Air Quality Assessment

Prepared by Arup

Submitted on behalf of Lab Selkirk House Ltd

Selkirk House, 166 High Holborn and 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street, London, WC1A 1JR

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List of Acronyms

Acronym	Definition
AADT	Annual Average Daily Traffic
ASR	Annual Status Report
ATC	Automatic Traffic Counts
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQN	Air Quality Neutral
AQP	Air Quality Positive
BEB	Building Emissions Benchmark
CAZ	Central Activities Zone
CEMP	Construction Environmental Management Plan
CHP	Combined Heat and Power
DAS	Design and Access Statement
Defra	Department for Environment, Food and Rural Affairs
DfT	Department of Transport
DM	Do-Minimum
DMP	Dust Management Plan
DS	Do-Something
EA	Environment Agency
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
EU	European Union
GIA	Gross internal area
GLA	Greater London Authority
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
LAEI	London Atmospheric Emissions Inventory
LBC	London Borough of Camden

Acronym	Definition
LDV	Light Duty Vehicle
MVHR	Mechanical Ventilation and Heat Recovery
NAEI	National Atmospheric Emissions Inventory
NPPF	National Planning Policy Framework
NRMM	Non-Road Mobile Machinery
NWP	Numerical Weather Predication
PCM	Pollution Climate Mapping
PPG	Planning Practice Guidance
SPG	Supplementary Planning Guidance
TEB	Transport Emissions Benchmark
TTE	Total Transport Emissions
ULEZ	Ultra Low Emission Zone
WCC	Westminster City Council
WEP	West End Project
WHO	World Health Organisation

Executive Summary

This report assesses the likely significant effects of the proposed development on local air quality. A review of current legislation and planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the site have been undertaken.

The site is located in the Camden AQMA, which has been declared for exceedances in the annual mean NO_2 and 24-hour mean PM_{10} standards. The London Borough of Camden Council has adopted more stringent standards for air pollution: 38µg/m^3 for NO_2 (as opposed to the 40µg/m^3 national standard), 20µg/m^3 for PM_{10} (as opposed to 40µg/m^3) and 10µg/m^3 (as opposed to 20µg/m^3). Even though air quality is anticipated to improve in future years, pollutant concentrations are likely to be in excess of these standards at the year of opening in 2024.

Monitoring data within 1km of the site showed that five of the ten monitoring sites exceeded the annual mean NO_2 air quality standard (40µg/m^3) and six exceeded the Council annual mean NO_2 air quality standard (38µg/m^3) in 2019. All of the sites that exceeded the national NO_2 annual mean standard in 2019 were at 'roadside' or 'kerbside' locations. The rest of the monitoring locations within 1km of the site measured concentrations below the relevant air quality standards for all pollutants of concern (NO_2, PM_{10} and $PM_{2.5}$). As the site abuts the A40, the environment into which the new receptors are being introduced is likely to be close to or over the national annual mean NO_2 air quality standard (40µg/m^3) and the Council's annual mean NO_2 air quality standard (38µg/m^3).

As a conservative assumption, the site was classified as high risk to dust soiling and low risk to human health effects from dust generating activities prior to the application of any mitigation measures. With the implementation of mitigation measures detailed in Section 8, the residual effects would be negligible and not significant.

Air quality is anticipated to improve in future years across the UK and around the area of the site. The improvement in traffic emissions is also expected through the introduction of two-way flow on roads around the site (A40 High Holborn) and the redevelopment of the 196 space multi-storey car park currently occupying the site location.

During operation of the site, there will be approximately 68 deliveries a day. The proposed development is car-free, so no additional traffic is anticipated from the operation of the proposed development. The effect of the operational traffic associated with the proposed development on these receptors has been assessed and is considered to be not significant, as a negligible impact was predicted at all selected existing and future receptors for all pollutants.

An assessment against the 'air quality neutral' criteria was undertaken in relation to building and transport emissions. The proposed development building emissions could be screened out and development trip rates were calculated to be below the relevant benchmarks for all land-use classes, and therefore, the proposed development complies with the 'air quality neutral' criterion.

An air quality positive statement has also been prepared, which includes relevant measures to maximise potential benefits to local air quality and how measures will be implemented to minimise pollution exposure.

1. Introduction

Ove Arup and Partners Limited (Arup) has been commissioned by Lab Selkirk House Ltd ('the Applicant') to undertake an air quality assessment for the redevelopment of the land at Selkirk House, 166 High Holborn and 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street, London, WC1A 1JR ('the site').

The Applicant is seeking a singular detailed planning application for the:

"*Redevelopment of Selkirk House, 166 High Holborn and 1 Museum Street following the substantial demolition of the existing car park and former Travelodge Hotel to provide a mixed-use scheme, providing office, residential, and town centre uses at ground floor level. Works of part-demolition and refurbishment to 10-12 Museum Street, 35-41 New Oxford Street, and 16A-18 West Central Street to provide further town centre ground floor uses and residential floorspace, including affordable housing provision. Provision of new public realm including a new pedestrian route through the site to link West Central Street with High Holborn. Relocation of cycle hire docking stations on High Holborn*" (the 'proposed development').

This application relates to a site covered by another application (ref. 2021/2954/P) it is the intention that this application supersedes the previous application which will in turn fall away. This new planning application has been prepared in the context of the recent listing of 10-12 Museum Street and 35-37 New Oxford Street, both of which sit within the application boundary.

The site is located within the Holborn and Covent Garden Ward of the London Borough of Camden (LBC) ('the Council'). It comprises a number of individual different buildings within the site boundary (also known as redline boundary), including Selkirk House, 166 High Holborn and 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street. It lies north of the River Thames and is situated between Covent Garden (to the south) and The British Museum (to the north) in central London (see Figure 1). The site is located in the London Borough of Camden near the border to the City of Westminster. Both Westminster City Council (WCC) and the Council have declared borough-wide air quality management areas (AQMA).

This report assesses the likely significant effects of the proposed development on the environment in respect of air quality. Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. The main pollutants of concern for local air quality are oxides of nitrogen (NO_x), including nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), and dust.

The report structure is as follows:

Section 2: review of the legislation and planning policy relevant to air quality;

Section 3: methodology of assessment and significance criteria;

Section 4: existing and predicted air quality conditions in the vicinity of the site;

Section 5: potential air quality effects associated with construction;

Section 6: potential air quality effects associated with operation;

