on air quality in the Borough; and b Improve or mitigate the impact on air quality for the occupiers of the building or users of the development.

B Air quality assessments will be required for all major development and other development proposals, where appropriate.

C Where necessary, adequate mitigation must be provided…"

"National planning policy and guidance seeks to promote sustainable communities and sets out that local authorities should consider how to manage air quality in their area, such as by ensuring that new development contributes to reducing or mitigating air pollution and the population's exposure to it."

"As Haringey is an AQMA it is expected that proposals for new development will consider air quality in the design, construction and operation of the development over its lifetime. This includes consideration of adverse impacts on potential site occupiers as well on the wider local area. Some types of uses are very sensitive to air pollution (such as schools, hospitals and residential uses,

particularly those for elderly people) and this should be considered by developers in the site selection process. In line with London Plan Policy 7.14, the Council expects that all development should be at least 'air quality neutral'. 4.59 The Mayor's 'The Control of Dust Emissions from Construction and Demolition' SPG (2014) should be referred until such time it is replaced by equivalent guidance, such as the proposed London Plan supplementary guidance."

2.4. The London Plan in Appendix A1 sets out development planning policies that have been implemented within the LBH.

London Borough of Haringey Planning Obligations SPD

2.5. The Council has also published a Supplementary Planning Document (SPD) (London Borough of Haringey, 2018) on planning obligations in the Borough which *"set out the Council's approach, policies and procedures in respect of the use of planning obligations".* This document states that:

"Sustainable development includes the impacts that the construction process of the development proposals may have on neighbouring activities, the general public, and the environment. For most forms of development, the Council will usually include a condition requiring the applicant to submit a construction management plan (CMP) prior to any work commencing. The CMP typically details the hours of construction activity, confirms the access arrangement, the times when HGV movements should take place, safety procedures, and environmental mitigation, such as wheel washing facilities and watering to prevent dust."

Air Quality Standards, Critical Levels/Loads, Limit Values and Air Quality Objectives

2.6. The Environment Act 1995 (HMSO, 1995) sets out the requirements of the Local Air Quality Management (LAQM) regime and the requirement for the Government to produce an Air Quality Strategy including standards and objectives.

2.7. The latest Air Quality Strategy was published in 2007 (Defra, 2007) and sets out the Air Quality Standards (AQS), which consider the effects on human health and ecosystems, and The National Air Quality Objectives (AQOs) for ambient pollution. The AQOs for use by local authorities when considering human health were incorporated into UK legislation within the Air Quality (England) Regulations, 2000, Statutory Instrument 928 (2000) and the Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002). In addition to the AQO for protection of human health set out in the Air Quality Regulations, both critical levels and critical loads are defined for protection of ecosystems. These critical levels and critical loads also form part of the AQOs in the strategy.

2.8. The Strategy explains that the AQSs for the protection of human health are defined as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. An exceedence is a breach of the threshold for the concentration for the specific averaging period. In terms of ecosystems the AQS are based on the critical levels and critical loads, which are derived for habitats and exceedence of these values are used as an indication of the potential for harmful effects to systems at steady state

thus giving an indication of risk to the system. Critical loads are values of pollutants deposited below which significant effects do not occur. Critical levels the concentrations of pollutants above which direct adverse effects on vegetation or ecosystems may occur.

2.9. The AQOs set out the extent to which the Government expects the AQS to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility, and possible timescales. AQO are policy targets often expressed as a maximum ambient concentration, for a specific averaging period, not to be exceeded, either without exception or with a permitted number of exceedences, within a specified timescale. The LAQM regime, introduced by the Environment Act 1995, requires local authorities to review air quality within their boundary and work towards achieving and maintaining the AQOs.

2.10. The Strategy describes the Local Air Quality Management (LAQM) regime that has been established by Part IV of the Environment Act 1995, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an AQMA and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives. The strategy also provides the policy framework for air quality management and assessment in the UK.

2.11. In additional to the AQOs set within the Air Quality Strategy, the European Union (EU) has also set limit values for the protection of human health and critical levels for the protection of ecosystems. These were transposed into the Air Quality Standards Regulations (HMSO, 2010), which sets out the UK limit values, target values and critical levels for specific pollutants. Like the AQOs, the limit values, target values and critical levels are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedences allowed per year (if any) and a date by which it must be achieved. Some pollutants have more than one value covering different dates or averaging times. While the AQOs are policy targets, the government has the duty to ensure compliance with the legally binding limit values which is a national obligation rather than a local one.

2.12. The 2019 Clean Air Strategy (Defra, 2019a) includes a commitment to set a *"new, ambitious, long-term target to reduce people's exposure to $PM_{2.5}$"* which the proposed Environment Bill 2019-2021 commits the Secretary of State to setting. The statutory Mayor's London Environment Strategy (published 31 May 2018) also includes a commitment to meet the World Health Organization's (WHO) recommended guideline for $PM_{2.5}$ by 2030. The WHO acknowledges that current evidence suggests no safe level for $PM_{2.5}$. However, the WHO set a guideline, which is 10 $\mu g/m^3$ as an annual mean and more stringent than the current AQOs, reflects the level at which increased mortality from exposure to $PM_{2.5}$ is likely. Following the UK leaving the EU the Government have drafted a new Environment Bill which is not currently finalised, however, early indication is that the UK Government also intend to benchmark the $PM_{2.5}$ target against the WHO guideline.

2.13. In addition, the recent coroners court case investigating Ella Abdoo Kissi-Debrah's death in 2013 concluded that air pollution was a significant contributing factor to both the induction of Ella's asthma and the exacerbation of her symptoms, due to exposure in exceedence of WHO guidelines

for pollutants. This set a legal precedence to consider WHO guidelines when determining the significance of air quality and has thus been considered when undertaking this assessment.

Useful Sources of Information

2.14. Summaries of relevant documents and useful information have been presented in Appendix A1. The documents cover the following:

- Planning Practice Guidance;
- The Clean Air Strategy;
- The Industrial Strategy;
- The Clean Growth Strategy;
- Road to Zero;
- The National Air Quality Action Plans;
- The London Plan;
- London Environment Strategy; and
- Mayor's Transport Strategy.

Local Air Quality Action Plans

2.15. In 2001, the LBH declared an AQMA for exceedances of the annual mean NO_2 AQO and the 24-hour mean PM_{10} AQO across the entirety of the borough. The Proposed Development site lies within this AQMA.

2.16. The Council have since published multiple Air Quality Action Plans (AQAPs) that include measures to improve local air quality. The latest AQAP published (London Borough of Haringey , 2019) sets out the actions for 2019 to 2024. These include monitoring, reduce emissions from developments and buildings, improve public health and raise awareness, reduce emissions from delivery servicing and fright, reduce borough fleet emissions, localised solutions, and cleaner road transport.

Guidance Documents

Guidance on Land-Use Planning & Development Control: Planning For Air Quality

2.17. Environmental Protection UK (EPUK) in partnership with The Institute of Air Quality Management (IAQM) have produced guidance on *Land-Use Planning & Development Control: Planning For Air Quality*. EPUK and IAQM have produced this guidance to ensure that air quality is adequately considered in the land-use planning and development control processes. It provides a means of reaching sound decisions, having regard to the air quality implications of development proposals and provides guidance on how air quality considerations of individual schemes may be considered within the development control process, by suggesting a framework for the assessment of the impacts of developments on local air quality.

LAQM Technical Guidance

2.18. Defra and the devolved administrations have published a guidance document on Local Air Quality Management (LAQM) - *Local Air Quality Management Technical Guidance (TG16), Revised April 2021*. This document is designed to support local authorities in carrying out their duties under the Environment Act 1995, the Environment (England) Order 2002, and subsequent regulations. LAQM is the statutory process by which local authorities monitor, assess, and take action to improve local air quality. The Technical Guidance provides tools, approaches and technical information related to air quality.

Guidance on the Assessment and Control of Dust from Demolition and Construction

GLA SPG

2.19. The Greater London Authority's (GLAs) Supplementary Planning Guidance (SPG) on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014a) provides a risk-based methodology for considering the potential for dust generation from a development site during construction and demolition phases. The SPG sets out what mitigation measures should be implemented to minimise the dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM's) guidance, and it states that "*the latest version of the IAQM Guidance should be used*".

IAQM Guidance

2.20. The IAQM produced guidance on the assessment of dust from demolition and construction. This document provides a risk-based methodology for assessing construction impacts, including demolition and earthworks where appropriate. The guidance has been used throughout this assessment, which should be read in conjunction with the guidance document.

GLA SPG: Sustainable Design and Construction

2.21. The GLA's SPG on Sustainable Design and Construction (GLA, 2014b) provides details on delivering some of the priorities in the London Plan. Section 4.3 covers 'Air Pollution'. It defines when developers will be required to submit an air quality assessment, explains how location and transport measures can minimise emissions to air, and provides emission standards for a range of stationary combustion plant, and provides guidance on how Policy SI 1 B2)a) of the London Plan relating to 'air quality neutral' should be implemented.

A guide to the assessment of air quality impacts on designated nature conservation sites 2020

2.22. The IAQM have produced guidance to assist in the assessment of the air quality impacts of development on designated nature conservation sites. The guidance focuses on air quality assessments in support of Habitats Regulations Assessments (HRA), but also considers the approach for assessing the air quality impact on national or local designated nature conservation sites.

3. Assessment of Significance

Criteria for this Assessment

3.1. The assessment criteria include three separate types, covered by different legislation, policy, and guidance. These include AQOs, limit values, and WHO guidelines.

3.2. No ecological assessment criteria are presented as impacts are screened at the stage prior to the need to define the criteria, the details are set out later in this report.

Air Quality Objectives and Limit Values

3.3. The human health related AQOs and limit values for England for the pollutants relevant to this project are detailed in Table 1.

Table 1: AQOs and Limit Values

Pollutant	Time Period	Criteria Type	Concentration, and the number of exceedences allowed per year (if any)	Date AQO / Limit Value to be Achieved From and Maintained After
Nitrogen Dioxide (NO_2)	1-hour Mean	AQO / Limit Value	200 µg/m³ not to be exceeded more than 18 times a year	31st December 2005 / 1st January 2010
	Annual Mean	AQO / Limit Value	40 µg/m³	31st December 2005 / 1st January 2010
Fine Particles (PM_{10})	24-hour Mean	AQO / Limit Value	50 µg/m³ not to be exceeded more than 35 times a year	31st December 2004
	Annual Mean	AQO / Limit Value	40 µg/m³	31st December 2004
Fine Particles ($PM_{2.5}$) [a]	Annual Mean	AQO / Limit Value	25 µg/m³	2020 / 2015

Table notes:

a. The $PM_{2.5}$ AQO is not in Regulations and there is no legal requirement for local authorities to meet it. However, the $PM_{2.5}$ WHO guideline may be adopted soon as part of the Environment Bill in the future.

WHO Guidelines

3.4. The WHO Guidelines for NO_2 are the same as those presented in Table 1, however, for the short-term there are no permissible exceedances. For PM, the guidelines are lower, although it is noted that there is no safe level of PM. The WHO guidelines are set out in Table 2.

Table 2: WHO Guidelines

Pollutant	Time Period	Criteria Type	Concentration
Nitrogen Dioxide (NO_2)	1-hour Mean	WHO Guideline	200 µg/m³
	Annual Mean	WHO Guideline	40 µg/m³
Fine Particles (PM_{10})	24-hour Mean	WHO Guideline	50 µg/m³
	Annual Mean	WHO Guideline	20 µg/m³ [a]
Fine Particles ($PM_{2.5}$)	24-hour Mean	WHO Guideline	25 µg/m³
	Annual Mean	WHO Guideline	10 µg/m³ [b]

Table notes:

a. The WHO PM_{10} guideline is 20 µg/m^3 and may be adopted soon.

b. The WHO PM2.5 guideline is 10 µg/m3 and may be adopted soon.

Health Effects

3.5. Air pollution has a significant effect on public health. Long-term exposure (over years) reduces life expectancy, mainly due to cardiovascular and respiratory diseases and lung cancer. Recent evidence suggests that it can also adversely affect cognitive ability, and is associated with dementia, diabetes, obesity, and low birth weight (Royal College of Physicians, 2016).

3.6. Short-term exposure (over hours or days) to elevated levels of air pollution can also cause a range of health effects, including on lung function and exacerbation of asthma, resulting in respiratory and cardiovascular hospital admissions and mortality.

3.7. It has been estimated that exposure to man-made air pollution in the UK gives rise to 28,000 to 36,000 deaths a year (Public Health England, 2018).

3.8. There is no evidence of a safe level of exposure to PM below which there is no risk of adverse health effects. PHE believe that reductions of both PM and NO_2 concentrations below the current standards is likely to bring health benefits.

3.9. The Public Health Outcomes Framework (PHE, 2021) provides information on the fraction of mortality attributable to particulate matter ($PM_{2.5}$) air pollution (indicator D01). For LBH 6.6% of deaths in 2019 were attributed to $PM_{2.5}$, which is slightly above the average for London of 6.4% and that of England of 5.1%. It is therefore important to minimise exposure to $PM_{2.5}$ concentrations at the Proposed Development.

Figure 2: Public Health Framework D01 Fraction of all-cause adult mortality attributable to anthropogenic particulate air pollution

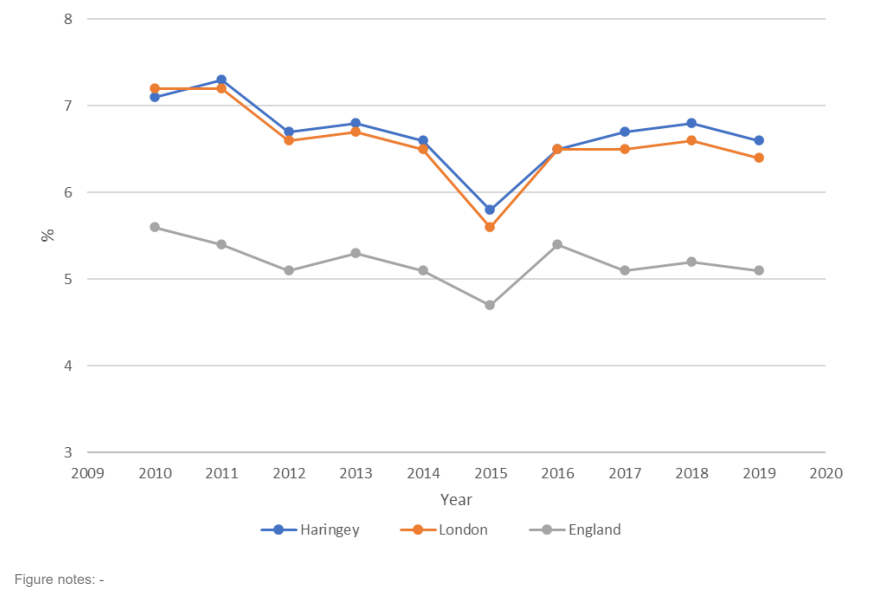


Figure notes: -

Relevant exposure

AQO Receptors

3.10. The annual mean AQO applies at locations where members of the public might be regularly exposed, such as building façades of residential properties, schools, hospitals, and care homes.

3.11. The 24-hour mean AQO applies at the annual mean locations of exposure as well as at hotels and residential gardens.

3.12. The 1-hour mean AQO applies at the annual mean locations of exposure and at hotels, residential gardens, and any outdoor location where members of the public might reasonably be expected to spend one hour or longer, such as busy pavements, outdoor bus stations and locations with outdoor seating.

3.13. Places of work like factories or offices are not considered places where members of the public might be regularly exposed and therefore the AQOs do not apply at these locations.

Limit Value Receptors

3.14. In accordance with Article 2(1), Annex III, Part A, paragraph 2 of Directive 2008/50/EC details locations where compliance with the limit values does not need to be assessed:

"Compliance with the limit values directed at the protection of human health shall not be assessed at the following locations:

a) Any locations situated within areas where members of the public do not have access and there is no fixed habitation;

b) In accordance with Article 2(1), on factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and

c) On the carriageway of roads; and on the central reservation of roads except where there is normally pedestrian access to the central reservation."

3.15. The government models compliance with the Directive at locations 4 m from the kerbside, 2 m high, more than 25 m from major road junctions and adjacent to at least 100 m of road length where the limit value applies.

WHO Receptors

3.16. The WHO criteria apply whenever there is relevant exposure in relation to each time period, for each pollutant. These are considered the same as those set out above for AQO receptors.

Assessment Approach

3.17. Standard practice is to assess the impacts of a proposed development on local air quality using the EPUK and IAQM guidance *on Land-Use Planning & Development Control: Planning For Air Quality*.

3.18. The EPUK and IAQM guidance provides a staged approach to considering air quality assessments:

- Stage 1) Initial screening
- Stage 2) Detailed screening
- Stage 3) Simple or Detailed assessment

3.19. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A2.