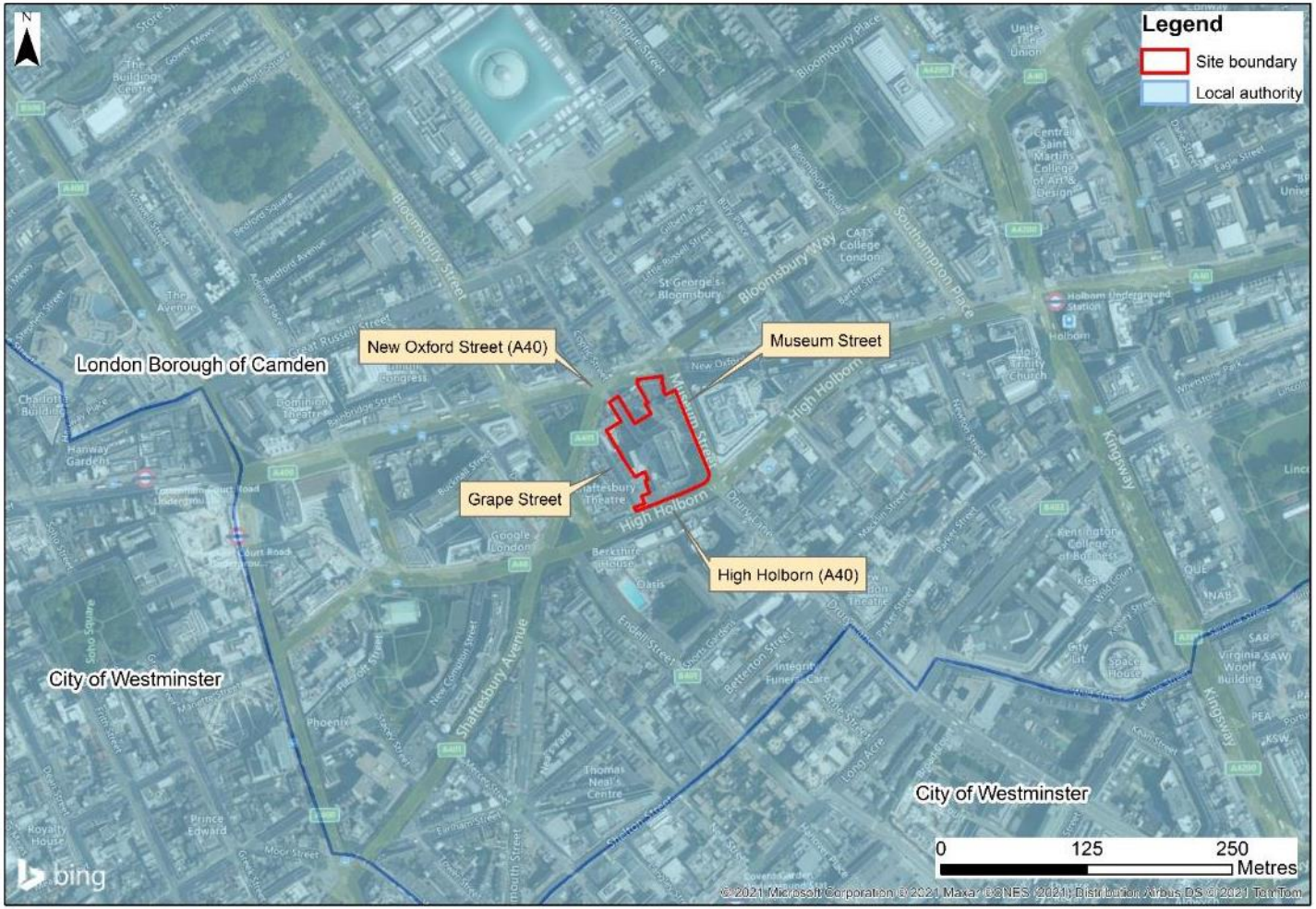
Section 7: assessment of the site against the air quality neutral criteria;

Section 8: assessment of air quality positive measures;

Section 9: proposed mitigation measures for construction and operation; and

Section 10: summary and conclusions of assessment.

Figure 1 Site location in the London



2. Legislation and Policy Context

2.1 Legislative Context

2.1.1 Environment Act 2021

The Environment Bill became an Act[1] (law) in November 2021. The Environment Act 2021 amends the Environment Act 1995[2] and the Clean Air Act 1993[3] to give local authorities more power at reducing local pollution, particularly that from domestic burning. It also amends the Environmental Protection Act 1990[4] to reduce smoke from residential chimneys by extending the system of statutory nuisance to private dwellings.

The following sections of the Environment Act 1995 have been transposed into the Environment Act 2021:

- For the Secretary of State to develop, implement and maintain an Air Quality Strategy. This includes the statutory duty, also under Part IV[5] of the Environment Act 1995, for local authorities to undergo a process of local air quality management and declare an AQMA where pollutant concentrations exceed the national air quality objectives. Where an AQMA is declared, the local authority needs to produce an Air Quality Action Plan (AQAP), which outlines the strategy for improving air quality in these areas;

The Act implements key parts of the government's Clean Air Strategy and includes targets for tackling air pollution in the UK. The requirements relevant to air quality are:

- for the Office for Environmental Protection to be established to substitute the watchdog function previously exercised by the European Commission;
- for local authorities' powers to be extended under the current local air quality management framework, including responsibilities to improve local air quality and to reduce public exposure to excessive levels of air pollution;
- for "air quality partners" to have a duty to share responsibility for dealing with local air pollution among public bodies; and
- introduces a new power for the government to compel vehicle manufacturers to recall vehicles and non-road mobile machinery if they are found not to comply with the environmental standards that they are legally required to meet.

2.1.2 Air Quality Standards

2.1.2.1 Air Quality Standards 2010 (amended in 2016)

The Air Quality Standards Regulations 2010 (amended in 2016) defines the policy framework for 12 air pollutants known to have harmful effects on human health or the natural environment. The Secretary of State for the Environment has the duty of ensuring compliance with the air quality limit values (pollutant concentrations not to be exceeded by a certain date).

Some pollutants have standards expressed as annual average concentrations due to the chronic way in which they affect health or the natural environment, i.e. effects occur after a prolonged period of exposure to elevated concentrations. Other pollutants have standards expressed as 24-hour, 1-hour or 15-minute average

[1] Environment Act 2021. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted [Accessed June 2022].

[2] Environment Act 1995, Chapter 25, Part IV Air Quality

[3] Clean Air Act 1993. Available at: https://www.legislation.gov.uk/ukpga/1993/11/contents. Accessed 23/11/2021.

[4] Environmental Protection Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents. Accessed March 2022.

[5] Environment Act 2021. Chapter 2. The Office for Environmental Protection.

concentrations due to the acute way in which they affect health or the natural environment, i.e. after a relatively short period of exposure. Some pollutants have standards expressed in terms of both long and short-term concentrations. Air quality limit values and objectives are quality standards for clean air. Therefore, in this assessment, the term 'air quality standard' has been used to refer to the national limit values.

Table 1 sets out the national air quality standards and targets for NO_2, PM_{10} and $PM_{2.5}$. Other pollutants have been screened out of this air quality assessment, since they are not likely to cause exceedances of their respective standards.

Table 1: Air quality standards and targets

Pollutant	Averaging period	Air quality standard
Nitrogen Dioxide (NO_2)	Annual mean	40µg/m^3
	1-hour mean	200µg/m^3 [a]
Particulate Matter (PM_{10})	Annual mean	40µg/m^3
	24-hour mean	50µg/m^3 [b]
Fine Particulate Matter ($PM_{2.5}$)	Annual mean	20µg/m^3
		12µg/m^3 to be achieved by 2028*
		10µg/m^3 to be achieved by 2040*

Notes:

[a] not to be exceeded more than 18 times a year (99.8th percentile)

[b] not to be exceeded more than 35 times a year (90.4th percentile)

* The Environmental Targets (Fine Particular Matter) (England) Regulations 2023 updated in 2023, to state that the "the annual mean level of $PM_{2.5}$ in ambient air must be equal to or less than 10 µg/m³ ("the target level")" by 31st December 2040[6]. The Environmental Improvement Plan (2023) sets an interim target of 12 µg/m³, to be achieved by 31 January 2028. The London Environment Strategy[7] outlines the London Mayor's aim to achieve the World Health Organisation (WHO) 2005 guidelines for $PM_{2.5}$, which is that $PM_{2.5}$ should be 10 µg/m³ by 2030.

2.1.2.2 Environmental Improvement Plan

The UK government published the Environmental Improvement Plan[8] in January 2023, to update the 25 Year Environment Plan. This set out an interim target for $PM_{2.5}$, as mandated by the Environment Act 2021, which required the Secretary of State to set a long-term target for air quality, and interim targets to be achieved within 5 years.

2.1.2.3 London Borough of Camden air quality standards

The London Borough of Camden has adopted the 2021 World Health Organisation (WHO) air quality standards in the Camden Planning Guidance document[9]. These standards are shown below and have been used in this assessment.

[6] Defra, 2023. Chief Planners Newsletter. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1140170/03_Chief_Planners_Newsletter_March_2023.pdf [Accessed March 2023]

[7] Greater London Authority, 2018. London Environment Strategy. Available at: https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf [Accessed March 2023]

[8] Department for Environment, Food and Rural Affairs, Environmental Improvement Plan 2023, https://www.gov.uk/government/publications/environmental-improvement-plan, accessed May 2023.

[9] LBC, 2021. Camden Planning Guidance Air Quality. Available at: https://www.camden.gov.uk/documents/20142/4823269/Air+Quality+CPG+Jan+2021.pdf/4d9138c0-6ed0-c1be-ce68-a9ebf61e8477?t=1611580574285 [Accessed May 2023].

The Council has adopted the more stringent standards of 38µg/m^3 for NO_2 (40µg/m^3 less 5% to take into account potential for uncertainty around NO_2 data), and the WHO guideline limits for PM_{10} (20µg/m^3) and $PM_{2.5}$ (10µg/m^3) as annual mean concentrations.

2.1.3 Clean Air Strategy

The Department for Environment, Food and Rural Affairs (Defra) Clean Air Strategy[10] was published in January 2019 and sets targets for improving air quality across the country. It includes actions for reducing emissions from various sources, such as transport, domestic activities, farming and industry. There is also a long-term target for reducing population exposure to $PM_{2.5}$ concentrations to meet the World Health Organisation (WHO) target of 10µg/m^3 as an annual mean.

2.1.4 Air Quality Strategy

In April 2023, Defra published the Air Quality Strategy[11], a framework for local authorities to take action on air quality. This is a strategic framework for local authorities and other partners, setting out their powers, responsibilities, and further actions the government expects them to take.

This document sets out a framework to enable local authorities to deliver long-term air quality goals, including our ambitious new targets for fine particulate matter ($PM_{2.5}$).

2.2 National Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality consideration that relates to land use and its development can be a material planning consideration in the determination of planning applications, dependent upon the details of each development.

2.2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[12] was updated in July 2021 with the purpose of planning to achieve sustainable development. Paragraph 186 of the NPPF on air quality states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of 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."

In addition, paragraph 105 states that:

"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

Paragraph 174 discusses how planning policies and decisions should contribute to and enhance the natural and local environment. In relation to air quality, NPPF notes that this can be achieved by:

[10] Department for Environment, Food and Rural Affairs (2019), Clean Air Strategy.

[11] Defra (2023). Air quality strategy 2023.

[12] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework

"e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

2.2.2 Planning Practice Guidance

National Planning Practice Guidance (PPG) has been developed in order to support the NPPF. The guidance[13] on air quality provides a concise outline as to how air quality should be considered in order to comply with the NPPF and states when air quality is considered relevant to a planning application. This includes factors such as changes in traffic volumes, vehicle speeds, congestion or traffic composition, the introduction of new point sources of air pollution, exposure of people to existing sources of air pollutants, and the potential to give rise to air quality impacts at nearby sensitive receptors.

2.3 Local and Regional Policy and Guidance

A desk-based review of the local and regional policies and guidance has been undertaken with the following documents being considered in this assessment:

Regional Policy and Guidance

The London Plan[14];

The London Environment Strategy[15];

Sustainable Design and Construction Supplementary Planning Guidance[16];

The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance[17];

Local Air Quality Management Technical Guidance[18];

London Local Air Quality Management Technical Guidance[19];

Air Quality Neutral London Plan Guidance[20];

Air Quality Positive London Plan Guidance[21];

Local Policy and Guidance

Camden Local Plan[22];

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[13] Department for Communities and Local Government (2014), Planning Practice Guidance.

[14] Greater London Authority (2021), The London Plan: The Spatial Development Strategy for Greater London. Available at: https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

[15] Greater London Authority (2018), The London Environment Strategy.

[16] Greater London Authority, 2014. The control of dust and emissions during construction and demolition supplementary planning guidance. Available at: https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance-and-spgs/control-dust-and [Accessed May 2023]

[17] Greater London Authority (2014), The Control of Dust and Emissions during Construction and Demolition, Supplementary Planning Guidance.

[18] Department for Environment Food and Rural Affairs (2021), Local Air Quality Management Technical Guidance (TG16).

[19] Greater London Authority (2019), London Local Air Quality Management Technical Guidance.

[20] GLA (2023). London Plan Guidance Air Quality Neutral. Available online at: https://www.london.gov.uk/sites/default/files/2023-02/Air%20Quality%20Neutral%20LPG.pdf

[21] GLA (2023). London Plan Guidance Air Quality Positive. Available online at: https://www.london.gov.uk/sites/default/files/2023-02/Air%20Quality%20Positive%20LPG.pdf

[22] Camden Borough Council (2017), Camden Local Plan.

Camden Planning Guidance: Air quality[23];

Camden Clean Air Action Plan 2019 – 2022[24];

Manual B – Minimising air pollution from new developments[25]; and

London Borough of Camden Draft Holborn Vision & Urban Strategy[26].

Further details of each of the local policies and guidance are in Appendix A. These policies have been considered throughout this air quality assessment.

2.4 Dust Nuisance

Dust is the generic term used to describe particulate matter in the size range 1-75µm in diameter (British Standard document BS 6069 Part Two)[27]. Dust nuisance is the result of the perception of the soiling of surfaces by excessive rates of dust deposition. Under provisions in the Environmental Protection Act 1990[28], dust nuisance is defined as a statutory nuisance.

There are currently no standards or guidelines for dust nuisance in the UK, nor are formal dust deposition standards specified. This reflects the uncertainties in dust monitoring technology and the highly subjective relationship between deposition events, surface soiling and the perception of such events as a nuisance. In law, complaints about excessive dust deposition would have to be investigated by the local authority and any complaint upheld for a statutory nuisance to occur. However, dust deposition is generally managed by suitable on-site practices and mitigation rather than by the determination of statutory nuisance and/or prosecution or enforcement notice(s).

[23] London Borough of Camden (2021), Camden Planning Guidance Air quality January 2021.

[24] London Borough of Camden (2019), Camden Clean Air Action Plan 2019-2022.

[25] London Borough of Camden (2013), Manual B – Minimising air pollution from new developments.

[26] London Borough of Camden (2019) Holborn Vision & Urban Strategy (Draft).

[27] BS 6069-2:1994, ISO 4225:1994 Characterization of air quality.

[28] Environmental Protection Act 1990, Part 3 Statutory Nuisances and Clean Air.

3. Assessment Methodology

The overall approach to the assessment of air quality comprises:

- A review of the existing air quality conditions at, and in the vicinity of, the site;
- An assessment of the potential changes in air quality arising from the construction and operation of the proposed development;
- An assessment of the proposed development against the 'air quality neutral' criteria; and
- Formulation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

In addition to the above, the Camden air quality proforma[29] has been completed and is provided in Appendix B.

3.1 Method of Baseline Assessment

Existing or baseline ambient air quality refers to the concentrations of relevant substances that are already present in the environment. These are present from various sources, such as industrial processes, commercial and domestic activities, traffic and natural sources.

A desk-based review of the following data sources has been undertaken to determine baseline air quality conditions around the site:

- The Environment Agency (EA) website[30];
- The Defra Local Air Quality Management website[31];
- The London Air website[32]; and
- London Borough of Camden [33] air quality status report (ASR).

The review identified the main sources of air pollution, local air quality monitoring data and local background pollutant concentrations.

3.2 Method of Construction Assessment

3.2.1 Construction Dust Assessment

The construction phase effects of the proposed development have been assessed using the qualitative approach described in the latest guidance by the Institute of Air Quality Management (IAQM)[34]. The guidance applies to the assessment of dust from construction/demolition activities.

An 'impact' is described as a change in pollutant concentrations or dust deposition, while an 'effect' is described as the consequence of an impact. The main impacts that may arise during construction of the proposed development are:

[29] LBC. Air quality assessment. Available at: https://www.camden.gov.uk/air-quality-assessment [Accessed May 2023]

[30] Environment Agency website, Available at: https://environment.data.gov.uk/public-register/view/search-industrial-installations [Accessed February 2021].

[31] Defra, Air Quality Management Areas website, Available at: https://uk-air.defra.gov.uk/aqma/list [Accessed February 2021].

[32] London Air, Available at: https://www.londonair.org.uk/LondonAir/Default.aspx [Accessed February 2021].

[33] London Borough of Camden (2022), London Borough of Camden Air Quality Annual Status Report for 2021.

[34] Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, v1.1. Institute of Air Quality Management, London.

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes;
- Elevated PM_{10} concentrations as a result of dust generating activities on-site; and
- An increase in NO_2 and PM_{10} concentrations due to exhaust emissions from Non-Road Mobile Machinery (NRMM) and vehicles accessing the site.

The IAQM guidance considers the potential for dust emissions from dust-generating activities, such as demolition of existing structures, earthworks, construction of new buildings and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and land capping, while trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on-site and then transfer dust and dirt onto the public road network.