3.20. Details of the approach are set out in Appendix A3.

Significance

3.21. The approach developed by EPUK and IAQM (2017) has been used. The guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either "significant" or "not significant".

3.22. If none of the criteria in Stage 1 and 2 are met, then there should be no requirement to carry out an air quality assessment for the impact of the development on the local area, and the impacts can be considered as having a not significant effect.

3.23. Where a Simple or Detailed assessment is carried out, in drawing the determination of significance, the following factors should be taken account of:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;

- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts. In such circumstances, several impacts that are described as “slight” individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a “moderate” or “substantial” impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and
- the judgement on significance relates to the consequences of the impacts; i.e. will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

3.24. The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the users of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

4. The Proposed Development

4.1. The Proposed Development involves the removal of existing garages and construction of several residential units at Baldewyne Court, Lansdowne Road, Haringey.

4.2. Baldewyne Court currently comprises of four, three storey rectangular buildings, which in one instance is linked with a glazed entrance. The blocks are typical of the period when they were constructed in the 1970's with the use of a light brown brick and red tile hanging. The roofs are a low pitch and window replacement works have been carried out so that the windows are white pvc with a light blue spandrel panel. The perimeter boundary predominantly comprises of a brickwork wall facing Lansdowne Road which forms the rear wall for garages and parking. The area proposed for redevelopment is a rectangular piece of land currently occupied by the parking and existing garages forming the northern boundary of the estate facing Lansdowne Road. There are a number of existing trees bordering the development area. The neighbouring housing on Lansdowne Road are a mix of buildings. The homes immediately adjacent to the east are three storey flat blocks of a similar era, whilst opposite is Arundel Court comprising of buildings of the same era as Baldewyne Court.

4.3. The proposal is to demolish the garages and remove the parking area to the Lansdowne Road frontage and provide a mix of new homes. The proposal provides two new apartment buildings which are three storeys in height. The new buildings will be a mix of light and dark brickwork with projecting balconies facing Lansdowne Road. To offer a buffer of privacy, the balconies will be constructed with brickwork piers. The ground floor apartments comprise of 1-bedroom and wheelchair dwellings, all with their own front doors. The buildings are walk up blocks serving two 2-bedroom apartments per floor. Refuse/recycling and cycle enclosures will be integral to the buildings with external access.

4.4. An indicative design of the Proposed Development is shown in Figure 3. The Proposed Development is anticipated to be operational by 2022.

Figure 3: The Proposed Development

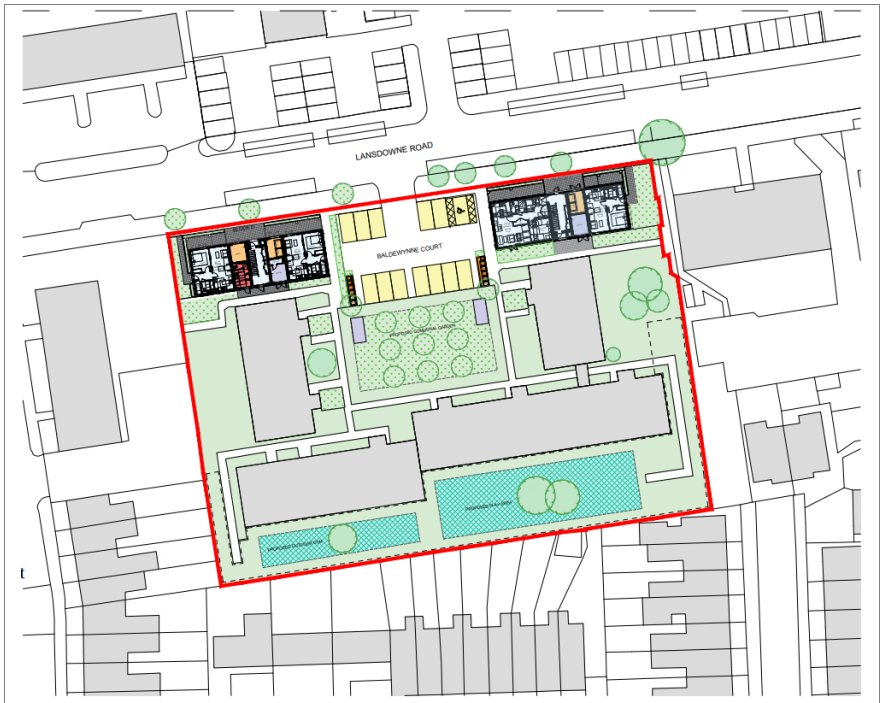


Figure notes: Drawing provided by BPTW Partnership.

Traffic Generation

4.5. The number of vehicle movements associated with the Proposed Development is not known. The Proposed Development will decrease the number of parking spaces within Baldewynne Court and is considered car-free. The existing buildings will maintain current vehicle movements, as the residential use will not change as part of the Proposed Development. Any increase in traffic movements will therefore only be associated with the proposed twelve residential properties. It is thus anticipated that there will be few vehicle movements generated. However, it is not known if local on-street parking will be used by future residents and the Proposed Development may lead to a small change in the number of delivery or refuses related vehicles.

Commented [KL2]: Silcock Dawson & Partners to confirm.

We believe this is correct. Please confirm if not.

Mitigation Included by Design

4.6. The EPUK and IAQM guidance (2017) is clear that it is important that development incorporate good design and best practice measures to ensure any impacts are minimalised as far as practicable, even where pollutant concentrations are predicted to be below the AQOs/limit values. This Proposed Development includes the following good design and best practice measures by design:

- the site will include pedestrian and bicycle access, with onsite storage for bicycles in accordance with the London Plan; and
- it is situated within 200 m of several bus stops, allowing easy access to sustainable modes of transport.

5. Methodology

5.1. The following section details the methodology of the assessment. The process consists of:

1. Defining baseline conditions.
2. Considering the impact of the emissions from the development.
3. Evaluating the significance of any impacts in relation to both the AQO receptors, using EPUK & IAQM and Environment Agency guidance, and the compliance receptors.

Existing Conditions

5.2. Consideration of the baseline conditions within the area of the Proposed Development have made based on the following:

- Industrial and waste management sources that may affect the area have been identified using the European Pollutant Release and Transfer Register (European Environment Agency, 2019). Local sources have also been identified through examination of maps and the Council's Air Quality Review and Assessment reports.
- Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority and where available other monitoring networks. This covers both the proposed site and the surrounding area, the latter being used to provide context to the assessment.
- Background concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been defined using the national pollution maps published by Defra (Defra, 2021b). These cover the whole of the country on a 1x1 km grid of average concentrations.
- Predicted roadside concentrations of NO_2 in the study area have been identified using the maps of roadside concentrations published by Defra (2019b) as part of its 2017 Air Quality Plan for the baseline year 2015 and for the future years 2017 to 2030. These maps are used by the UK Government, to report exceedances of the limit value to the EU. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2021c), which are available for the years 2009 to 2015, show no exceedances of the limit values anywhere in the UK in 2015.
- Predicted mapped concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been defined using pollution maps published by the GLA and Transport for London (TfL) (2021). These cover the whole of Greater London on a 20x20 m grid of average ground level concentrations for 2016.

Construction and Demolition Dust

5.3. The assessment method follows the approach provided by the IAQM guidance document (2016). This approach follows a sequence of steps:

- Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required.
- Step 2 is to assess the risk of dust impacts.
- Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site.
- Step 2b defines the sensitivity of the area to any dust that may be raised.

- Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation.
- Step 3 uses this information to determine the appropriate level of site-specific mitigation required to ensure that there should be no significant impacts.
- Step 4 is to examine the residual effects and to determine whether or not these are significant.

5.4. The approach developed by IAQM (2016), divide the activities on construction sites into four types to reflect their different potential impacts. These are:

1. demolition;
2. earthworks;
3. construction; and
4. trackout.

Impacts of proposed Development on the local area

5.5. With regards to human health, the first step in considering the road traffic impacts of the Proposed Development has been to screen it and its traffic generation against the criteria set out in the EPUK and IAQM guidance, as described in Paragraph A3.8 to A3.9. Where impacts can be screened out there is no need to progress to a more detailed assessment.

5.6. With regards to ecologlical sites, the first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the IAQM habitats guidance, as described in Paragraph 2.22. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Impacts of emissions sources on sensitive receptors within the Proposed Development

5.7. The following section sets out the approach taken to the assessment of pollutant emissions upon air quality at the Proposed Development.

Modelling approach overview

5.8. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted for the existing year of 2019.

5.9. While the Proposed Development did not exist in 2019, as air quality is predicted to improve into the future and traffic growth in London is relatively small (if not negligible), using 2019 as an assessment year is associated with a conservative assessment.

Modelled Receptors

5.10. Pollutant concentrations have been predicted at sixteen receptor locations within the Proposed Development, at a range of heights, representing a range of locations, including of worst-case exposure at the Proposed Development. The receptor locations are shown in Figure 4.

Figure 4: Receptor locations within the Proposed Development

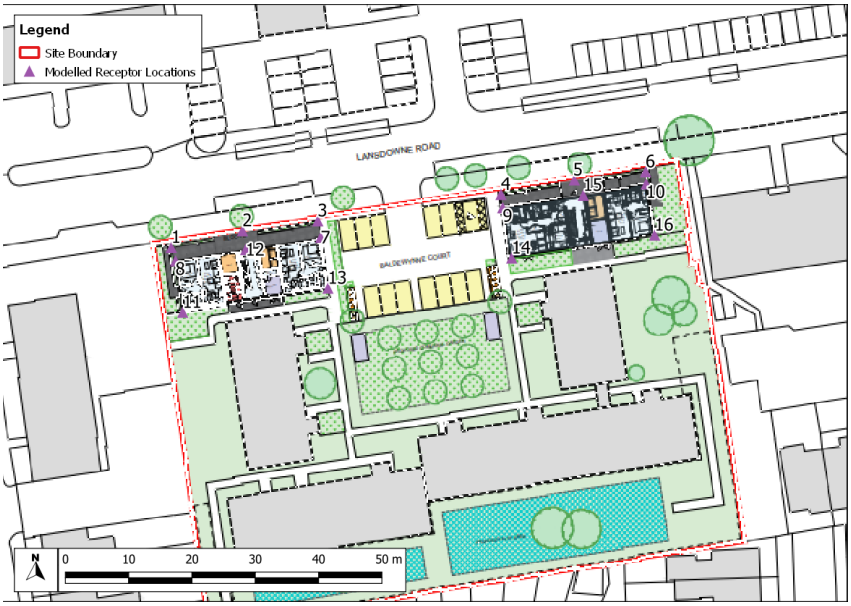


Figure notes: Drawing provided by BPTW Partnership.

5.11. In addition, concentrations have also been predicted at three monitoring sites located in the local area, to improve and verify the model (see paragraph 0).

Impacts of road traffic

5.12. Concentrations have been predicted using the ADMS-Roads atmospheric dispersion model (v5) with the latest vehicle emission factors available from Defra's Emission Factor Toolkit (EFT) (v10.1). ADMS-Roads was developed and validated by Cambridge Environmental Research Consultants (CERC). The model is used extensively throughout the UK for dispersion modelling and is accepted as an appropriate tool by local authorities. The model requires a range of input parameters which are discussed below.

Modelled Roads

5.13. The road links, widths, heights, and street canyons included in the dispersion model have been aligned with data from Ordinance Survey maps, google maps and considering distances based on a range of mapping sources ensuring relative distances from the roadsides to receptors and monitoring sites are carefully set. The modelled road links, speeds, and street canyons are shown in Figure 5. This includes roads near to the Proposed Development and those close to local monitoring sites.

Figure 5: Modelled roads links, Speeds, Street Canyons, Verification Sites, and Proposed Development Location

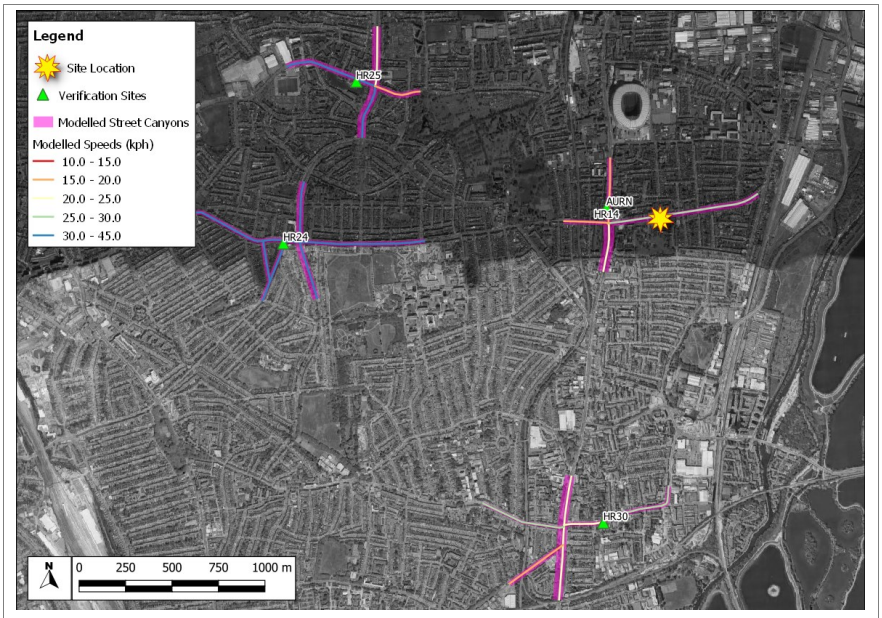


Figure notes: Imagery © 2021 Google, Map data © 2021.

Traffic Data

5.14. Traffic data have been taken from the GLA's London Atmospheric Emissions Inventory (LAEI) for the years of 2013 and 2020 and interpolated to the assessment year of 2019. This data includes Annual Average Daily Traffic (AADT) flows, the percentage of diesel and petrol cars, Light Goods Vehicles (LGVs), Heavy Goods Vehicles (HGVs), buses and motorcycles, and average vehicle speeds for all main roads in London.

5.15. Where appropriate, the vehicle speeds have been reduced to take account of slower speeds at junctions and queuing. A summary of the traffic data used in the model is presented in Table A1 in Appendix A3.

Additional Model Setup Parameters and Post-processing

5.16. Further details on additional model setup parameters and post-processing approaches are set out in Appendix A3. These include the vehicles emission factors, meteorology, model verification and other key modelling considerations.

Uncertainty and limitations

5.17. The assessment involves a range of uncertainties, including the model inputs, assumptions, the model, model verification and post-processing of model results. A brief overview of the key uncertainties is discussed in Appendix 0.

Air Quality Neutral

5.18. The methodology follows the approach set out in the GLA's SPG on Sustainable Design and Construction (GLA, 2014b). The assessment involves comparing building and transport-related nitrogen oxides (NOx) and PM_{10} emissions associated with the Proposed Development against emission benchmarks for properties of a similar nature within Greater London.

Air Quality Positive

5.19. Specific guidance setting out a methodology for the assessment of whether a Proposed Development is air quality positive is not yet available. The assessment has therefore been based upon the air quality neutrality of the Proposed Development and a comparison of direct and indirect building and transport emissions generated by the Proposed Development and the existing building on-site.

6. Baseline Conditions

AQMAs

6.1. The LBH has investigated air quality within its administrative area as part of its responsibilities under the LAQM regime. The Council has declared a borough-wide AQMA for exceedances of the annual mean NO_2 AQO and the 24-hour mean PM_{10} AQO. The Proposed Development site lies within this AQMA.

Air Quality Emission Zones

6.2. The Proposed Development is also located within the London Low Emission Zone (LEZ) operated by Transport for London (TfL). Light Goods Vehicles (LGVs) and Heavy-Duty Vehicles (HDVs) are charged to travel within the zone. Tougher emission standards are due to come into force from March 2021 and will still only apply to these vehicle types. The Proposed Development lies within the LEZ.

6.3. TfL also operate the Ultra-Low Emission Zone (ULEZ) in London, which charges most vehicle types including private vehicles such as cars. The Proposed Development is located outside the current ULEZ. However, in October 2021 the ULEZ boundary will be expanded, and the Proposed Development will be located within the expanded ULEZ.

Air Quality Focus Areas

6.4. The GLA has identified 187 Air Quality Focus Areas (AQFA) in London. These are locations that not only exceed the EU annual mean limit value for NO_2, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and TFL will focus actions to improve air quality.

6.5. The Proposed Development is located 340 m away from the nearest AQFA, which covers the A10 High Road to Bruce Grove and A1010, as shown in Figure 6.

Figure 6: Focus Area location relative to Proposed Development location

Figure notes: Contains OS data © Crown copyright and database right (2021).