For each of these dust-generating activities, the guidance considers three separate effects:

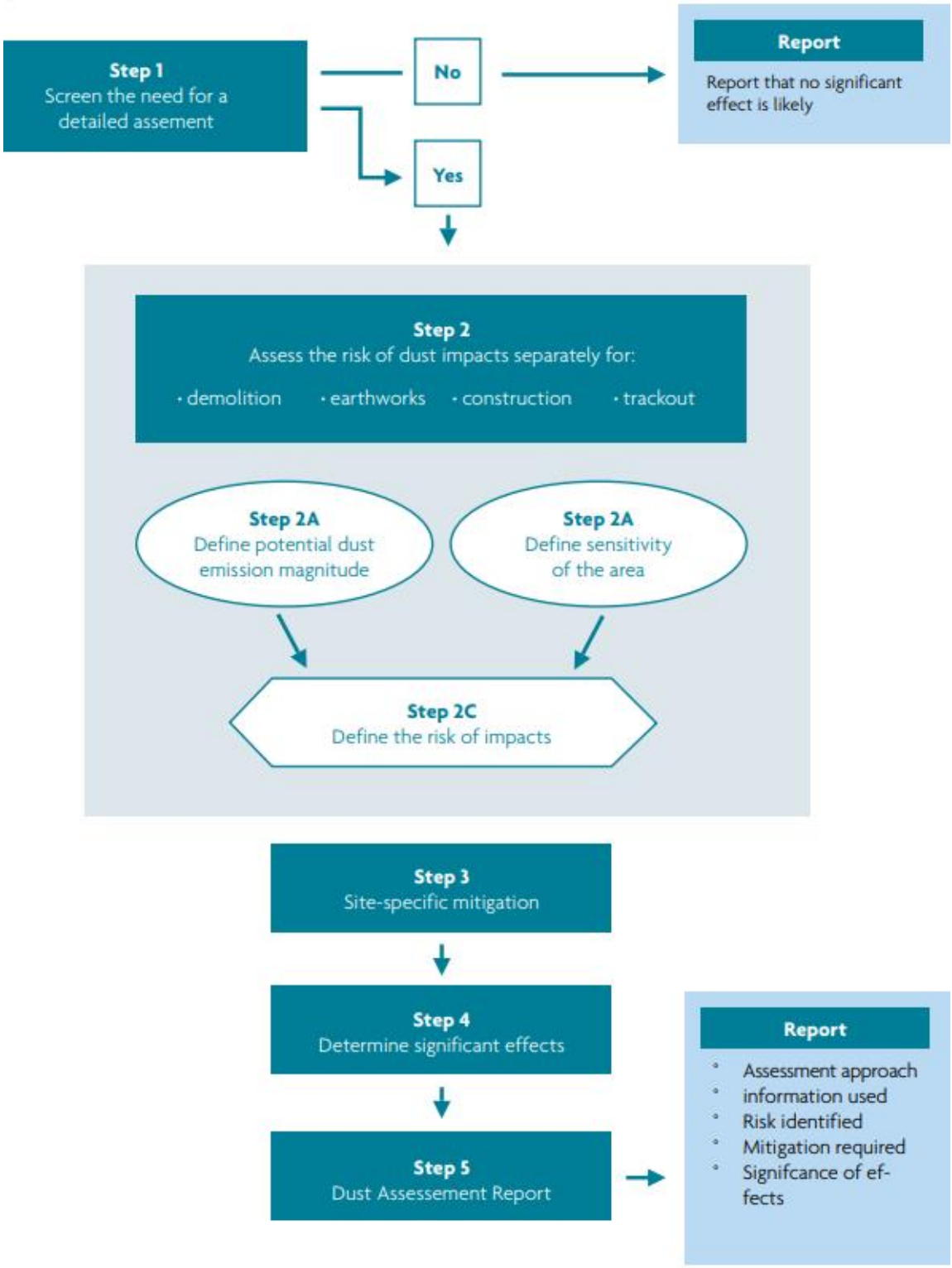
- Annoyance due to dust soiling;
- Harm to receptors; and
- The risk of health effects due to a significant increase in PM_{10} exposure.

The receptors can be human or ecological and are selected based on their sensitivity to dust soiling and PM_{10} exposure. Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development.

The methodology takes into account the scale at which the above effects are likely to be generated (classed as small, medium or large), the levels of background PM_{10} concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into consideration when deriving the overall risk for the site. Suitable mitigation measures are also proposed to reduce the risk of the potential impacts on local air quality as a result of the construction works.

There are five steps in the assessment process described in the IAQM guidance, this is summarised in Figure 2 with further description provided in Appendix D.

Figure 2: IAQM dust methodology[34]



3.2.2 Construction Traffic Assessment

Air quality impacts from the proposed development may also arise as a result of construction traffic along the local road network associated with the building of the proposed development.

Traffic routing information and vehicle numbers for construction will be confirmed with the appointment of the contractor. It is assumed that HGVs will access the site following the main roads around the area such as M40/A40, A11/A13, M4/A23/A24.

The construction traffic flows are yet to be determined in detail, and therefore no detailed air quality assessment has been undertaken. It is proposed that when this data is available it should be assessed against the EPUK/IAQM screening criteria to determine whether a detailed assessment using dispersion modelling would be required.

3.3 Method of Operational Assessment

Operational air quality impacts from the proposed development can arise principally as a result of traffic changes on the road network. The proposed development will be 'car-free' and therefore the only development traffic predicted is from deliveries and servicing.

3.3.1 Road Traffic Emissions

Traffic data for the operational phase was provided by the transport consultant, Arup, for the roads in the surrounding area. As outlined above, the proposed development is within an AQMA, so the following criteria contained in the EPUK/IAQM land-use guidance document[35] have been used to determine whether a detailed assessment is likely to be considered necessary for operational traffic:

A change of Light Duty Vehicle (LDV) flows of more than 100 Annual Average Daily Traffic (AADT) movements; and/or

a change of Heavy Goods Vehicle (HGV) flows of more than 25 AADT movements.

The data has been extracted from the AECOM West End Project monitoring report (May 2022). This report includes Automatic Traffic Count (ATC) data before and after the implementation of the West End Project (WEP) at sites within the vicinity of the proposed development. Given the general saturated nature of the highway network in the West End of London, traffic growth has not been applied to the pre-WEP and post-WEP flows to interpolate the data to the modelling baseline or future year assessment. The pre and post data will identify how the traffic flows in the area as a result of the WEP.

To validate the appropriateness of the third-party data, Arup has commissioned ATC surveys to be undertaken on Shaftsbury Avenue, New Oxford Street, High Holborn, Museum Street and West Central Street in mid-May 2023. It was not possible to commission the data earlier to inform this assessment as major works were taking place on Shaftsbury Avenue. A follow up note to validate the suitability of the AECOM data will follow once the survey data has been received.

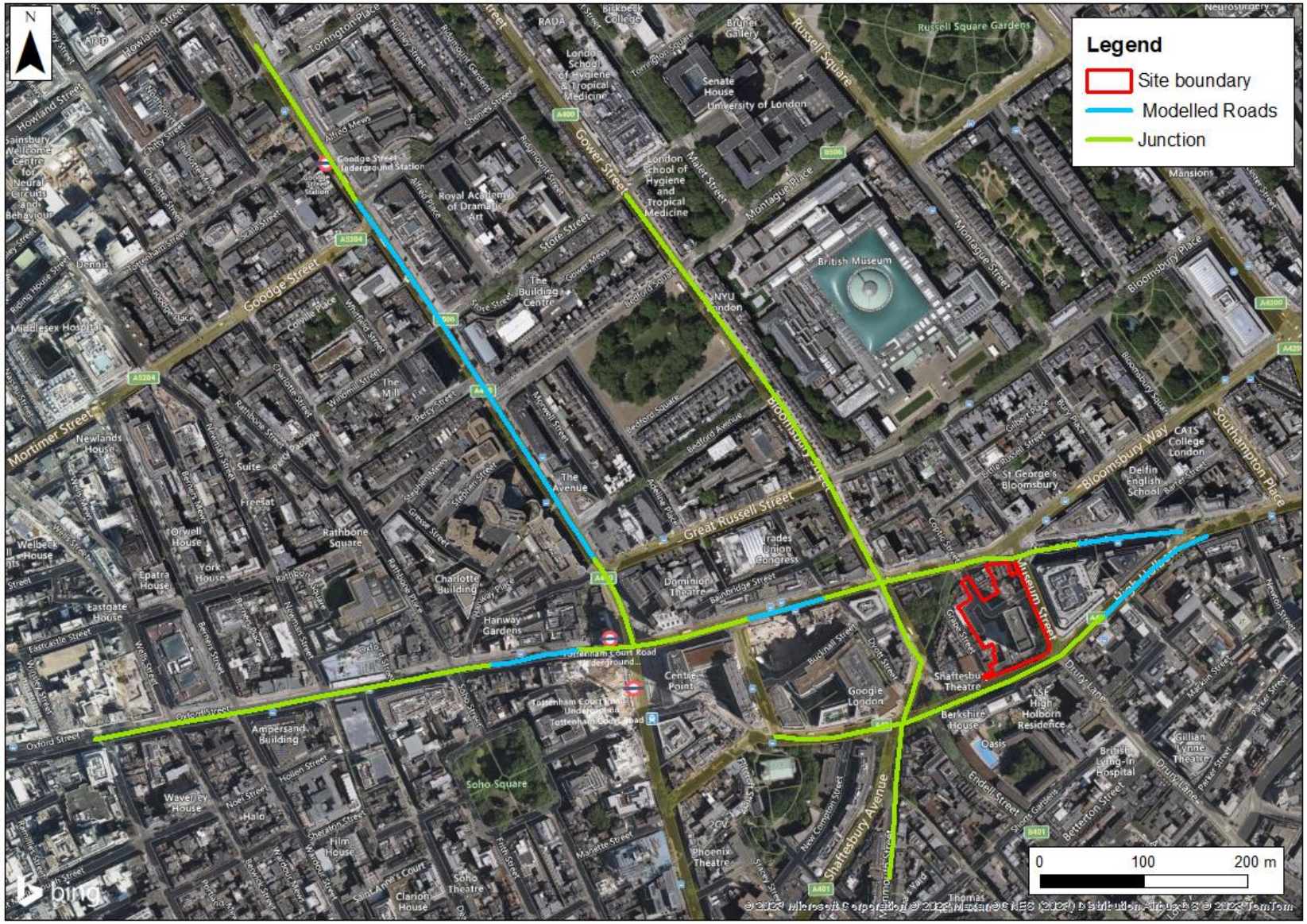
The traffic data consists of 24-hour AADT flows for all vehicle types and for HGVs for each road link and speeds (in kph). The speeds provided are used in the assessment, with the exception of road links recognised as junctions, where modelled speeds were assumed to be 20kph following Defra's LAQM.TG22 guidance[36] (as this is considered to be representative of congested conditions).

The modelled road network is shown in Figure 3 and details of the modelled roads and the traffic data used are provided in Appendix C.

[35] EPUK/IAQM, 2017. Land-Use Planning & Development Control: Planning for Air Quality

[36] Defra, 2022. Local Air Quality Management Technical Guidance (TG22). Available at: https://laqm.defra.gov.uk/wp-content/uploads/2022/08/LAQM-TG22-August-22-v1.0.pdf [Accessed: May 2023]

Figure 3: Modelled road network



3.3.2 Assessment Scenarios

The traffic assessment scenarios can be summarised as follows:

- Baseline scenario (using 2019 traffic volumes and using 2019 emission factors);
- Do-Minimum (DM) scenario (2024), which is the future year without the site in place (using 2024 traffic volumes and using 2022 emission factors as a conservative assessment); and
- Do-Something (DS) scenario (2024), which is the future year including the impact from the site (using 2024 traffic volumes and using 2022 emission factors as a conservative assessment).

Emission rates have been calculated using the latest Defra Emissions Factor Toolkit (EFT) v11.0[37]. For the and DS scenarios, impacts on air quality during operation have been modelled using 2022 vehicle emission factors and 2022 background concentrations to provide a pessimistic assumption of future concentrations.

A baseline year and model verification were considered for the year 2019 as this is the most recent year for which a full year of monitoring data are available that was not affected by Covid-19 national lockdowns.

3.3.3 Sensitive Receptors

The operational traffic modelling predicted concentrations at sensitive receptor locations. Sensitive receptors are defined as those residential properties/schools/hospitals that are likely to experience a change in pollutant concentrations due to the operation of the site. A desk-top study was undertaken to identify the sensitive receptors near the site. Details of the sensitive receptors used in this assessment are shown in Table 2 and their locations are shown in Figure 4 and Figure 5.

Receptors have been modelled at a height of 1.5m to represent exposure and ground floor receptors and 4.5m for first floor receptors, and then an additional 3m was added for additional storeys where required up to a height of 16.5m.

Future residential receptors have been included in the model and are located within the redline boundary, and are also modelled at various heights up to 16.5m. This provides a review of potential exposure for future residents as well as recommendations for operable windows.

Table 2. Sensitive Receptors

Receptor	Description	OS grid reference		Height (m)
		X	Y	
1	Residential	529971	181618	1.5
2	Residential	529620	181701	4.5
3	Residential	529541	181811	4.5
4	Future residential	530149	181400	1.5
5	Future residential	530149	181400	4.5
6	Future residential	530149	181400	7.5
7	Future residential	530149	181400	10.5
8	Future residential	530149	181400	13.5
9	Future residential	530149	181400	16.5
10	Future residential	530153	181394	1.5
11	Future residential	530153	181394	4.5
12	Future residential	530153	181394	7.5
13	Future residential	530153	181394	10.5

[37] Defra, 2021. Emissions Factors Toolkit (EFT) v11.0. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html; [Accessed: March 2023].

Receptor	Description	OS grid reference		Height (m)
		X	Y	
14	Future residential	530153	181394	13.5
15	Future residential	530153	181394	16.5
16	Future residential	530176	181458	1.5
17	Future residential	530176	181458	4.5
18	Future residential	530176	181458	7.5
19	Future residential	530176	181458	10.5
20	Future residential	530176	181458	13.5
21	Future residential	530176	181458	16.5
22	Future residential	530195	181450	1.5
23	Future residential	530195	181450	4.5
24	Future residential	530195	181450	7.5
25	Future residential	530195	181450	10.5
26	Future residential	530195	181450	13.5
27	Future residential	530195	181450	16.5
28	Pearson College	530311	181430	1.5
29	Residential	530086	181277	4.5
30	Residential	530020	181284	4.5

In addition to the sensitive receptors, local monitoring sites have also been included in the model. There are three monitoring sites located on the modelled road network, which are the Council's diffusion tubes CA11 and CA21, and WCC automatic monitor CM7. These monitoring sites were included as receptors in the model at heights specified in the relevant ASRs to enable model verification. Details of the monitoring sites considered for model verification are shown in Table 3 and the location of these monitoring sites are shown in Figure 4.

Table 3: Monitoring sites included in the model to enable model verification

Monitoring site	Local authority	Description	OS grid reference		Height (m)
			X	Y	
CA11	LBC	Diffusion Tube	529589	181746	3.5
CM7	WCC	Continuous Monitor	529493	181331	1.7
CA21	LBC	Diffusion Tube	529962	181620	2.2