Ecological Sites

6.6. The location of the Proposed Development in relation to nearby designated ecological habitats is shown in Figure 4. Habitats fall into the following categories:

- Locally designated sites: local wildlife sites (LWS), Local Nature Reserves (LNR) and Antient Woodlands (AW).
- Nationally designated sites: Sites of Specific Scientific Interest (SSSI), National Nature Reserves (NNR).
- Internationally designated sites: Ramsar, Special Protection Area (SPA), Special Areas of Conservation (SAC).

6.7. The Proposed Development is located approximately 965 m away from the Lee Valley Ramsay/SPA and Walthamstow Reservoirs SSSI which are to the east of the Proposed Development.

Figure 7: Designated Ecological Habitats and the Proposed Development Location

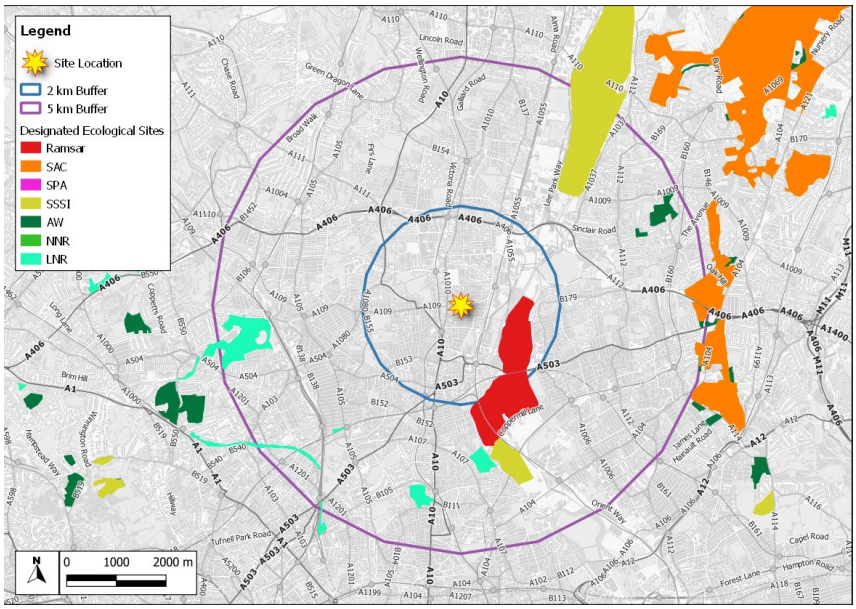


Figure notes: Contains OS data © Crown copyright and database right (2021).

Baseline Concentrations

LAQM Monitoring

6.8. The LBH operates two automatic stations, which measure concentrations of NO_2. The nearest monitoring station, Haringey Roadside (UKA00260), is located 295 m northwest from the Proposed Development. The Council also measures NO_2 concentrations using passive monitors (diffusion tubes). The nearest passive monitor 639 High Road (HR14) is located 295 m northwest of the Proposed Development (which is co-located with the automatic monitor). The next nearest passive monitor is located approximately 1.65 km south of the Proposed Development (HR30). Monitoring locations located close to the Proposed Development are shown in Figure 6. Data for these monitoring sites have been taken from the Council's Air Quality Annual Status Report (London Borough of Haringey, 2020). The LBH do not undertake monitoring of PM_{10} and $PM_{2.5}$ within its administrative area.

Figure 8: Monitoring Sites relative to Proposed Development location

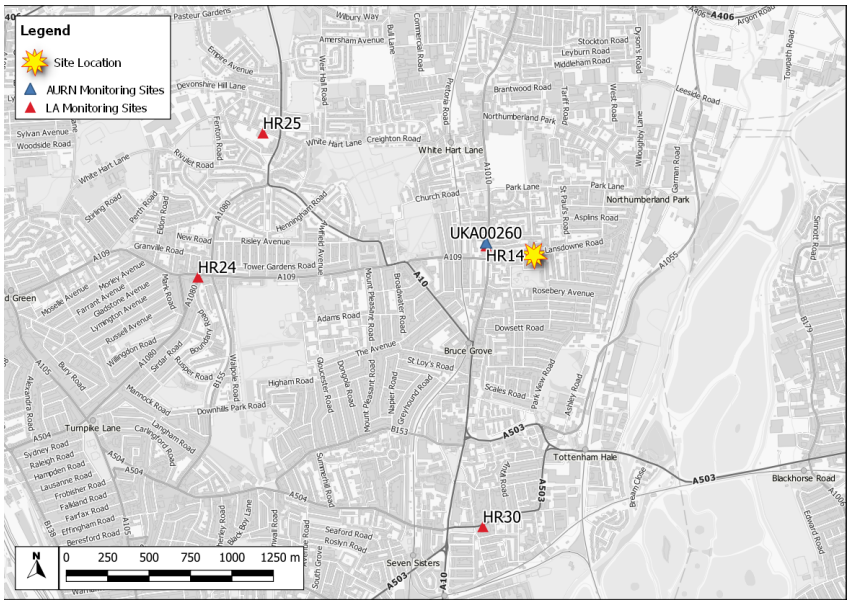


Figure notes: Contains OS data © Crown copyright and database right (2021).

Annual Mean NO_2

6.9. Annual mean NO_2 concentrations for the years of 2015 to 2019 are presented in Table 3. Data for 2015 to 2020 for UKA00260 have been obtained from Defra's AURN website (Defra, 2021c). Local Authority's monitoring data for 2015 to 2019 has been obtained from the Council's Air Quality Annual Status Report (London Borough of Haringey, 2020). A request for the more recent data was made but the Local Authority has not been made it available.

6.10. Measured NO_2 concentrations were above the annual mean AQO level of 40 µg/m^3 at the monitoring site located at Westbury Medical Centre (HR24) for 2015. Exceedances of the AQO were also measured at Earlsmead Primary School (HR30) for 2015 to 2018 and Haringey Roadside (UKA00260) for 2015 to 2017. Concentrations were below the AQO at all monitoring sites in 2019.

6.11. The closest monitoring stations Haringey Roadside (UKA00260) and 639 High Road (HR14) are both located 295 m northwest of the Proposed Development, these sites are considered the most representative of conditions at the Proposed Development as they are located within close proximity of the Development Site. Both monitoring sites measured below the AQO in 2019.

Table 3: Measured NO_2 Annual Mean Concentrations ($\mu g/m^3$) [a]

Site ID – Name (Type)	2015	2016	2017	2018	2019	2020 [b]
HR14 – 639 High Road (Roadside)	39	33	34	33	34	n/a
HR24 – Westbury Medical Centre (Roadside)	**43**	37	33	33	34	n/a
HR25 – Rowland Hill Nursery (Roadside)	33	30	29	35	28	n/a
HR30 – Earlsmead Primary School (Roadside)	**50**	**43**	**40**	**44**	39	n/a
UKA00260 - Haringey Roadside (Roadside)	**40**	**43**	**40**	39	37	33
AQO / Limit Value / WHO Guideline	40					

Table notes:

a. Exceedances of the AQO are presented in bold.

b. 2020 date covers the period of the COVID-19 pandemic and therefore not presentative of typical emission and not comparable to previous years.

1-Hour Mean NO_2

6.12. The measured number of 1-hour mean NO_2 concentrations above 200 $\mu g/m^3$ for the monitoring sites which measure 1-hour averages are presented in Table 4. Data for 2015 to 2020 for Haringey Roadside (UKA00260) have been obtained from Defra's AURN website (Defra, 2021c). No exceedances of the 1-hour mean NO_2 AQO were measured.

Table 4: Measured Number of NO_2 1-hour Concentrations above 200 $\mu g/m^3$ [a]

Site ID - Name (Type)	2015	2016	2017	2018	2019	2020
UKA00260 - Haringey Roadside (Roadside)	0	6	5	0	0	0
AQO / Limit Value	18					

Table notes:

a. Exceedances of the AQO are presented in bold.

b. Information not current available.

AURN Monitoring

6.13. National Government monitoring sites, operated as part of the Automatic Urban and Rural Network (AURN) regime, within the vicinity of the site are presented in Figure 6. The nearest monitoring site is the Haringey Roadside automatic monitoring station mentioned above. As LBH's Pollution Team were unable to provide the 2020 monitoring data, the data shown in Table 3 and Table 4 for 2020 were taken from the AURN interactive website (Defra, 2021c).

LAQN Monitoring

6.14. The LondonAir website (www.londonair.org.uk) hosts air quality monitoring data for many sites in London, mainly for local authority automatic monitoring sites. The automatic NO_2 monitoring site, Haringey Roadside, shown in Figure 8, is operated as part of the London Air Quality Network, the results of which are presented above. This monitoring site has been presented in the sections above.

Tottenham Hotspur Football Club

6.15. Tottenham Hotspur Football Club (THFC) recently redeveloped their stadium as a mixed-use development. The Section 106 (s.106) agreement presented on the LBH planning portal shows that that THFC had to carry out air quality monitoring in the local area and report the monitoring annual to the Pollution Team at the LBH. Given the proximity of the development to the stadium, there are a number of monitoring sites which were operated by THFC which would be useful to provide a further understanding of the air quality in the local area. A request for the data was made to the Pollution Team at LBH and the team have stated that they are unaware of the requirement for THFC to report and stating:

"I am not aware of any Tottenham Hotspur Football Club development air quality monitoring in the local area and no report of such monitoring has been sent to us in the last one year."

Breathe London

6.16. The Breathe London monitoring survey is a multi-partner project (EDF Europe, 2020) which uses low-cost continuous monitoring sensors to measure pollutant concentrations. The reliability of these measurements is currently under review, however, the data can provide some useful information. The closest monitoring station is located 1.7 km northwest at North Middlesex University Hospital, the station was installed on 22nd January 2021. No data for this monitoring station has been released since it's installation.

Predicted background concentration

6.17. Ambient background concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been defined using the national pollution maps published by Defra (Defra, 2021b). These cover the whole of the country on a 1x1 km grid for each year from 2018 until 2030. Concentrations for 2019 and 2022 have been extracted for the grid cells that surround the receptor locations. The values are presented in Table 5. These concentrations have been bilinearly interpolated to give specific background concentrations at each receptor location. All predicted background concentrations are well below the AQOs, limit values, and WHO guidelines, apart from $PM_{2.5}$ in both 2019 and 2022 where concentrations are above the WHO guideline.

Table 5: Mapped Background Concentrations (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2019	23.0	18.8	12.5
2021	22.0	17.9	11.9
AQO / Limit Value	**40**	**40**	**25** [a]
WHO Guideline [b]	**40**	**20**	**10**

Table notes:

a. The $PM_{2.5}$ AQO is not in Regulations and there is no legal requirement for local authorities to meet it.

b. The WHO guidelines are not in Regulations and there is no legal requirement for local authorities to meet it.

Predicted roadside concentration

6.18. Defra has predicted roadside concentrations of NO_2, PM_{10}, and $PM_{2.5}$ for the main roads in the UK (Defra, 2019b) for the years 2017 to 2030 as part of Defra's commitment to report exceedences of the limit values. For 2022, there are exceedances of the NO_2 limit value on A503 and A1055, see Figure 9. There are no exceedances of the PM_{10} and $PM_{2.5}$ limit values predicted in the local area.

6.19. It should also be noted that it is widely accepted that in many locations in the UK Defra's modelling has underpredicted roadside concentrations when compared with local monitoring and these Defra roadside estimates should be treated with caution.

6.20. The earliest year that occupants of the Proposed Development might be exposed to local air pollution is 2022. Defra predicts that there will be exceedances of NO_2 limit value in 2021 for the A503 and A1055, no exceedances of the limit value are expected for 2022. Future occupants of the proposed Development are unlikely to be exposed to concentrations above the AQO.

Table 6: Relevant Defra Predicted Roadside Concentrations (µg/m^3) [a]

Link (Census ID)	NO_2		PM_{10}		$PM_{2.5}$	
	2021	2022	2021	2022	2021	2022
A10 (26654)	36.0	34.1	20.5	20.3	13.6	13.5
A109 (6639)	26.2	24.9	19.4	19.2	13.0	12.9
A503 (79993)	**42.3**	39.7	22.1	21.9	14.4	14.2
A1010 (73479)	27.3	25.8	18.6	18.4	12.6	12.4
A1055 (79994)	**41.8**	39.3	19.8	19.6	14.0	13.8
Limit Value	**40**		**40**		**25**	

Table notes:

a. Breaches of the limit value are in bold

Figure 9: PCM modelled NO_2 concentrations for 2021 and Site Location

Figure notes: Contains OS data © Crown copyright and database right (2021).

LAEI concentrations

6.21. The GLA and TfL have jointly produced the London Atmospheric Emissions Inventory (LAEI), a database of geographically referenced datasets of pollutant emissions and sources in Greater London. It includes maps of modelled ground level NO_2, PM_{10} and $PM_{2.5}$ concentrations at a 20x20 m grid resolution for the base year of 2016.

6.22. The mapped concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the vicinity of the Proposed Development are shown in Figure 10 to Figure 12, respectively. Figure 10 illustrates the annual mean NO_2 concentrations are predicted to range between 34.1 – 36.6 µg/m^3 at ground level, i.e., below the AQO throughout the ground floor of the Proposed Development. Figure 11 shows the annual mean PM_{10} concentrations are predicted to range between 22.8 – 23.1 µg/m^3 at ground level, i.e., well below the AQO throughout the site. Figure 12 shows the annual mean $PM_{2.5}$ concentrations are predicted to range between 13.4 – 13.5 µg/m^3 at ground level, i.e., well below the AQO throughout the site. These concentrations are predicted for 2016; concentrations will be significantly lower in 2022 when the Proposed Development may be occupied.

Figure 10: Ground Level LAEI predicted annual mean NO_2 concentrations for 2016

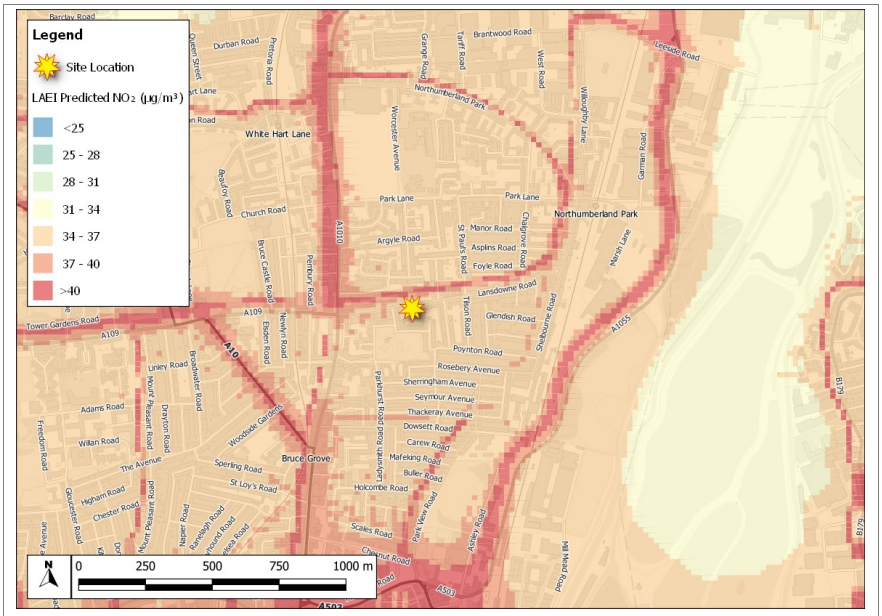


Figure notes: Contains OS data © Crown copyright and database right (2021).

Figure 11: Ground Level LAEI predicted annual mean PM_{10} concentrations for 2016

Figure notes: Contains OS data © Crown copyright and database right (2021).

Figure 12: Ground Level LAEI predicted annual mean $PM_{2.5}$ concentrations for 2016

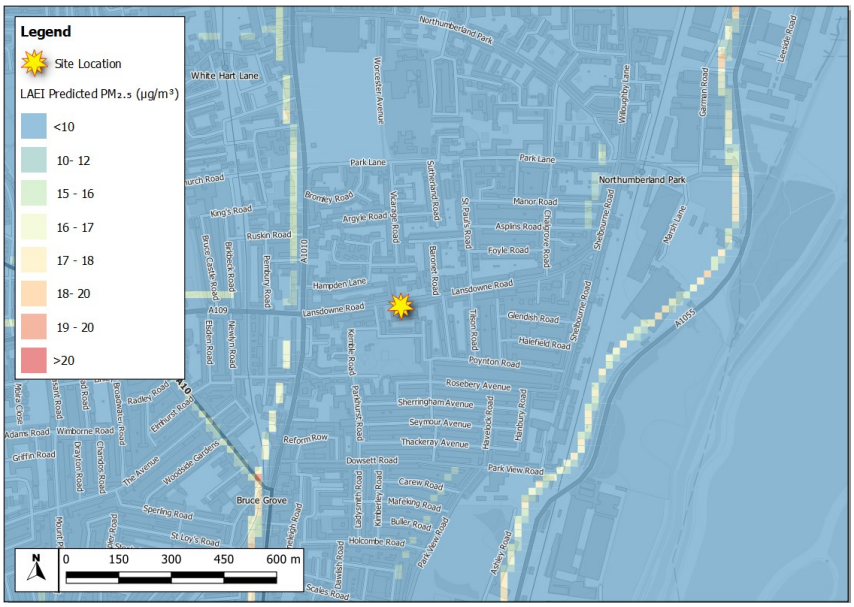


Figure notes: Contains OS data © Crown copyright and database right (2021).