Figure 4. Modelled Sensitive Receptor Locations

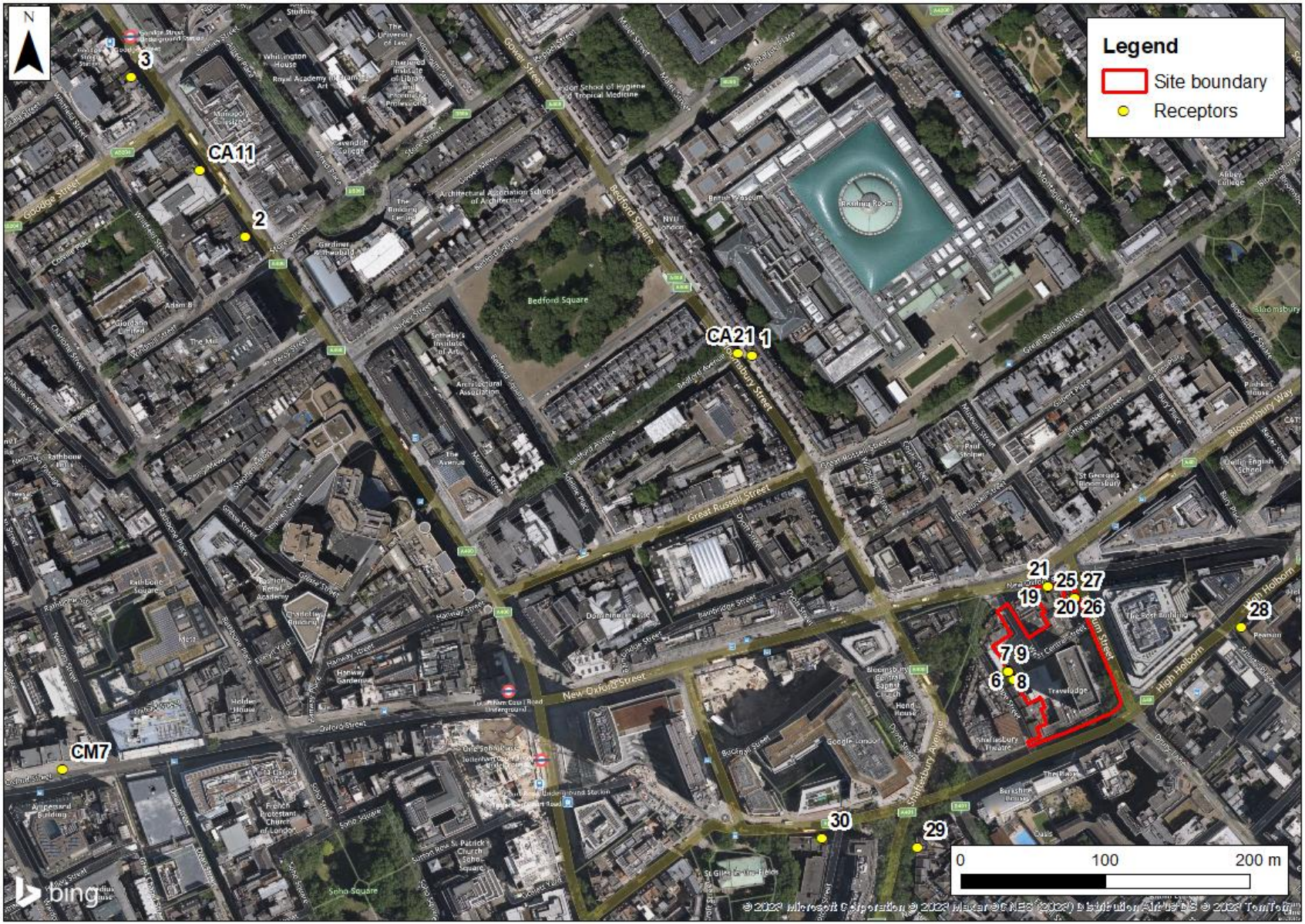
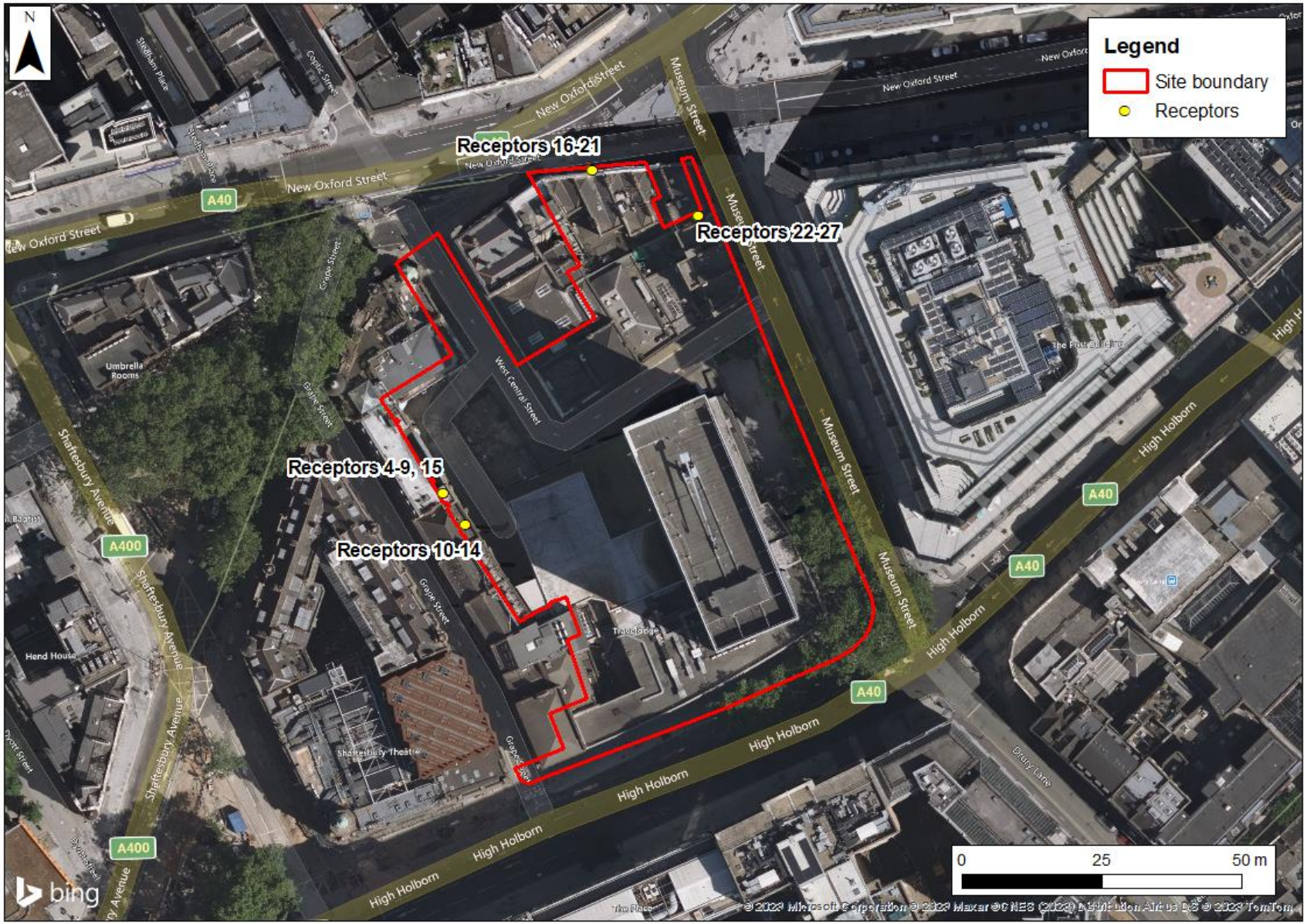


Figure 5: Onsite receptors



3.3.4 Dispersion Model Setup

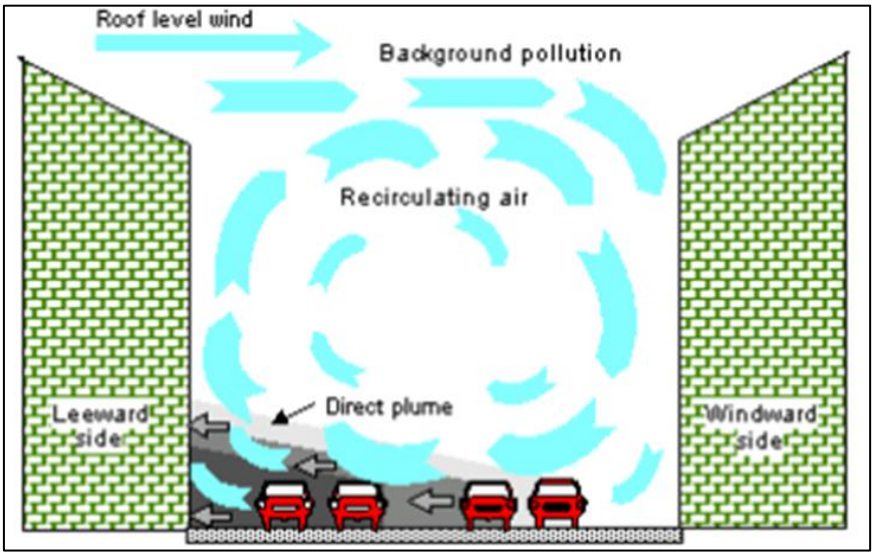
This section details the inputs and set-up for the operational traffic dispersion modelling. The ADMS-Roads dispersion model (version 5.0.0.1) has been used for this assessment.

3.3.4.1 Street Canyons

The existing urban streetscape can create street canyons. The street canyon effect can impact dispersion within the canyon, such as increasing concentrations on the leeside of the road (see Figure 6). The ADMS-Roads model is able to model the impacts of street canyons.

Street canyon has been included in this assessment on parts of the A40 Oxford St (west) and A40 High Holborn, and the details of these locations are shown in Appendix C.1.

Figure 6: Conventional street canyon air flow[38]



3.3.4.2 Meteorological Data

The meteorological data used in this assessment were measured at London Heathrow Airport meteorological station. For the baseline model verification exercise, the data was collected over the period 1st January 2019 to 31st December 2019 (inclusive). For the assessment scenarios (using the year 2022), the data was collected over the period 1st January 2022 to 31st December 2022 (inclusive). London Heathrow Airport is located approximately 20km west of the proposed development and was chosen due to its proximity to the proposed development.

Most dispersion models of roads do not use meteorological data if modelling calm wind conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75m/s. Defra's LAQM.TG22 guidance[36] recommends that the meteorological data file is tested in a dispersion model and the relevant output log file checked to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedances. The guidance recommends that meteorological data should only be used if the percentage of usable hours is greater than 75% and preferably 90%.

Hourly sequential observation data was used. Both the 2019 and 2022 datasets include 8,760 lines of usable hourly data, which is 100% of the year. This is above the 90% threshold, so meets the requirements of the Defra guidance and is suitable for the dispersion modelling. Figure 7 and Figure 8 show the wind rose for London Heathrow Airport for 2019 and 2022 respectively. It can be seen that the predominant wind direction is south-westerly for each.

[38] Berkowicz, R. (2000) A Simple Model for Urban Background Pollution - https://doi.org/10.1023/A:1006466025186

Figure 7: Wind Rose for London Heathrow Airport 2019

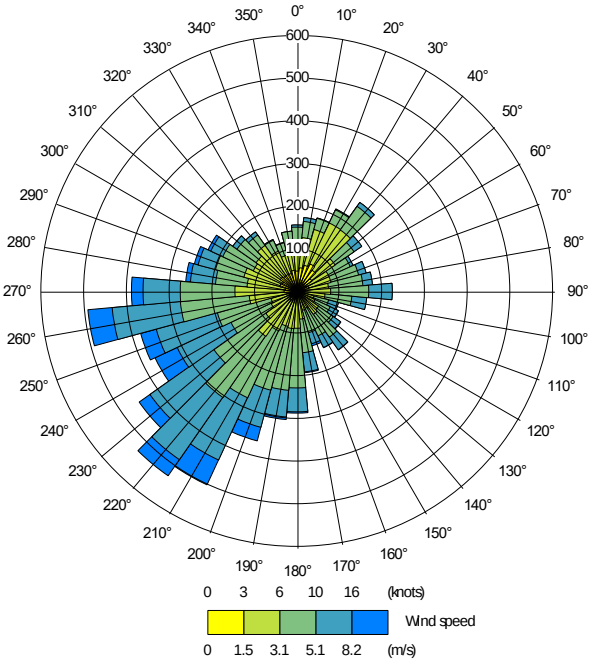
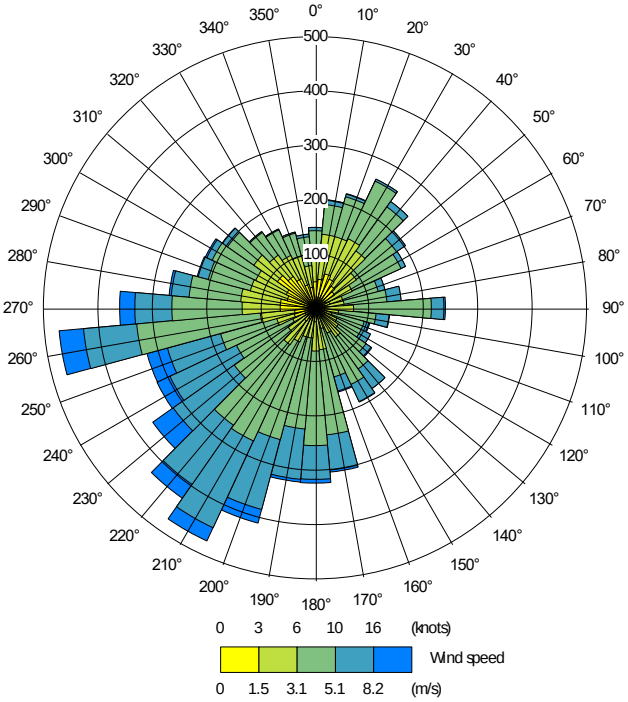


Figure 8. Wind Rose for London Heathrow Airport 2022



Meteorology Sensitivity Test

A sensitivity test was carried out using Heathrow Airport meteorological data and Numerical Weather Predication (NWP) data to determine which source provided the most conservative assessment. The model was run with both sets of meteorological data and it was found that the results were higher when using the Heathrow meteorological data. This dataset was therefore used in the assessment.

The NWP wind rose and a comparison of modelled road NO_x calculated using NWP with that of Heathrow meteorological data is provided in Appendix D.

3.3.4.3 Other Input Parameters

The extent of mechanical turbulence (and hence, mixing) in the atmosphere is affected by the surface/ground over which the air is passing. Typical surface roughness values range from 0.0001m (for water or sandy deserts) to 1.5 (for cities, forests and industrial areas). In this assessment, the general land use in the local study area can be described as "large urban areas" with a corresponding surface roughness of 1.5m. The same surface roughness value was used for the meteorological station site.

The minimum Monin-Obukhov length is a model parameter that describes the extent to which the urban heat island effect limits stable atmospheric conditions. A minimum Monin-Obukhov length of 100m has been used in this dispersion modelling study. It is suggested in ADMS-Roads that this length is suitable for "large conurbations > 1 million". The same minimum Monin-Obukhov length was used for the meteorological station site.

3.3.4.4 NO_x to NO_2 Conversion

The dispersion model predicts NO_x concentrations which comprise nitric oxide (NO) and NO_2. NO_x is emitted from combustion processes, primarily as NO with a small percentage of NO_2. The emitted NO reacts with oxidants in the air (mainly ozone) to form NO_2. NO_2 is associated with effects on human health. The air quality standards for the protection of human health are based on NO_2 rather than total NO_x or NO.

LAQM.TG22[36] details an approach for calculating the roadside conversion of NO_x to NO_2. This approach takes into account the difference between ambient NO_x concentrations with and without the site, the concentration of ozone and the different proportions of primary NO_2 emissions in different years. This approach is available as a spreadsheet calculator, with the most up-to-date version being version 8.1, released in August 2020[39] and has been used in the assessment.

3.3.5 Model Verification

Model verification refers to the comparison of modelled and measured pollutant concentrations at the same locations to determine the performance of the model and determine an adjustment factor, if one is required. Should the majority of model results for NO_2 be within ±25% of the measured values and there is no systematic over or under-prediction of concentrations, then the LAQM.TG22[36] guidance advises that no adjustment is necessary. If this is not the case, modelled concentrations are adjusted based on the observed relationship between modelled and measured NO_x concentrations to provide a better agreement.

Modelled results may not compare as well at some locations for various reasons, including:

- Errors/uncertainties in model input data (e.g. traffic flows and speed data estimates);
- Model set-up (including street canyons where applicable, road widths, location of monitoring sites);
- Neglect of local effects (including queues, bus stops and street canyons);
- Uncertainty in monitoring data, notably diffusion tubes (e.g. bias adjustment factors and annualisation of short-term data); and
- Uncertainty in emissions and emission factors.

The above factors were investigated as part of the model verification process to minimise the uncertainties as far as practicable. The outcome of the model verification is reported in Section 6.

3.3.6 Significance Criteria

The 2017 EPUK/IAQM guidance note 'Land-Use Planning & Development Control'[35] provides an approach to determining the air quality impacts resulting from a Site and the overall significance of local air quality effects arising from a Site.

[39] Defra NO_x to NO_2 calculator (version 8.1), 2020. Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/ [Accessed: March 2023].

Firstly, impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the annual mean NO_2, PM_{10}, and $PM_{2.5}$ objectives. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the annual mean NO_2, PM_{10}, and $PM_{2.5}$ objectives.