Other Sources of Air Pollution

Permitted Facilities

6.23. The Environment Agency regulates sites which are at risk of contributing significantly to pollutant concentrations and maintains a database of these sites called the UK Pollutant Release and Transfer Register (PRTR). The UK PRTR data has been used to fulfil the reporting requirements of the European Pollutant Release and Transfer Register (E-PRTR) which provides details of all regulated sites in the UK (European Environment Agency, 2019). The 2019 database has identified no regulated facility within 1 km of the Proposed Development.

Overall Baseline Conditions

Air Quality Objectives

6.24. There are exceedences of the NO_2 AQO, although the PM objectives are likely be to be below the relevant AQOs.

Limit Value Compliance

6.25. Existing levels of NO_2 are likely to breach the limit values in locations near to some busy roads in the local area. The PM limit values are unlikely to exceed the limit values.

World Health Organization Guidelines

6.26. The World Health Organization (WHO) have produced guidelines to protect human health from poor air quality. There is the potential for a likely exceedance of the NO_2 guideline where the AQO is breached, discussed earlier.

6.27. There is a reduced level of detail relating to PM concentrations, however, there PM_{10} background concentrations are just below the guideline of 20 µg/m^3, in locations in close proximity to sources of particulate matter, such as vehicles on local roads, there could be exceedances of the PM_{10} guideline. The $PM_{2.5}$ background concentration exceeds the guideline of 10 µg/m^3, as is the case for much of London.

7. Construction Phase Impact Assessment

7.1. The construction works will give rise to a risk of dust impacts during demolition, earthworks, and construction, as well as from trackout of dust and dirt by vehicles onto the public highway.

7.2. Given the small size of the Proposed Development, there is unlikely to be significant impact from construction traffic generated or Non-Road Mobile Machinery (NRMM) during the construction phase. The Proposed Development is located within London's Low Emission Zone for NRMM, where all engines between 37-560 kW are required to meet at least stage IIIB emission standards to minimise pollution. From 28th February 2021 the NRMM will be required to meet stage IV emission standards which are stricter and will minimise pollution further. Furthermore, engines running at constant speeds, such as generators, are required to meet stage V emission standards. Suitable mitigation measures for construction site plant are set out in Section 9, based on advice presented in GLA (2014b) and IAQM (2016) guidance documents.

Construction dust

Step 1

7.3. Step 1 of the assessment procedure is to screen the need for a detailed assessment. The guidance provides distance-based criterion in Box 1 of the guidance which states:

An assessment will normally be required where there is:

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

7.4. There are human receptors within the distances set out in the guidance, thus an assessment is required for human receptors. There are no ecological receptors within the screening distances and therefore effects on ecological receptors can be discounted as not significant.

Step 2

7.5. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

7.6. The guidance explains that the dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large. The guidance provides examples of the magnitude classification for each of the potential stages.

Demolition

7.7. There will be a requirement to demolish the existing garages and pram sheds on-site. The total building volume is unknown but has been estimated to be about 200 m^3. Based on the illustrative criteria in the IAQM guidance, the dust emission class for demolition is considered *Small*.

Earthworks

7.8. The dust generated by the earthworks depends on the nature of the earth and soil at the site. The characteristics of the soil at the development site have been defined using the British Geological Survey's UK Soil Observatory website (2021), and are set out in Table 7. Overall, it is considered that, when dry, this soil has the potential to be slightly dusty.

Table 7: Soil Characteristics at the Proposed Development

Category	Record
Soil layer thickness	Deep
Soil texture	Silt to Silty Loam
Subsoil grain size	Argillaceous- A clay and silt-rich subsoil
European Soil Bureau Description	Loam Loess
Table notes: -	

7.9. It is not known whether there will be a requirement for earthworks on-site, however it is assumed that there will be a need for some earthworks in order to create foundations and landscaping for the Proposed Development. The approximate area for earthworks covers an area of 1,400 m^2. Dust will arise mainly from the handling and transport of dusty materials (such as dry soil). Based on the illustrative criteria in the IAQM guidance document, the dust emission class for earthworks is considered *Small*.

Construction

7.10. The Proposed Development includes the construction of two new apartment buildings which are three storeys in height. Construction work will be required for the building of the Proposed Development. The total volume and material of the buildings are unknown but is estimated to be about 6,300 m^3 and concrete. Based on the illustrative criteria in the IAQM, the dust emission class for earthworks is considered *Small*.

Trackout

7.11. The number of Heavy-Duty Vehicles (HDVs) leaving the site on a single day is unknown. Given the small scale of the Proposed Development, it is considered likely that there will be less than ten HDVs driving onto the site per day. Based on the use of the Proposed Development and taking worst-case approach, the IAQM Guidance dust emission class for trackout is considered *Small.*

Summary of Potential Dust Emission Magnitude

7.12. Table 8 summarises the dust emission magnitude for the Proposed Development.

Table 8: Summary of Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Small
Construction	Small
Trackout	Small
Table notes: -	

Sensitivity of the Study Area

7.13. The guidance explains that the sensitivity of the area should take account of a number of factors including:

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

7.14. The IAQM guidance document provides examples of high, medium, and low sensitive receptors for each of the potential effects. These are provided in Box 6 to Box 8 of the guidance and consideration should be given to the additional factors presented in Box 9 of the guidance. The guidance has also, helpfully, provided a series of matrices (Table 2, Table 3, and Table 4 of the guidance document) to determine the sensitivity of the area based on the receptor sensitivity, number of receptors, the proximity to the dust emission activity and baseline PM_{10} concentration.

7.15. Residential properties are considered high sensitivity receptors to dust soiling and elevated levels of PM_{10}, while the commercial properties are medium sensitivity receptors. Some commercial properties, such as retail shops with windows, would be considered high sensitivity receptors to dust soiling.

7.16. Figure 11 shows the site location with several bands representing 20 m, 50 m, and 100 m distances from the site boundary. There are between 10 and 100 high sensitivity receptors within 20 m of the site boundary. Based on Table 2 of the IAQM guidance document, the sensitivity of the area to dust soiling impact will be *High*.

7.17. The maximum predicted annual mean PM_{10} concentration for receptors at the Proposed Development based on the modelling carried out for 2019 is 19 $\mu g/m^3$ (see Table 11). There are between 10 to 100 high sensitivity receptors within 50 m of the site boundary that are likely to be exposed to these concentrations from the site boundary. Based on Table 3 of the IAQM guidance, the sensitivity of the area to human health impacts due to elevated levels of PM_{10} during the demolition, earthworks and construction stages will be *Low.*

Figure13: Distance Buffers from Site Boundary

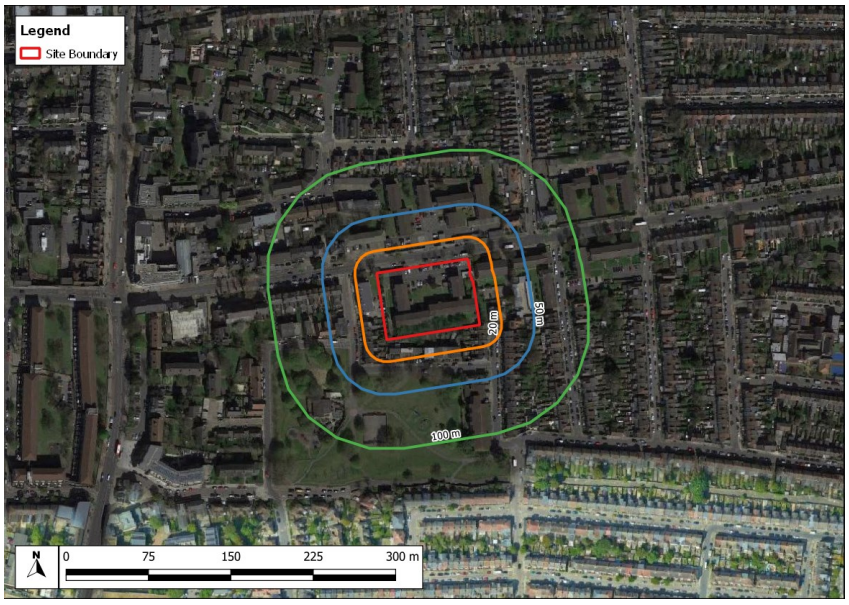


Figure notes: Imagery © 2021 Google, Map data © 2021

7.18. Footnote C of Table 2 of the guidance explains that where there is a small dust emission magnitude for trackout there is a risk of material being tracked up to 50 m from the site. It is expected that all construction-related vehicles will access the site via the likely entrance on Lansdowne Road, shown in Figure 12. There are more than 10 medium sensitivity properties within 20 m of the roads along which material could be tracked (although there are likely to be fewer than 10), and thus the area is considered of *high* sensitivity to dust soiling (based on Table 2 of the guidance) and *low* sensitivity for human health impacts (based on Table 3 of the guidance).

Figure 14: Distance Buffers from road lanes where dirt may be tracked out from the site

Notes: Imagery © 2021 Google, Map data © 2021

7.19. Table 9 summarises the sensitivity of the area around the proposed construction works based on the highest level of sensitivity determined for each stage.

Table 9: Summary of Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low
Table notes: -				

Risk of Dust Effect

7.20. The guidance has, helpfully, provided a series of matrices (Table 2, Table 3, and Table 4 of the guidance document) to determine the potential impact at receptors based on the receptor sensitivity, number of receptors and the proximity to the dust emission activity.

7.21. The dust emission magnitudes in Table 8 have been combined with the sensitivities of the area in Table 9 using the matrices in the guidance (Table 6, Table 7, and Table 8 of the guidance), in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 10.

Table 10: Summary of Dust Risk for each stage

Potential Impact	Risk			
	Demolition [a]	Earthworks [b]	Construction [c]	Trackout [d]
Dust Soiling	Medium Risk	Low Risk	Low Risk	Low Risk
Human Health	Negligible	Negligible	Negligible	Negligible

Table notes:

a. Based on Table 6 of the IAQM guidance document.

b. Based on Table 7 of the IAQM guidance document.

c. Based on Table 8 of the IAQM guidance document.

d. Based on Table 9 of the IAQM guidance document.

Significance of effects

7.22. The IAQM guidance does not provide a method for assessing the significance of effects before mitigation and advises that pre-mitigation significance should not be determined.

Step 3

7.23. The risk categories set out in Table 10 have been used to determine the appropriate level of mitigation as set out in Section 9 of this report (step 3 of the assessment procedure).

8. Operational Phase Impact Assessment

Impacts of the Proposed Development on the Local Area

Impacts on Air Quality Objectives

8.1. The Proposed Development involves more than 10 residential units, thus based on the EPUK and IAQM guidance there is a need to consider the impacts on local air quality.

8.2. The screening criteria set out in the EPUK and IAQM guidance states that the impacts are likely to be negligible where the change in AADT flow is less than 100 within an AQMA.

8.3. The Proposed Development is car-free, and although there may be a small number of additional vehicle trips associated with the Proposed Development, it is anticipated they will be well below the EPUK and IAQM threshold. Therefore, impacts on the local area due to changes in vehicle emissions are negligible.

8.4. The proposed development does not include provision of significant centralised combustion plant on-site and therefore there impacts on the local area due to onsite emissions are negligible.

Impacts on Critical Levels and Critical Loads

8.5. There are a number of sensitive habitats in the wider area.

8.6. According to IAQM guidance (IAQM, 2020), the need for a detailed assessment of impacts on nationally and internationally designated ecological sites can be screened out if a development will lead to an increase in traffic generation of less than 1,000 AADT. A no net change in traffic trip generation does not exceed this criterion, the impact of emissions related to the Proposed Development upon the ecological sites are considered insignificant.

Impacts on Limit Value Compliance

8.7. Without the Proposed Development, existing levels of air pollution are predicted by Defra to be below the limit values in 2022. The Proposed Development is not expected to significantly increase traffic on local roads and will therefore not delay compliance with the limit values in the LBH.

Impacts on WHO Guidelines

8.8. Without the Proposed Development, existing levels of air pollution are predicted to be below the WHO guidelines for NO_2 and PM_{10} but exceed the guidelines for $PM_{2.5}$. This is due to baseline $PM_{2.5}$ levels being in exceedence across most of Greater London. The Proposed Development is not expected to significantly increase traffic on local roads and will therefore not result in changes of the local air quality in relation to the WHO guidelines.

Impacts on the Proposed Development

8.9. The Proposed Development is located within an urban area where ambient background pollution and pollutant emissions from vehicles using local roads may impact on future users of the Proposed Development.

Air Quality Objectives

8.10. The Proposed Development is not anticipated to be occupied prior to 2022. However, to account for future uncertainty in road traffic related emissions an assessment has been based on 2019 predictions to be conservative. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted for the year of 2019 at the Proposed Development. The predicted concentrations are presented in Appendix A5. The maximum concentrations are predicted at the ground floor, nearest to the road emission sources. The maximum concentrations at each receptor are presented in Table 11.

8.11. All predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the annual mean AQOs at ground floor. Air quality for receptors located at higher floors in general improves as the distance from the road emission sources increases, as demonstrated in Defra's 'Nitrogen Dioxide fall off with distance' calculator which was published as part of their LAQM tools (Defra, 2021a).

8.12. As set out in paragraph A3.15, exceedances of the 1-hour mean NO_2 and 24-hour mean PM_{10} AQOs are unlikely to occur where annual mean concentrations are below 60 µg/m^3 and 32 µg/m^3 (Defra, 2021), respectively. All predicted concentrations (including receptors B1-B6 which are located at the front of the terrace where the short-term AQOs apply) are below these criteria, and it is thus considered unlikely that the short-term AQOs will be exceeded. Air quality for future occupants of the Proposed Development will thus be acceptable.

Table 11: Maximum Predicted Annual Mean Concentrations at Locations within the Proposed Development (µg/m^3)

Receptor	Relevant exposure	NO_2	PM_{10}	$PM_{2.5}$
B1	For Information only, not relevant exposure for annual mean AQO.	25.4	19.2	12.7
B2	For Information only, not relevant exposure for annual mean AQO.	25.5	19.3	12.8
B3	For Information only, not relevant exposure for annual mean AQO.	25.5	19.2	12.7
B4	For Information only, not relevant exposure for annual mean AQO.	25.4	19.2	12.7
B5	For Information only, not relevant exposure for annual mean AQO.	25.5	19.2	12.7
B6	For Information only, not relevant exposure for annual mean AQO.	25.4	19.2	12.7
B8	Relevant exposure for annual mean AQO – façade of building.	25.2	19.2	12.7
B7	Relevant exposure for annual mean AQO – façade of building.	25.2	19.2	12.7
B9	Relevant exposure for annual mean AQO – façade of building.	25.1	19.2	12.7
B10	Relevant exposure for annual mean AQO – façade of building.	25.1	19.2	12.7
B11	Relevant exposure for annual mean AQO – façade of building.	23.5	18.9	12.6
B12	Relevant exposure for annual mean AQO – façade of building.	25.2	19.2	12.7
B13	Relevant exposure for annual mean AQO – façade of building.	23.5	18.9	12.6
B14	Relevant exposure for annual mean AQO – façade of building.	23.5	18.9	12.5
B15	Relevant exposure for annual mean AQO – façade of building.	25.1	19.2	12.7
B16	Relevant exposure for annual mean AQO – façade of building.	23.4	18.9	12.5

AQO / Limit Value	40.0	40.0	25.0 [a]
WHO [b]	40.0	20.0	10.0

Table notes:

a. The $PM_{2.5}$ AQO is not in Regulations and there is no legal requirement for local authorities to meet it.

b. The WHO guidelines are not in Regulations and there is no legal requirement for local authorities to meet it.

Limit Value Compliance

8.13. Existing levels of air pollution are predicted by Defra to be below the limit values in 2022. Predicted concentrations within the Proposed Development are below all the limit values and will therefore not lead to any delay in compliance of the limit values in LBH.

WHO Guidelines

8.14. Consideration has also been given to whether concentrations will exceed the WHO guidelines. The WHO guidelines will not be breached for NO_2 and PM_{10}, however, the annual mean $PM_{2.5}$ concentration exceeds the WHO guideline of 10 $\mu g/m^3$.

Significance of Operational Air Quality Effects

8.15. The operational air quality effects without mitigation are judged to be *'not significant'*. This professional judgement is made in accordance with the methodology and assessment criteria set out earlier in this report.

8.16. The judgement that the operational air quality effects will be *'not significant'* without mitigation takes account of the assessment that:

- the Proposed Development's trip generation on local roads is well below the screening criteria presented in the EPUK and IAQM guidance and thus the impacts of development traffic on the local area are negligible;
- the Proposed Development will not lead to detrimental effect on local air quality and will not delay compliance with the limit values or lead to any exceedences of the WHO guidelines at existing sensitive locations;
- predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ are likely to be well below the AQOs throughout the Proposed Development, including both residential areas, balconies and amenity areas, and air quality for the future occupants and users of the Proposed Development will be acceptable;
- pollutant concentrations at Proposed Development will not exceed the limit values or lead to any delay in compliance; and
- pollutant concentrations at the Proposed Development will be below the NO_2 and PM_{10} WHO guidelines throughout the site, although the $PM_{2.5}$ guideline will be exceeded at the Proposed Development, as is the case for much of London.

Air Quality Neutral

8.17. Irrespective of the significance of operational air quality effects set out above, a small incremental change can cumulatively with other developments worsen air quality. Following Policy SI 1 B2)a) of

the Mayor's London Plan, the Proposed Development should thus be at least 'air quality neutral' and not cumulatively lead to further deterioration of existing poor air quality in Greater London.

8.18. The air quality neutral assessment involves comparing building and transport-related nitrogen oxides (NOx) and PM_{10} emissions associated with the Proposed Development against emission benchmarks for properties of a similar nature within Greater London.

Building Emissions

8.19. The Building Emission Benchmarks (BEBs) for each land use category relevant to the Proposed Development are presented in Table 12. The Proposed Development will comprise of residential use (C3).

Table 12: Calculation of Benchmarked Building Emissions for the Development

Land Use	GFA (m^2)	NOx		PM_{10}	
		Building Emission Benchmark (g/m^2/annum) [a]	Benchmarked Emissions (kg/annum)	Building Emission Benchmark (g/m^2/annum) [a]	Benchmarked Emissions (kg/annum)
C3	1170	26.2	30.7	2.3	2.7
Total Benchmarked Building Emission		-	**30.7**	-	**2.7**

Table notes:

a. Taken from Table 6 of the GLA's report on Air Quality Neutral Planning Support (GLA, 2014c).

8.20. Details of how the heating and hot water will be provided to the Proposed Development is not currently known; it has therefore not been possible to determine whether the Proposed Development will be air quality neutral in terms of building-related emissions.

Commented [KL3]: Silcock Dawson & Partners to confirm.

Can you provide a short statement?

Transport Emissions

8.21. The guidance provides Transport Emission Benchmarks (TEBs) for residential use class (C3). The Proposed Development includes residential use and thus the TEBs for Class C3 are presented in presented in Table 13.

Table 13: Calculation of Transport Emissions Benchmarks for the Development

Land Use	Gross Internal Area (m^2)	NOx (g/m^2/annum)	NOx (kg/annum)	PM_{10} (g/m^2/annum)	PM_{10} (kg/annum)
C3	12	558.0	6.7	100.0	1.2
Total Transport Emission Benchmark (kg/annum)		-	**6.7**	-	**1.2**

Table notes:

a. Taken from Table 11 of the GLA's report on Air Quality Neutral Planning Support (GLA, 2014c).

8.22. The Proposed Development is not expected to generate significant increase in traffic due to the size of the development and will reduce the number of on-site parking spaces. The project team have stated there will be no net car trips generated as a result of the Proposed Development. On this basis, the transport emissions for the Proposed Development are therefore considered to be zero.

Commented [KL4]: Silcock Dawson & Partners to confirm.

Can you provide a short statement? If the Proposed Development will generate a small number of trips it is fine. We just need to know.

The total transport NOx and PM_{10} emissions for the Proposed Development are thus both below the benchmarked transport NOx and PM_{10} emissions of 6.7 kg/annum and 1.2 kg/annum (see Table 13). Thus, the Proposed Development is air quality neutral in terms of transport-related emissions.

Air Quality Positive

8.23. The London Plan sets out a requirement for the Proposed Development to be at least 'air quality neutral' and extends the requirement of the Proposed Development to aim to be 'Air Quality Positive' by implementing measures that will actively reduce air pollution (Policy SI 1 C). As part of the new London Plan, the GLA have stated that further guidance will be published on Air Quality Positive standards.

8.24. Consideration has therefore been given to whether the Proposed Development will be 'Air Quality Positive'. In the absence of published guidance, the approach used has been to consider:

- whether the Proposed Development will be better than 'Air Quality Neutral'; and
- whether the Proposed Development directly or indirectly reduces building and transport emissions compared to the existing building.

Air Quality Neutral Comparison

8.25. The Proposed Development is expected to be air quality neutral in terms of building and transport emissions.

Existing Building Comparison

8.26. The Proposed Development will reduce the number of on-site car parking spaces and is not expected to lead to a significant increase in vehicle movements per day on local roads.

8.27. Details of existing and proposed heating and hot water provision are unknown and it has therefore not been possible to carry out a comparison in terms of building emissions.

Overall Air Quality Positiveness

8.28. The Proposed Development will be better than air quality neutral and the Proposed Development will also include cycle provision in accordance with the London Plan, which will help to minimise air pollution.

9. Mitigation

Mitigation Included by Design

9.1. Mitigation measured included by design are set out in Section 4.

Recommended Mitigation

Construction Phase

9.2. Measures to mitigate dust emissions will be required during the construction phase of the Proposed Development in order to minimise impacts upon nearby sensitive receptors.

9.3. The site has been identified as a Low Risk site for dust soiling effects during demolition, earthworks, and construction, and as a Negligible Risk site during trackout. The site has been identified as a Negligible Risk site for human health effects during all four construction phases, as set out in Table 10.

9.4. It should be noted that the baseline PM_{10} levels may exceed the WHO guideline and the sensitivity of human health effects could be considered high, rather than low, elevating the risk of human health effects to low, rather than negligible. However, since a Medium risk of effects has already been identified for dust soiling, the mitigation measures will remain the same.

9.5. The GLA and IAQM guidance documents describe measures that should be employed, as appropriate, to reduce the impacts. These measures are shown in Table 14 to Table 18.

Table 14: Communication

Measure	Recommendation
Display the name and contact details of person(s) account- able for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	Highly Recommended
Display the head or regional office contact information.	Highly Recommended
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.	Highly Recommended
Table notes: -	

Table 15: Dust Management

Measure	Recommendation
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.	Highly Recommended
Make the complaints log available to the local authority when asked.	Highly Recommended

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 logbook.	Highly Recommended
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.	Desirable
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	Highly Recommended
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Highly Recommended
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.	Highly Recommended
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	Highly Recommended
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	Highly Recommended
Avoid site runoff of water or mud.	Highly Recommended
Keep site fencing, barriers and scaffolding clean using wet methods.	Highly Recommended
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	Highly Recommended
Cover, seed, or fence stockpiles to prevent wind whipping.	Highly Recommended
Operating vehicle/machinery and sustainable travel	
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone / Ultra Low Emission Zone.	Highly Recommended
Ensure all vehicles switch off engines when stationary - no idling vehicles.	Highly Recommended
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	Highly Recommended
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Desirable
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.	Highly Recommended
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	Highly Recommended
Use enclosed chutes and conveyors and covered skips.	Highly Recommended

Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly Recommended
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.	Highly Recommended
Waste management	
Reuse and recycle waste to reduce dust from waste materials.	Highly Recommended
Avoid bonfires and burning of waste materials.	Highly Recommended
Table notes: -	

Table 16: Measures Specific to Demolition

Measure	Recommendation
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Desirable
Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly Recommended
Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly Recommended
Bag and remove any biological debris or damp down such material before demolition.	Highly Recommended
Table notes: -	

Table 17: Measures Specific to Construction

Measure	Recommendation
Avoid scabbling (roughening of concrete surfaces) if possible.	Desirable
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.	Desirable
Table notes: -	

Table 18: Measures Specific to Trackout

Measure	Recommendation
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.	Desirable
Avoid dry sweeping of large areas.	Desirable
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Desirable
Record all inspections of haul routes and any subsequent action in a site log book.	Desirable

Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Desirable
Table notes: -	

Operation

9.6. The assessment has demonstrated that the Proposed Development will not cause any exceedences of the AQOs in the local area. Furthermore, the future users of the Proposed Development will not be exposed to unacceptable air quality conditions. The overall effect of the Proposed Development will be "not significant". It is, therefore, not considered necessary to include mechanical ventilation or propose further mitigation measures.

9.7. Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which was transposed into UK law). Furthermore, the government, GLA and the local authority are working on improving air quality under the relevant air quality Strategies and LAQM regime.

Air Quality Neutral and Air Quality Positive

9.8. The assessment has demonstrated that the Proposed Development will be better than air quality neutral in terms of both building and transport emissions. Further mitigation measures are therefore not considered necessary.

Optional Further Mitigation

9.9. This report assesses the effects of ambient air quality. The health of future occupants may also be affected by indoor air quality. An indoor air quality strategy may thus be beneficial. This will identify the key indoor pollutants of concern, the sources of pollution, relevant policies and regulations and the exposure risks, and set out recommendations on mitigating and minimising the exposure to indoor air pollution.

10. Summary and Conclusions

10.1. Impacts of the Proposed Development on the local area during construction and operation have been considered along with the impact on future occupants of the Proposed Development. Air quality neutral and air quality positive assessments have also been carried out.

10.2. The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emission. With these measures in place, it is expected that any residual effects will be '*not significant*'. The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be *not significant*.

10.3. The Proposed Development is car free, and although there may be a small number of additional vehicle trips associated with the development, it is anticipated they will be well below the EPUK and IAQM threshold. Therefore impacts on the local area due to changes in vehicle emissions are negligible. The proposed development does not include provision of significant centralised combustion plant on-site and therefore there impacts on the local area due to onsite emissions are negligible. As the development is car free the there is no risk of an impact on sensitive ecological systems in the wider-area.

10.4. The impacts of existing sources of pollution in the local area upon air quality for future users of the Proposed Development have also been considered. Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at the Proposed Development. All predicted concentrations are below the AQOs and limit values. It is therefore not necessary to include any further mitigation measures (such as mechanical ventilation). The $PM_{2.5}$ WHO guideline is exceeded across much of London including the Proposed Development. Any borough-wide, regional or national measures to reduce $PM_{2.5}$ concentration will be beneficial. The future occupants of the Proposed Development may benefit form an indoor air quality plan to minimised the risk of poor indoor air quality although this is not a requirement under the development control process.

10.5. Overall, the air quality effects of the Proposed Development are judged to be *'not significant'*. This conclusion is based on the concentrations that future users of the Proposed Development will be exposed to being below the AQO, and the operational impacts of the Proposed Development being *negligible*.

10.6. The Proposed Development is likely to be at least Air Quality Neutral and is likely to be Air Quality Positive.

10.7. Although not required, it may be beneficial to include an indoor air quality strategy to ensure the best possible indoor air pollution for future users of the Proposed Development.

Formatted: Not Highlight

11. Glossary, References and Appendices

Glossary

AADT	Annual Average Daily Traffic
Air Quality Standards	Concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment.
An exceedence	A period of time (defined for each standard) where the concentration is higher than that set out in the Standard.
An objective	The target date on which exceedances of a Standard must not exceed a specified number.
APS	Air Pollution Services
AQAP	Air Quality Action Plan
AQFA	Air Quality Focus Area
AQO	Air Quality Objective
AQMA	Air Quality Management Area
COPERT	Computer Programme to calculate Emissions from Road Transport
DfT	Department for Transport
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
HDV	Heavy Duty Vehicle (which comprise of heavy goods vehicles, buses, and coaches)
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LBH	London Borough of Haringey
LDV	Light Duty Vehicle (which comprise of motorcycles, cars, taxis, and light goods vehicles)
Limit Values	Legally binding EU parameters that must not be exceeded. Limit values are set for individual pollutants and are made up of a concentration value, an averaging time over which it is to be measured, the number of exceedances allowed per year, if any, and a date by which it must be achieved. Some pollutants have more than one limit value covering different endpoints or averaging times.

NO_2	Nitrogen dioxide
NOx	Nitrogen oxides
NPPF	National Planning Policy Framework
$\mu g/m^3$	Microgrammes per cubic metre
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles, more specifically particulate matter less than 2.5 micrometres in aerodynamic diameter
WHO	World Health Organization

References

British Geological Survey. (2021). *UK Soil Observatory (UKSO)*. Retrieved from British Geological Survey: http://mapapps2.bgs.ac.uk/ukso/home.html

Copernicus. (2018). *CLC 2018*. Retrieved from Copernicus Land Monitoring Service: https://land.copernicus.eu/pan-european/corine-land-cover/clc2018

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

Defra. (2017b). *UK plan for tackling roadside nitrogen dioxide concentrations.*

Defra. (2019a). *Clean Air Strategy.*

Defra. (2019b). *2019 NO2 projections data (2017 reference year)*. Retrieved from UK AIR Air Information Resource: https://uk-air.defra.gov.uk/library/no2ten/2019-no2-projections-from-2017-data

Defra. (2021). *Local Air Quality Management Technical Guidance (TG16)*. Retrieved from https://laqm.defra.gov.uk/technical-guidance/

Defra. (2021a). *LAQM Tools - Nitogren Dixoide fall off with distance*. Retrieved from https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

Defra. (2021b). *Background Mapping data for local authorities*. Retrieved from UK AIR Air Information Resource: https://uk-air.defra.gov.uk/data/laqm-background-home

Defra. (2021c). *UK Ambient Air Quality Interactive Map*. Retrieved from UK AIR Air Information Resource: https://uk-air.defra.gov.uk/data/gis-mapping

DfT. (2018). *The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy .*

DfT. (2019). *Road traffic statistics (TRA)*. Retrieved from https://www.gov.uk/government/statistical-data-sets/road-traffic-statistics-tra

EDF Europe. (2020). Retrieved from Breathe London: https://www.breathelondon.org/)

EPA. (2018). *User's Guide for the AERMOD Meteorological Preprocessor (AERMET).*

EPUK/IAQM. (2017). *Land-Use Planning & Development Control: Planning For Air Quality*.

European Environment Agency. (2019). *E-PRTR Facilities*. Retrieved from European Pollutant Release and Transfer Register: https://prtr.eea.europa.eu/#/home

GLA. (2010). *Clearing the air, The Mayor's Air Quality Strategy.*

GLA. (2014a). *The control of dust and emissions during construction and demolition supplementary planning guidance.*

GLA. (2014b). *Sustainable design and construction supplementary planning guidance.*

GLA. (2014c). *Air Quality Neutral Planning Support Update: GLA 80371.*

GLA. (2017). *The London Plan, The spatial development strategy for London consolidated with alterations since 2011.*

GLA. (2018a). *London Environment Strategy.*

GLA. (2018b). *Mayor's Transport Strategy.*

GLA. (2021). *London Atmospheric Emissions (LAEI) 2016*. Retrieved from London Datastore: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016

GLA. (2021). *The London Plan*. Retrieved from https://www.london.gov.uk/sites/default/files/draft_london_plan_-_consolidated_changes_version_-_clean_july_2019.pdf

GLA. (2021). *The London Plan, The Spatial Development Strategy for Greater London.*

Grange, S, et al. (2017). Lower vehicular primary emissions of NO2 in Europe than assumed in policy projections. *Nature GeoScience*(ISSN 1752-0908), pp 914-920.

HM Government. (2017). *Industrial Strategy: Building a Britain fit for the future.*

HM Government. (2018). *The Clean Growth Strategy: Leading the way to a low carbon future.*

HM Government. (2019). *A Green Future: Our 25 Year Plan to Improve the Environment.*

HMSO. (1995). *Environment Act.* HMSO.

HMSO. (2000). *The Air Quality Regulations, 2000, Statutory Instrument 928.* HMSO.

HMSO. (2002). *The Air Quality (England) (Amendment) Regulations, 2002, Statutory Instrument 3043.* HMSO.

HMSO. (2010). *The Air Quality Standards Regulations 2010, ENVIRONMENTAL PROTECTION, 2010 No. 1001, STATUTORY INSTRUMENTS.*

IAQM. (2016). *Guidance on the assessment of dust from demolition and construction.*

London Borough of Haringey . (2017). *Development Management DPD.* London: London Borough of Haringey.

London Borough of Haringey . (2019). *Air quality Action Plan 2019-2024.* London: London Borough of Haringey.

London Borough of Haringey. (2013). *Haringey's Local Plan Strategic Policies 2013-2016.* London: London Borough of Haringey.

London Borough of Haringey. (2017). *Site Allocations DPD.* London: London Borough of Haringey.

London Borough of Haringey. (2018). *Planning Obligations Supplementary Planning Document .* London: London Borough of Haringey.

London Borough of Haringey. (2020). *London Borough of Haringey Air Quality Annual Status Report for 2019.* London: London Borough of Haringey.

Ministry of Housing, Communities & Local Government. (2019a). *National Planning Policy Framework.*

Ministry of Housing, Communities & Local Government. (2019b). *Guidance Air quality*. Retrieved from GOV.UK: https://www.gov.uk/guidance/air-quality--3

A1. Legislation, Policy and Guidance

A1.1. There are a large number of policy, guidance, and strategy documents published regarding air quality at a national, regional and local level. The documents all provide useful context, information, and justification in support of the approaches in this assessment. Details of relevant documents are provided below.

National

Planning Practice Guidance

A1.2. The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019b). The PPG on air quality published in November 2019 states:

Paragraph: 001 Reference ID: 32-001-20191101:

"The Department for Environment, Food and Rural Affairs carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified."

Paragraph: 002 Reference ID: 32-002-20191101:

"It is important to take into account air quality management areas, Clean Air Zones and other areas including sensitive habitats or designated sites of importance for biodiversity where there could be specific requirements or limitations on new development because of air quality".

Paragraph: 005 Reference ID: 32-005-20191101:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

Where air quality is a relevant consideration the local planning authority may need to establish:

- the 'baseline' local air quality, including what would happen to air quality in the absence of the development;
- whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity); and
- whether occupiers or users of the development could experience poor living conditions or health due to poor air quality".

Paragraph: 007 Reference ID: 32-007-20191101:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific".

Paragraph: 008 Reference ID: 32-008-20191101:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact. It is important that local planning authorities work with applicants to consider appropriate mitigation so as to ensure new development is appropriate for its location and unacceptable risks are prevented".

Clean Air Strategy

A1.3. Defra published the Clean Air Strategy in January 2019 (Defra, 2019a). The strategy focuses on exposure to toxic pollutants like nitrogen oxides, ammonia, particulate matter, non-methane volatile organic compounds and sulphur dioxide. The strategy aims to reduce emissions of pollutants including the aim to reduce particulate matter emissions by 30% by 2020, and by 46% by 2030.

A1.4. This strategy sets out the aim for new enforcement powers at a national and local level, across all sectors of society and sets out the comprehensive action that is required from government and society to meet these targets. The strategy includes actions to reduce emissions from transport (including road, maritime, rail, aviation and NRMM), homes, farming and industry.

A1.5. The strategy states that:

"New legislation will create a stronger and more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem."

The Industrial Strategy

A1.6. The Government has published a white paper that sets out a long-term 'Industrial Strategy' for the UK (HM Government, 2017). It includes a key policy to *"support electric vehicles through a £400m charging infrastructure investment and an extra £100m to extend the plug-in car grant*" and states "*the UK's road and rail network could dramatically reduce carbon emissions and other pollutants*". Unlike their fossil fuel counterparts, electric vehicles do not release nitrogen oxides (NOx) emissions; if the strategy is fulfilled then NOx emissions will reduce significantly over the coming decades.

The Clean Growth Strategy

A1.7. An ambitious blueprint for Britain's low carbon future was set out by the Government in a Policy paper (HM Government, 2018) in April 2018. Although this strategy focuses on reducing the UK's carbon footprint, it contains several policies and proposals that relate to air quality, including:

22. "End the sale of new conventional petrol and diesel cars and vans by 2040

23. Spend £1 billion supporting the take-up of ultra low emission vehicles (ULEV), including helping consumers to overcome the upfront cost of an electric car

24. Develop one of the best electric vehicle charging networks in the world by:

    - Investing an additional £80 million, alongside £15 million from Highways England, to support charging infrastructure deployment

    - Taking new powers under the Automated and Electric Vehicles Bill, allowing the Government to set requirements for the provision of charging points

25. Accelerate the uptake of low emission taxis and buses by:

    - Providing £50 million for the Plug-in Taxi programme, which gives taxi drivers up to £7,500 off the purchase price of a new ULEV taxi, alongside £14 million to support 10 local areas to deliver dedicated charge points for taxis

    - Providing £100 million for a national programme of support for retrofitting and new low emission buses in England and Wales

26. Work with industry as they develop an Automotive Sector Deal to accelerate the transition to zero emission vehicles

27. Announce plans for the public sector to lead the way in transitioning to zero emissions vehicles

28. Invest £1.2 billion to make cycling and walking the natural choice for shorter journeys

29. Work to enable cost-effective options for shifting more freight from road to rail, including using low emission rail freight for deliveries into urban areas, with zero emission last mile deliveries

30. Position the UK at the forefront of research, development and demonstration of Connected and Autonomous Vehicle technologies, including through the establishment of the Centre for Connected and Autonomous Vehicles and investment of over £250 million, matched by industry The Clean Growth Strategy 15

31. Innovation: Invest around £841 million of public funds in innovation in low carbon transport technology and fuels including:

    - Ensuring the UK builds on its strengths and leads the world in the design, development and manufacture of electric batteries through investment of up to £246 million in the Faraday Challenge

    - Delivering trials of Heavy Goods Vehicle (HGV) platoons, which could deliver significant fuel and emissions savings".

The 25 Year Environment Plan

A1.8. The Government has published a Policy paper called the '25 Year Environment Plan' (HM Government, 2019) which set out what the government will do to improve the environment within a generation. This includes the first goal 'Clean air' where the government states *"we will achieve clean air by:*

- Meeting legally binding targets to reduce emissions of five damaging air pollutants. This should halve the effects of air pollution on health by 2030.
- Ending the sale of new conventional petrol and diesel cars and vans by 2040.
- Maintaining the continuous improvement in industrial emissions by building on existing good practice and the successful regulatory framework".

Road to Zero

A1.9. The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition.

A1.10. This paper confirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by 2040, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

A1.11. The paper sets out a number of measures by which Government will support this transition, but is clear that Government expects this transition to be industry and consumer led. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades.

Air Quality Plan

A1.12. Defra has produced an Air Quality Plan to tackle roadside NO_2 concentrations in the UK (Defra, 2017b). Alongside a package of national measures, the Plan requires those English Local Authorities (or the GLA in the case of London Authorities) that are predicted to have exceedances of the limit values beyond 2020 to produce local plans by December 2018. These plans are undertaken in stages and must have measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a charging Clean Air Zone (CAZ).

Regional

The London Plan

A1.13. The London Plan (GLA, 2021) sets out the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London.

A1.14. The plan includes Policy SI 1 on improving air quality:

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

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

1) *Development proposals should not:*

   a) *lead to further deterioration of existing poor air quality*

   b) *create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits*

   c) *create unacceptable risk of high levels of exposure to poor air quality.*

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

   a) *development proposals must be at least Air Quality Neutral*

   b) *development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures*

   c) *major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1*

   d) *development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure.*

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

1) *how proposals have considered ways to maximise benefits to local air quality, and*

2) *what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this.*

D *In order to reduce the impact on air quality during the construction and demolition phase development proposals must demonstrate how they plan to comply with the Non-Road*

Mobile Machinery Low Emission Zone and reduce emissions from the demolition and construction of buildings following best practice guidance.

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

A1.15. Policy GG3 on 'Creating a healthy city' states:

"To improve Londoners' health and reduce health inequalities, those involved in planning and development must… seek to improve London's air quality, reduce public exposure to poor air quality and minimise inequalities in levels of exposure to air pollution."

A1.16. Policy SD4 on 'The Central Activities Zone (CAZ)' states:

"Taking account of the dense nature of the CAZ, practical measures should be taken to improve air quality, using an air quality positive approach where possible (Policy SI 1 Improving air quality) and to address issues related to climate change and the urban heat island effect".

London Environment Strategy

A1.17. The revised Mayor's Air Quality Strategy (MAQS) Clearing the Air was published in December 2010 (GLA, 2010). The overarching aim of the Strategy is to reduce pollution concentrations in London to achieve compliance with the EU limit values as soon as possible. The Strategy commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures. The MAQS has been replaced by the London Environment Strategy.

A1.18. The London Environment Strategy was published in May 2018 (GLA, 2018a). The Strategy sets out a vision for improving London's environment for the benefit of all Londoners. One of the aims if for London to "*have the best air quality of any major world city by 2050, going beyond the legal requirements to protect human health and minimise inequalities*."

A1.19. The strategy considers air quality in Chapter 4; the Mayor's main objectives are:

"• reducing exposure of Londoners to harmful pollution across London – especially at priority locations like schools – and tackling health inequality

• achieving legal compliance with UK and EU limits as soon as possible, including by mobilising action from the London boroughs, government and other partners

• establishing and achieving new, tighter air quality targets for a cleaner London, meeting World Health Organization (WHO) health-based guidelines by 2030 by transitioning to a zero emission London to create a "zero emission London by 2050".

A1.20. Policy 4.2.1 aims to "reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable

forms of transport". Policy 4.3.2 states "The Mayor will encourage the take up of ultra low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines".

A1.21. An implementation plan for the strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the strategy.

Mayor's Transport Strategy

A1.22. The Mayor's Transport Strategy (GLA, 2018b) sets out the Mayor's policies and proposals to reshape transport in London over the next two decades. The Strategy focuses on reducing car dependency and increasing active sustainable travel, with the aim of improving air quality and creating healthier streets. It notes that development proposals should "be designed so that walking and cycling are the most appealing choices for getting around locally".

A2. Professional Experience

KL, Meng (Hons) MIEnvSc MIAQM

Mr Laxen is a Director of APS and has over twelve years' experience in the field of air quality. Kieran is an active member of the IAQM committee. He has extensive experience of air quality monitoring and is a leading UK expert in the assessment of power generating facilities for both permitting and planning applications. He has been a stakeholder in Defra's and the Environment Agency's consultations into implementing the MCPD and Specified Generator Controls.

George Bratchel, BSc (Hons)

Mr Bratchel is a graduate air quality consultant of APS. He completed his BSc Environmental Science at Plymouth University and previously worked as a graduate consultant at Create Consulting Engineers. He has experience working on residential planning applications of various sizes. He is currently gaining further experience of undertaking air quality assessments for planning and permit applications while supporting on a wide range of projects.

Dr Austin Cogan, MPhys (Hons) PhD MIEnvSc MIAQM

Dr Cogan is a Director and cofounder of Air Pollution Services and has over twelve years' experience in environmental sciences. He has extensive experience of air quality, dust, and odour assessments, having been involved in hundreds of projects including residential and commercial developments, road schemes, airports, waste management processes, industrial processes and power generating facilities.

Austin has carried out city and borough scale modelling for many parts of the UK. This has included Clean Air Zone studies for Bristol, Bath and North East Somerset, Newcastle, Gateshead, and Tyneside, which involved predicting baseline pollutant concentrations on a similar scale to the Borough and modelling various future schemes. It also included the development of ranked lists of measures to improve local air quality and carrying out streamlined calculations to calculate the likely improvements achieved by each measure to produce short lists of options for detailed scenario testing.

Austin also has substantial experience in modelling Air Quality Action Plan (AQAP) options, having completed AQAP feasibility studies for Reigate and Banstead, South Gloucestershire, Thurrock, Warwick, Leamington Spa, and most recently Harborough. They have also carried out borough wide modelling on behalf of local authorities to provide evidence bases for Borough Plans, most recently for Nuneaton and Bedworth Borough Council. These included the use of micro-simulation traffic modelling and a range of vehicle emission databases, such as average-speed emissions from the EFT and instantaneous emissions from AIRE and TNO.

He is also an international expert in the field of climate change, having monitored greenhouse gases globally. Austin gained two years' experience in scientific instrument design and spent four years' pioneering research in satellite observations of greenhouse gases and aerosols at the University of Leicester. This involved software and algorithm development, data validation, model comparisons, bias correction, instrumentation design and testing, and applications to a wide range of fields including climate change, volcanic eruptions, land use, and extra-terrestrial atmospheres. Austin

has worked with many international bodies, including NASA, JAXA, CNES and ESA, and published numerous scientific papers and presented at conferences both nationally and internationally.

A3. Assessment Approach

A3.1. Standard practice is to assess the impacts of a proposed development on local air quality using the EPUK and IAQM guidance *on Land-Use Planning & Development Control: Planning For Air Quality*.

A3.2. The EPUK and IAQM guidance provides a staged approach to considering air quality assessments:

Stage 1) Initial screening

Stage 2) Detailed screening

Stage 3) Simple or Detailed assessment

A3.3. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A2.

Stage 1

Impacts of the Development on the Local Area

A3.4. Table 6.1 of the EPUK and IAQM guidance provides the Stage 1 screening criteria. The approach first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a Stage 2 and in general there is no need to consider the impacts of the development on the local area.

Impacts of Emissions Sources on the Development

A3.5. The EUPK and IAQM guidance explains that there:

"may be a requirement to carry out an air quality assessment for the impacts of the local area's emissions on the proposed development itself, to assess the exposure that residents or users might experience. This will need to be a matter of judgement and should take into account:

- *the background and future baseline air quality and whether this will be likely to approach or exceed the values set by air quality objectives;*
- *the presence and location of Air Quality Management Areas as an indicator of local hotspots where the air quality objectives may be exceeded;*
- *the presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular nitrogen dioxide), that would cause unacceptably high exposure for users of the new development; and*
- *the presence of a source of odour and/or dust that may affect amenity for future occupants of the development".*

Stage 2 Screening Criteria

A3.6. The EPUK and IAQM guidance provides example criteria and states the following in relation to the criteria:

"They are intended to function as a sensitive "trigger" for initiating an assessment in cases where there is a possibility of significant effects arising on local air quality. This possibility will, self-evidently, not be realised in many cases. The criteria should not be applied rigidly; in some instances, it may be appropriate to amend them on the basis of professional judgement, bearing in mind that the objective is to identify situations where there is a possibility of a significant effect on local air quality".

A3.7. The guidance notes that consideration should still be given to the potential impacts of neighbouring sources on the site, even if an assessment of impacts of the development on the surrounding area is screened out.

Road Traffic Assessments

A3.8. The second stage of the EPUK and IAQM guidance then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that "the criteria provided are precautionary and should be treated as indicative", and "*it may be appropriate to amend them on the basis of professional judgement".*

A3.9. The criteria relating to road traffic are:

- A change of Light Duty Vehicle (LDV) flows of:
    - more than 100 AADT within or adjacent to an AQMA
    - more than 500 AADT elsewhere.
- A change of Heavy Duty Vehicle (HDV) flows of:
    - more than 25 AADT within or adjacent to an AQMA
    - more than 100 AADT elsewhere.
- Where roads are realigned near to sensitive receptors and the change in alignment is 5 m or more and the road is within an AQMA.
- Applies to junctions that cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights, or roundabouts.
- Where bus flows will change by:
    - more than 25 AADT within or adjacent to an AQMA
    - more than 100 AADT elsewhere.

Simple or Detailed Assessments

A3.10. Where an air quality assessment is identified as being required, then this may take the form of either a Simple Assessment or a Detailed Assessment. It is not uncommon for assessments to utilise detailed dispersion models to predict pollutant concentrations and impacts on local air quality (Detailed Assessment), however, it should be noted that exceeding a screening criterion in Table 6.2 of the guidance does not automatically lead to the requirement for a Detailed Assessment and the use of professional judgement and sufficient evidence can be considered appropriate at times (Simple Assessment).

A3.11. The EPUK and IAQM guidance also outlines what the content of the air quality assessment should include and this has been adhered to in the production of this report.

Long-term (Annual Mean) Impacts on Human Health

A3.12. The approach set out in the EPUK and IAQM guidance provides a method for describing the impacts on local air quality arising from development.

A3.13. Impact descriptors for individual receptors are used which expresses the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table A1 sets out the matrix for determining the impact descriptor for annual mean concentrations at individual receptors, based on Table 6.3 in the EPUK and IAQM guidance document.

A3.14. Where the impacts are negligible the overall significance is judged to be 'not significant'.

Table A1: Annual Mean Impact Descriptors for Individual Receptors

Annual Mean Concentration with Proposed Development (µg/m³)	% Change in Concentration relative to the AQO (µg/m³)			
	1	2-5	6-10	>10
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109% of AQO	Moderate	Moderate	Substantial	Substantial
75% or less of AQO	Moderate	Substantial	Substantial	Substantial

Table notes: -

Short-term Impacts on Human Health

A3.15. Previous research carried out on behalf of Defra and the devolved administrations identified that exceedences of the 1-hour mean NO_2 AQO are unlikely to occur where the annual mean is below 60 µg/m³ (Defra, 2021). Similarly, exceedences of the 24-hour mean PM_{10} AQO are unlikely to occur where the annual mean is below 32 µg/m³. Where annual mean concentrations are below these levels the short-term impacts are considered negligible.

A4. Modelling

The model

A4.1. Parameters and data relating to the detailed dispersion modelling approach are set out below.

Vehicle Emissions

A4.2. Emissions of road-NOx (i.e. the contribution from vehicles using roads), road-PM_{10} and road-$PM_{2.5}$ have been derived from the latest version of Defra's Emission Factor Toolkit (EFT) (v10.1) using the traffic data presented in Table A1. The EFT is based on the COPERT 5 (Computer Programme to calculate Emissions from Road Transport) vehicle emission model and provides speed-average based emission rates. The EFT provides vehicle emission rates for the years 2017 – 2030; future years are based on a range of factors, such as expected vehicle fleet release dates, anticipated improvements in emission reduction technologies, expected uptake rates of different vehicles based on government policies, etc. It is therefore possible that the expected future emission rates in the EFT may differ from reality.

Fraction of Primary NO_2

A4.3. In addition to emission rates, the fraction of primary NO_2 (f-NO_2) has be obtained from the EFT. This represents the amount of NO_2 released from vehicle exhausts, before any further chemical reactions in the atmosphere, which becomes an important variable when post-processing the model predictions. In order to obtain the f-NO_2 value at each receptor location, the NOx emission rates have been multiplied by f-NO_2 values to derive NO_2 emission rates. These NO_2 emissions have been included in the model and primary NO_2 concentrations have been predicted at the receptors. The predicted NOx concentrations have been divided by the predicted primary NO_2 concentrations to calculate the f-NO_2 values at the receptor locations. The f-NO_2 values have then been used in the model post-processing (see paragraph A4.35).

Time-Based Profiles

A4.4. Vehicle emissions vary over time depending on the volume of traffic, this includes hourly, daily and seasonal variations. Seasonal (monthly) and diurnal (hourly) traffic flow profiles have been taken from DfT national statistics (DfT, 2019). Both the profiles have been assumed to follow an urban traffic profile for all modelled roads. These have been used in the model to adjust the emissions for each hour of the year modelled. These profiles are shown in Figure A1 and Figure A2.

Figure A1: Urban Diurnal Profile for Each Day of the Week used in the Model, where the Factor is the Value that the Average Daily Emissions are Multiplied by in the Model

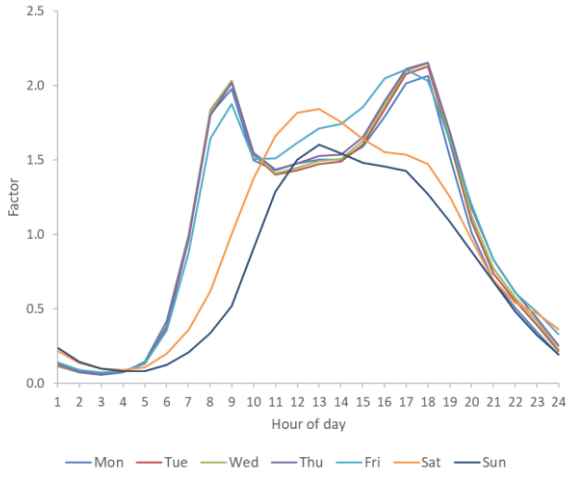


Figure notes: -

Figure A2: Urban Seasonal Profile for Each Month of the Year used in the Model

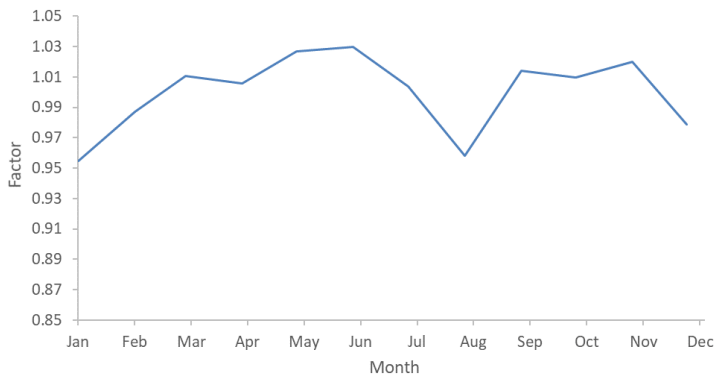


Figure notes: -

Traffic Flows

A4.5. The traffic flows used in the model are presented below in Table A2 along with the percentage of heavy-duty vehicles for context.

Table A2: Traffic data used in the model - 2019 [a]

Link	AADT	HDV (%)
Lansdowne Road	2,829	28.2
A1010 (High Road)	14,292	5.4
A10	33,525	8
A109	14,292	5.4
Broad Lane	34,627	7.3
A504	9,690	9.2
A503	11,791	11.5
A109	12,662	6.6
Boreham Road	12,353	9.5
A1080	25,324	6.6
B155	17,631	7.9
White Hart Lane	16,684	5.5
A10 (Great Cambridge Road)	33,367	5.5

Table notes:

a. This is a summary of the data used in the model. The percentages of petrol cars, diesel cars, Light Goods Vehicles (LGVs), rigid Heavy Goods Vehicles (HGVs), artic HGVs, buses and coaches, and motorcycles have been entered into the model.

b. Roads with n/a values have only been included to verify the model against 2019 measured concentrations and are not relevant for the future year of 2021 within the assessment.

Wake effects

A4.6. As vehicles travel along a road a wake is left behind the vehicles as air in the path of travel is forced around the vehicle. The wake can be considered the turbulence induced by the movement of the vehicle, which affects the dispersion of pollution away from roads. The AADT traffic flows have been entered into the ADMS-roads dispersion modeling in order to account for vehicle wake effects which will vary on each link depending on the proportion of large vehicles to small vehicles.

Street Canyons

A4.7. Roads in the local area are enclosed by buildings and vegetation, leading to restricted dispersion of pollution away from the roads and higher pollutant concentrations close to the roads along with a recirculation of pollution due to the wind passing over the urban canopy and 'trapping' pollution within the streetscape. This is known as a 'street canyon' effect. Roads where there is a potential for the streetscape to result in elevated concentration have therefore been modelled as asymmetric street canyons using the Advanced Street Canyon Module, within the ADMS-Roads model, accounting for the fraction of covered 'canyons'.

Meteorology

A4.8. Meteorological data has been taken from the London City Airport Meteorological Station for the year of 2019. This station is located approximately 13 km southeast of the application site and is considered representative of meteorological conditions in Tottenham; both the station and application site are located in London and will experience very similar meteorological conditions.

Meteorological data for the year of 2019 is considered to provide typical conditions. Illustrations of wind speed and direction for 2019 and other recent years are presented in Figure A3.

Figure A3: Windrose of Wind Speed and Direction for Each Year from 2015 (Top Left) to 2019 (Bottom Right) at the London City Airport Meteorological Station

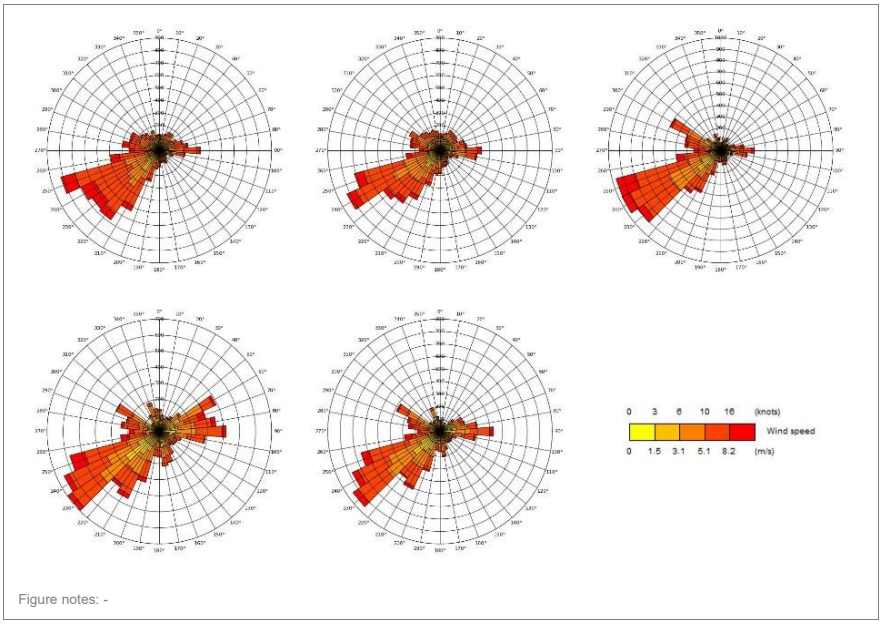


Figure notes: -

Meteorological Parameters

A4.9. In addition to the meteorological data, the model requires values to be set for a number of meteorological related parameters, for both the meteorological station and the dispersion site (the development). Details of the parameter values used in the modelling are provided in Table A3 below.

A4.10. Land-use and surface characteristics have an important influence in determining turbulent fluxes and, hence, the stability of the boundary layer and atmospheric dispersion.

A4.11. Surface roughness length used within the model represents the aerodynamic effects of surface friction and is defined as the height at which the extrapolated surface layer wind profile tends to zero. This value is an important parameter used by the built-in meteorological pre-processor of ADMS to interpret the vertical profile of wind speed and estimate friction velocities which are, in turn, used to define heat and momentum fluxes and, consequently, the degree of turbulent mixing. Surface roughness values for different land-use classifications are provided in the 2018 Corine Land Use dataset (Copernicus, 2018).

A4.12. The surface albedo is the ratio of reflected to incident shortwave solar radiation at the surface of the earth. This varies depending on the land use, and thus area-weighted average albedos have been derived for the meteorological and dispersion sites and used in the models. Albedo values

have been taken from US Environmental Protection Agency (EPA) guidance (2018) and associated with the different land uses in the 2018 Corine Land Use dataset (Copernicus, 2018).

A4.13. The Priestley-Taylor parameter is a parameter representing the surface moisture available for evaporation. A Priestley-Taylor parameter of 1 has been set in the model.

A4.14. The CERC user guide explains that "the Monin-Obukhov length provides a measure of the stability of the atmosphere. In very stable conditions in a rural area its value would typically be 2 to 20 m. In urban areas, there is a significant amount of heat generated from buildings and traffic, which warms the air above the town/city". For large urban areas this is known as the urban heat island. It has the effect of preventing the atmosphere from ever becoming very stable. The model has the ability to define the minimum Monin-Obukhov length to account for the urban heat island effect which is not represented by the meteorological data. This varies depending on the land use, and thus area-weighted average minimum Monin-Obukhov lengths have been derived for the meteorological and dispersion sites and used in the models.

Table A3: Meteorological Parameters Values used in the Model

Parameter	Meteorological Site Value	Dispersion Site Value
Latitude (°)	n/a	51.6
Surface roughness (m)	0.45	0.60
Surface albedo	0.17	0.17
Minimum Monin-Obukhov length (m)	29.7	40.8
Priestley-Taylor parameter	1	1
Table notes: -		

A4.15. The meteorological parameters alter the meteorological data inputted into the model to reflect conditions at the dispersion site. For example, if the dispersion site has a higher surface roughness value than the meteorological site, then the model will reduce the wind speed at the dispersion site to reflect this. Figure A4 shows the frequency of wind speeds and directions measured at the meteorological station in 2019 (left), which has been inputted into the model, as well as the frequency of wind speeds and directions processed by the ADMS-roads model for the dispersion site (right). These illustrate that wind predominantly comes from the southwest and that the model has slightly lower wind speed at the dispersion site.

Figure A4: Wind Rose Showing the Frequency of Wind Speed and Wind Direction for the Meteorological Station (Left) and the Modelled Dispersion Site (Right) for the Year of 2019

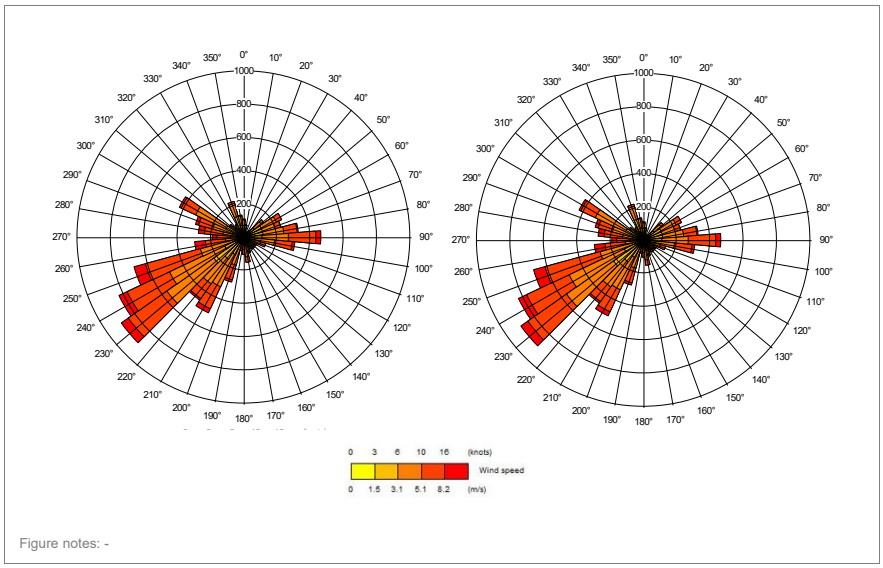


Figure notes: -

Urban Canopy Flow

A4.16. The effect of buildings in a wider spatial context upon dispersion has been taken account of within the model. Buildings slow wind velocity and displace wind flow upwards over the buildings, particularly in large urban areas, such as London. ADMS includes an urban canopy module which calculates the changes in wind velocity and turbulence caused by the presence of buildings. Building data for London has been provided by CERC, the model developers, and the average building heights are presented in Figure A5.

Figure A5: Building Heights used within the Modelled Urban Canopy

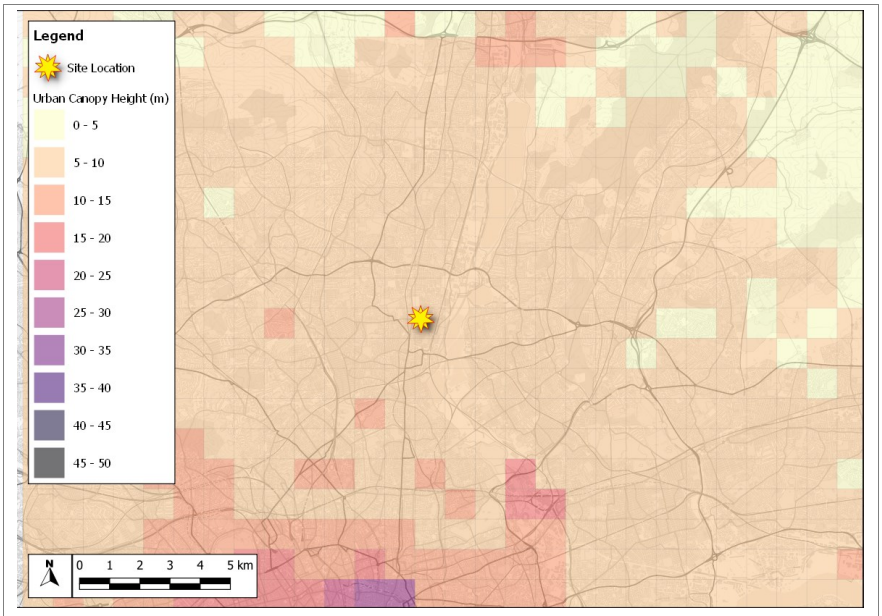


Figure notes: Contains OS data © Crown copyright and database right (2021).

Model Performance

A4.17. The modelling will inherently have some uncertainties and may not reflect real conditions in the local area. An important part of modelling is reviewing the model results carefully and checking the model setup parameters and input data to minimise uncertainties.

A4.18. LAQM.TG.16 (Defra, 2021), provides local authorities with advice on good practice for modelling air quality. This advice is widely applied for air quality assessments of proposed developments, although it is specifically aimed at local authority's duties to review and assess air quality. LAQM.TG.16 states that model verification, defined as a comparison of modelled results with monitoring results at relevant locations, is necessary (paragraph 7.520).

A4.19. There are many reasons why there may be a difference between modelled and monitored concentrations and LAQM.TG.16 states *"Model verification is the process by which these and other uncertainties are investigated and where possible minimised."* (paragraph 7.512). It provides a list of the factors that may explain the differences including meteorological data, source activity data (e.g., traffic flow and speed), emission factors, model input parameters such as roughness length, and monitoring data.

A4.20. The advice in LAQM.TG.16 is generic for all dispersion models. ADMS has been shown to predict concentrations well given sufficiently accurate data inputs.

A4.21. It is important to review the results of the modelling carefully and check the model setup parameters and input data. Once reasonable efforts have been made to reduce the uncertainties of input data for a model, further comparison of modelled and monitored results should be undertaken. Where discrepancies remain, consideration may be given to adjusting the model.

A4.22. Using good modelling techniques provides confidence that the model is performing as well as possible everywhere in the modelling area in the base year, not just at the monitoring locations. Modelling is often an iterative process of improving the model setup and evaluating the impact on model performance. The same principles need to be applied to the entire modelling study area to ensure the model performs well throughout the study area.

A4.23. All reasonable efforts have been made to improve the model inputs. The model has gone through several modelling iterations to consider whether the performance of the modelled inputs can be improved. Improvements are based on comparison with the measured concentrations at specific monitoring locations and where improvements have been made, they have been applied as a wholistic approach with systematic updates to the entire model study area to ensure that the model is not performing well exclusively at the monitoring locations.

A4.24. A final model verification exercise has been undertaken to determine whether there are any remaining discrepancies and to derive a factor with which to adjust the predicted concentrations from the model so that they match local conditions as closely as possible.

Model Verification

A4.25. A final model verification exercise has been undertaken, following the guidance set out by Defra in Box 7.14 and Box 7.15 of LAQM.TG(16) (Defra, 2021) and following good modelling practice.

NO_2

A4.26. Concentrations of road-NOx and primary NO_2 have been predicted for the year of 2019 using the ADMS-roads dispersion model at a number of sites, shown in Figure 5:

- Haringey Roadside (AURN);
- High Road (HR14);
- Westbury Medical Centre (HR24);
- Rowland Hill Nursery (HR25); and
- Earlsmead Primary School (HR30).

A4.27. Predictions have been made at the heights of the monitor inlets. While High Road (HR14) and Haringey Roadside (AURN) monitoring stations have both been included within the model verification exercise, the model has not been setup to carefully reflect the complex dispersion of pollution at these locations. The complex streetscape is not representative of or similar to the situation at the Proposed Development and therefore they have been excluded from the verification process but presented for information.

A4.28. Initially, the measured NO_2 concentrations at the monitoring sites have been inputted into Defra's NOx to NO_2 Calculator, along with the background NO_2 concentrations and f-NO_2 values, in order to obtain 'measured' road-NOx concentrations at the monitoring sites. The primary NO_2 emission

factor (f-NO_2) at each monitoring site was calculated by taking the ratio of predicted primary NO_2 concentration to predicted road-NOx concentration.

A4.29. The predicted road-NOx concentrations have then been compared to the 'measured' road-NOx concentrations and NOx factor calculated for each monitor, see Table A3.

Table A3: Measured and Modelled NOx Comparison

Monitor	Measured NO_2	Background NO_2	Predicted f-NO_2	Measured Road-NOx	Modelled Road-NOx	NOx Ratio (measure / modelled)
AURN (Haringey Roadside)	37.0	23.3	0.25	29.2	9.0	3.238
HR14	34.1	23.3	0.25	22.6	9.0	2.520
HR30	39.6	24.6	0.15	32.8	36.0	0.912
HR25	27.4	22.7	0.15	9.4	7.7	1.213
HR24	34.1	23.4	0.15	22.4	13.3	1.683
Table notes: -						

A4.30. Table A2 demonstrates that the model is performing relatively well at monitoring sites HR24, HR25, and HR30; and as expected not performing as well at HR14 and the AURN site where the model was not optimized for the complex local dispersion characteristics at these sites which do not represent the Proposed Development.

A4.31. The model slightly underpredicts the concentrations at HR25 and HR24 and marginally over predicts at HR30. These three sites are used for the final model adjustment calculations.

A4.32. The predicted road-NOx concentrations have then been compared to the 'measured' road-NOx concentrations, see Figure A6. An adjustment factor of 1.013 has been derived from the equation of the linear trend line that has been fitted through zero. This factor indicates that, overall, the model is slightly underpredicting concentrations at the monitoring sites. The adjustment factor has been applied to all predicted road-NOx concentrations to uplift the values to match the real measured 2019 concentrations at the monitoring sites. This is illustrated in Figure A7, which shows a comparison of the measured NO_2 concentrations and the total (i.e. road plus background) predicted NO_2 concentrations. While the spread of the points shown Figure A7 is greater than would be ideal. statistics of this comparison, as given in Table A3, demonstrate that the predicted NO_2 concentrations have an insignificant fractional bias (~0) and an acceptable root mean square error (RMSE) of less than 10% of the NO_2 AQO (i.e. less than 4 $\mu g/m^3$).

A4.33. Overall the adjustment is small at it is considered the model is performing well.

Figure A6: Comparison of predicted road-NOx to 'measured' road-NOx

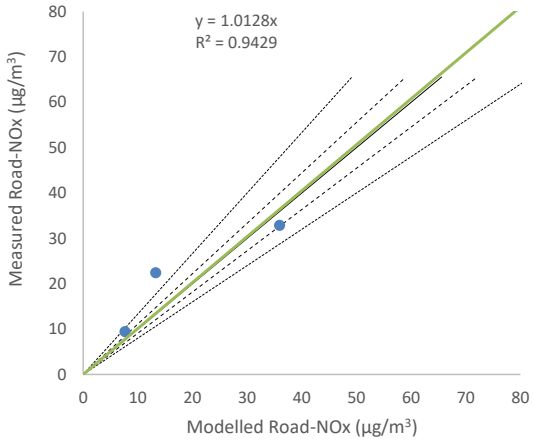


Figure notes: -

Figure A7: Comparison of predicted NO_2 to measured NO_2

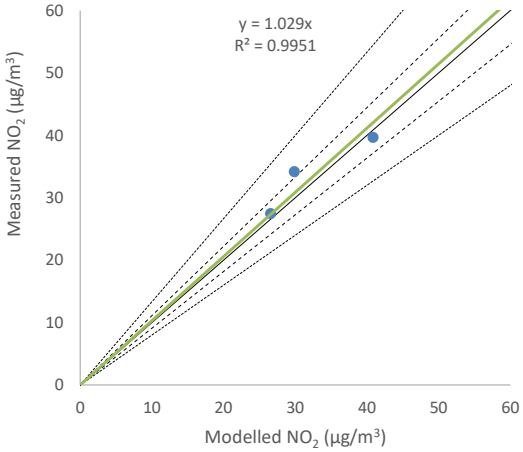


Figure notes: -

Table A4: Model Verification Statistics

Statistic	NO_2
Correlation Coefficient (r) [a]	0.937
Real Mean Squared Error (RSME) [b]	2.569
Fractional Bias (FB) [c]	0.038

Table notes:

a. This is used to measure the linear relationship between predicted and measured concentrations. A value of zero means no relationship and a value of 1 means absolute relationship (ideal value).

b. RMSE is used to define the average error or uncertainty in the model. The ideal value for NO_2 is zero, and a value within 10% of the objective (i.e., 4 µg/m^3) is general acceptable although models should always be improved where possible even where the value is less than 10% of the objective. If the value is greater than 25% of the objective (i.e., 10 µg/m^3) then it is recommended that the model be revisited (this only applies to NO_2).

c. This is used to identify if the model shows a systematic tendency to over or under predict. FB values range between -2 and +2 and has an ideal value of zero. Negative values indicate a model over-prediction and positive values indicate a model under-prediction.

PM_{10}

A4.34. The Council do not operate any monitoring sites that measure roadside concentrations of PM_{10} or $PM_{2.5}$ in close proximity to the Proposed Development. In the absence of relevant monitoring sites with which to verify the model predictions of PM against, the model adjustment factor for road-NOx has been used to uplift all predicted road-PM concentrations.

Post Processing

A4.35. Concentrations of road-NOx and primary NO_2 have been predicted at each receptor using the ADMS-Roads model. The primary NO_2 emission factor (f-NO_2) at each receptor has been calculated by taking the ratio of predicted primary NO_2 concentration to road-NOx concentration.

A4.36. The f-NO_2 values along with the adjusted modelled road-NOx concentrations and background NO_2 concentrations have been inputted into Defra's NOx to NO_2 calculator (v8.1) in order to obtain predicted road-NO_2 concentrations at each receptor. This tool has been run assuming the traffic is described as 'All London traffic', which is considered appropriate for the traffic associated with the LBH. It should be noted, however, that receptor specific f-NO_2 values have been used in the NOx to NO_2 calculator, which supersede the traffic selection.

A4.37. The road-NO_2 concentrations have then been added to the background NO_2 concentrations to obtain total NO_2 concentrations at the receptors. Similarly, the adjusted road-PM_{10} and road-$PM_{2.5}$ concentrations have been added to the background PM_{10} and $PM_{2.5}$ concentrations to obtain total PM_{10} and $PM_{2.5}$ concentrations at the receptors.

Uncertainty and limitations

A4.38. The assessment involves a range of uncertainties, including the model inputs, assumptions, the model, model verification and post-processing of model results. A brief overview of the key uncertainties is discussed below.

A4.39. There are inherent uncertainties associated with the traffic data; the LAEI traffic data are based upon a total of 2009 one day Manual Classified Count (MCC) surveys of vehicles travelling on the roads in Greater London carried out by both DfT and Transport for London (TfL), and based on TfL's

London Highway Assignment Model (LoHAM) and the London Transportation Studies (LTS) models. These provide estimated vehicle trips in an average way, but the specific routing, timing, driving conditions and driving behavior of vehicles will vary and potentially lead to different emission levels.

A4.40. The emission factors also involve a considerable amount of uncertainty. Emissions from the EFT are link averages and do not explicitly take account of acceleration or deceleration. Modelled speeds have been adjusted to account for this where possible. Future year vehicle emission rates are also based on a range of factors, such as expected vehicle fleet release dates, anticipated improvements in emission reduction technologies, expected uptake rates of different vehicles based on government policies, etc. It is therefore possible that the expected future emission rates in the EFT may differ from reality. Historically, evidence had suggested that Defra's EFT exaggerated reductions in NOx emissions as expectations of reductions from diesel vehicles were included which were not seen in practice. However, analyses of recent NOx measurements now provide evidence that vehicle controls are working and as a result Defra's EFT (v10.1) is the current best reflection of the rate of reductions into the future. The unknown of the future traffic fleet composition (built into the EFT) remain uncertain. In the absence of officially published alternative emissions, the approach of this assessment has been to utilise the EFT as recommended by Defra in the LAQM.TG(16) guidance (Defra, 2021). This assessment has been based on 2019 emission factors which negate the uncertainty of the rate of future improvements in emissions.

A4.41. The model itself is based on assumptions of a range of parameters, including road geometries, road widths, street canyons and meteorological related parameters. There is uncertainty in all these parameters, but the modelling has been setup in a robust way based on professional experience to best represent the conditions. One of the main uncertainties in the model is meteorological data; this has been based on measurements made at a representative meteorological station, and although meteorological conditions will remain similar, it entirely likely that meteorological conditions will vary in subsequent years and lead to marginally different concentrations.

A4.42. The ambient background concentrations are also uncertain. While these are provided by Defra, the 1x1 km resolution is coarse, and the maps do not include all sources of pollution. Given the urban fringe location of the proposed development, it is considered likely that the background maps for this area are likely to be reasonable. To minimise uncertainty in the spatial resolution of the maps, the background concentrations have been interpolated to each receptor; essentially smoothing out the coarseness of the maps.

A4.43. Emerging evidence (Grange, S, et al., 2017) suggests that the f-NO_2 has been decreasing in recent years, which is not taken into account within Defra's EFT or NOx to NO_2 Calculator. If lower f-NO_2 values were assumed, then the predicted concentrations would likely be slightly lower throughout the development and local area. Until more detailed scientific analysis is undertaken to understand the full extent of why f-NO_2 is decreasing and how it will behave in the future, it remains an uncertainty.

A4.44. A model verification exercise has been undertaken to adjust the predicted concentrations from the model so that they match local conditions as best as possible. This has adjusted concentrations to match average conditions; some locations will remain underpredicted and some overpredicted.

A4.45. This report does not consider the impacts of air quality on the health implications associated with Covid-19, as there remains too much uncertainty at this stage to consider this explicitly. In addition, the potential long-term implications of the pandemic on transport practices has not been considered, as it is too uncertain at this stage.

A4.46. Although there is uncertainty associated with air quality modelling, the predictions made by this assessment have been carried out in a robust manner to minimise uncertainties where possible.

A5. Predicted Concentrations

A5.1. The full results of predicted concentrations at the Proposed Development at given in Table A4 below.

Table A4: Predicted Annual Mean Concentrations at Locations within the Proposed Development

Receptor	X (m)	Y (m)	Z (m)	NO_2 (µg/m³)	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)
B1	534148.1	190649.5	1.5	25.4	19.2	12.7
B2	534159.4	190652.1	1.5	25.5	19.3	12.8
B3	534171.3	190653.7	1.5	25.5	19.2	12.7
B4	534200.2	190657.8	1.5	25.4	19.2	12.7
B5	534211.8	190660.1	1.5	25.5	19.2	12.7
B6	534223.1	190661.4	1.5	25.4	19.2	12.7
B8	534148.8	190647.3	1.5	25.2	19.2	12.7
B7	534171.8	190651.1	1.5	25.2	19.2	12.7
B9	534200.5	190655.7	1.5	25.1	19.2	12.7
B10	534223.1	190659.5	1.5	25.1	19.2	12.7
B11	534149.9	190639.3	1.5	23.5	18.9	12.6
B12	534159.9	190649.1	1.5	25.2	19.2	12.7
B13	534172.9	190643.1	1.5	23.5	18.9	12.6
B14	534201.9	190647.8	1.5	23.5	18.9	12.5
B15	534213.2	190657.7	1.5	25.1	19.2	12.7
B16	534224.4	190651.4	1.5	23.4	18.9	12.5
B1	534148.1	190649.5	4.5	25.2	19.2	12.7
B2	534159.4	190652.1	4.5	25.2	19.2	12.7
B3	534171.3	190653.7	4.5	25.2	19.2	12.7
B4	534200.2	190657.8	4.5	25.1	19.2	12.7
B5	534211.8	190660.1	4.5	25.2	19.2	12.7
B6	534223.1	190661.4	4.5	25.1	19.1	12.7
B8	534148.8	190647.3	4.5	25.0	19.2	12.7
B7	534171.8	190651.1	4.5	25.0	19.2	12.7
B9	534200.5	190655.7	4.5	25.0	19.1	12.7
B10	534223.1	190659.5	4.5	24.9	19.1	12.7
B11	534149.9	190639.3	4.5	23.5	18.9	12.6
B12	534159.9	190649.1	4.5	25.0	19.2	12.7
B13	534172.9	190643.1	4.5	23.5	18.9	12.6
B14	534201.9	190647.8	4.5	23.4	18.9	12.5
B15	534213.2	190657.7	4.5	25.0	19.1	12.7
B16	534224.4	190651.4	4.5	23.4	18.9	12.5

B1	534148.1	190649.5	7.5	24.9	19.2	12.7
B2	534159.4	190652.1	7.5	24.9	19.1	12.7
B3	534171.3	190653.7	7.5	24.9	19.1	12.7
B4	534200.2	190657.8	7.5	24.8	19.1	12.7
B5	534211.8	190660.1	7.5	24.9	19.1	12.7
B6	534223.1	190661.4	7.5	24.8	19.1	12.7
B8	534148.8	190647.3	7.5	24.8	19.1	12.7
B7	534171.8	190651.1	7.5	24.8	19.1	12.7
B9	534200.5	190655.7	7.5	24.8	19.1	12.7
B10	534223.1	190659.5	7.5	24.7	19.1	12.7
B11	534149.9	190639.3	7.5	23.5	18.9	12.6
B12	534159.9	190649.1	7.5	24.8	19.1	12.7
B13	534172.9	190643.1	7.5	23.4	18.9	12.6
B14	534201.9	190647.8	7.5	23.4	18.9	12.5
B15	534213.2	190657.7	7.5	24.8	19.1	12.7
B16	534224.4	190651.4	7.5	23.4	18.9	12.5
Annual Mean AQO / Limit Value				**40**	**40**	**25** [a]
Annual Mean WHO Guideline [b]				**40**	**20**	**10**

Table notes:

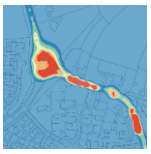
a. The PM2.5 AQO is not in Regulations and there is no legal requirement for local authorities to meet it.

b. The WHO guidelines are not in Regulations and there is no legal requirement for local authorities to meet it.

AIR POLLUTION
SERVICES

Experts in Air Quality, Odour and Climate Change

- Air Quality Assessments for Planning Applications
- Air Quality Neutral
- Pre-application Feasibility



- LAQM Support
- Feasibility Studies
- Local Plan Modelling

- Construction Dust
- Mineral Dust
- Dust Management

- Odour Risks
- Odour Modelling
- Odour Management

- Transport Schemes
- Industrial and Energy
- Agriculture and Waste

- EIA Air Quality Chapters
- Greenhouse Gas Assessments
- Climate Vulnerability

- Air Risk Assessments
- MCPD Permits
- Specified Generator Permits

- Litigation Services
- Quality Assurance
- Monitoring Services
- Policy Development

www.airpollutionservices.co.uk

Tel: 01179 112434

contact@airpollutionservices.co.uk