The assessment framework for determining impact descriptors at each of the assessed receptors is shown in Table 4.

Table 4. Impact Descriptors

Annual average concentrations at receptor in the assessment years	Change in concentrations relative to annual mean NO_2, PM_{10} and $PM_{2.5}$ objectives			
	1%	2-5%	6-10%	>10%
75% or less of objective	Negligible	Negligible	Slight	Moderate
76-94% of objective	Negligible	Slight	Moderate	Moderate
95-102% of objective	Slight	Moderate	Moderate	Substantial
103-109% of objective	Moderate	Moderate	Substantial	Substantial
110% of more of objective	Moderate	Substantial	Substantial	Substantial
Note: Changes in pollutant concentrations of less than 1%				

The impact descriptors at each of the assessed receptors can then be used as a starting point to making a judgement on the overall significance of effect of a Site, however other influences would also need to be taken into account, such as:

- The existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts; and
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts.

Professional judgement should be used to determine the overall significance of effects of the site, however in circumstances where the site can be judged in isolation, it is likely that a 'moderate' or 'substantial' impact will give rise to a significant effect and a 'negligible' or 'slight' impact will not result in a significant effect. In this assessment, 'moderate' or 'substantial' impacts have been judged to result in significant effects and 'slight' or 'negligible' impacts to result in effects which are not significant.

3.4 Method of Air Quality Neutral Assessment

The Air Quality Neutral Assessment follows the latest Air Quality Neutral Guidance published by the GLA.

'Air Quality Neutral' is a term for developments that do not contribute to air pollution beyond allowable benchmarks. The two sets of benchmarks defined by the guidance cover the two main sources of air pollution from new developments:

- Building Emissions Benchmark (BEB) – emissions from equipment used to supply heat and energy to the buildings
- Transport Emissions Benchmark (TEB) – emissions from private vehicles travelling to and from the development.

The guidance requires a development to meet both benchmarks separately in order to be Air Quality Neutral. If one or both benchmarks are not met, appropriate mitigation or offsetting will be required.

3.4.1 Building emissions

The proposed development will not have any CHP boilers and will only have two back-up generators, which are excluded in accordance with the Air Quality Neutral London Planning Guidance. Therefore, no building emissions need to be included in the assessment.

3.4.2 Transport emissions

In order to determine the air quality neutrality for the transport emissions of the proposed development, the following information is required:

- Gross internal area (GIA) (m^2); and
- Proposed development trip rates (trip/m^2/annum).

The relevant benchmark from the guidance has been used to calculate the TEB of the proposed development it is presented in Table 5.

Table 5: Air Quality Neutral emissions benchmarks

Land use	Annual trips per	Central Activities Zone (CAZ)
Residential	Dwelling	68
Offices / light industrial	m^2 (GIA)	2
Retail		18

3.5 Method of Air Quality Positive Statement

The Air Quality Positive approach is a process of identifying and implementing ways to push development beyond compliance. A draft Air Quality Positive (AQP) Statement has been produced as per the GLA's Air Quality Positive London Plan Guidance. The air quality positive approach should be applied to developments at the plan making and application stages, as shown in Figure 9. For this assessment, the AQP statement has been produced using the 'planning application route'.

Measures in relation to better design and reducing exposure, building emissions, transport emissions, and innovation and futureproofing were identified and discussed with the project manager and transport consultants for the project. The AQP Statement was then drafted in accordance with the structure as shown in Figure 10.

Figure 9: Routes to applying the air quality positive approach

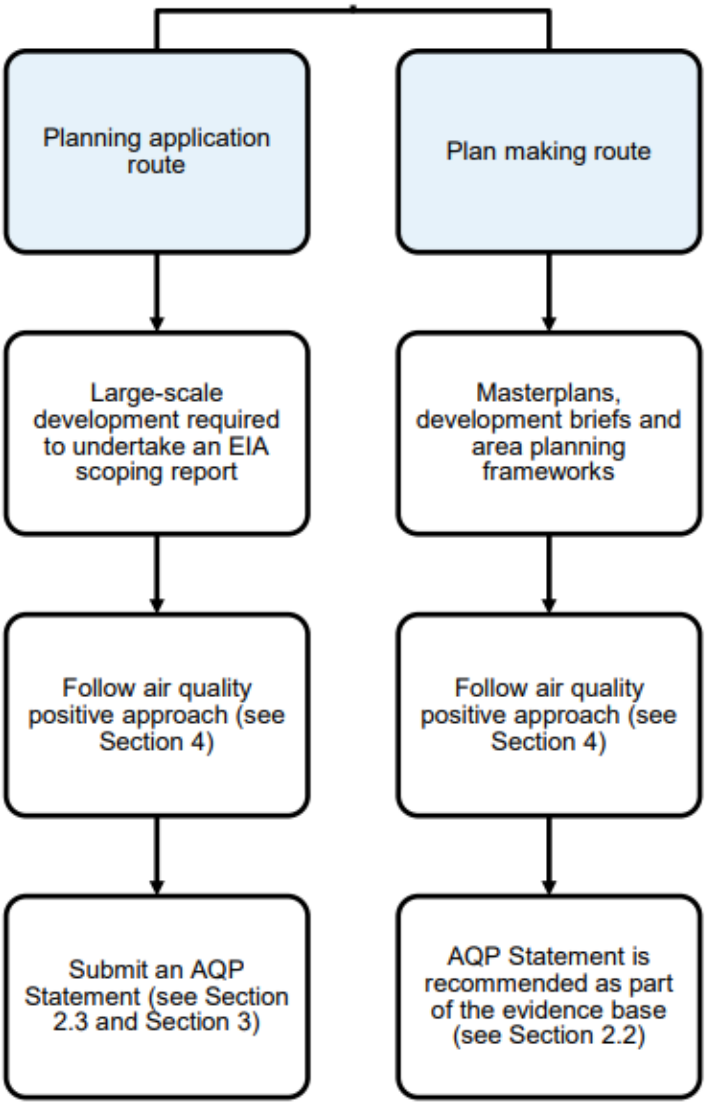


Figure 10 Air Quality Positive Structure

Statement section	What to include
Introduction	Description of the development Method statement
Constraints and opportunities	Summary of site air quality constraints and opportunities Map of constraints and opportunities
Measures adopted	Matrix of adopted measures Rationale for adoption/non-adoption of measures Glossary of technical evaluations and assessments that have informed the measures adopted
Implementation and monitoring	Consultation Implementation plan (how measures will be secured, e.g. against variation in the future) Monitoring plan

3.6 Assumptions and Limitations

3.6.1 Assumptions

The proposed development will use high efficiency air source heat pumps. There will also be two standby generators (one on the Grape Street building and one on the West Central Street building) provided under the current design for life safety (means of escape and firefighting). The generators will only be used in case of emergency or power cut. They will each be tested at full load (not simultaneously) once a month, during working hours, for an hour each time to ensure they are functional. To mitigate any potential impacts of these generators, the exhausts will be located on the roof, approximately 0.5m (Grape Street) and 1m (Museum Street) from the highest structures on the roofs, to aid dispersion, and building air intakes have been located away from the main road sources and generator exhausts.

Another consideration is the short-term air quality concentrations in the area. Although NO_2 concentrations are relatively high in the area, the short-term air quality objective is met. At the nearest three monitoring sites, annual mean concentrations do not exceed 60µg/m^3. According to the TG(22) guidance[36], this is an indicator that the short-term NO_2 limit is not likely to be exceeded. Hourly NO_2 concentrations are recorded directly at three other monitoring sites within the study area, in the Camden ASR[33], the LondonAir website[32] and the Westminster 2020 ASR[40]. Two of these sites report no exceedances of 200µg/m^3 and the third reports five exceedances of 200µg/m^3. As an exceedance of hourly NO_2 is defined as over 18 instances of exceedances of 200µg/m^3 per year, the short-term objective is met.

The generators have been scoped out of this assessment, and are not considered further.

It has been assumed that all NRMM will meet the relevant emissions standards as detailed in the GLA construction SPG[16] and therefore their emissions are unlikely to give rise to significant effects on local air quality.

As flexible planning permission is being sought for the full range of E use classes, the details of any commercial scale kitchens and extraction systems are currently unknown. Therefore, an assessment of odour emissions from kitchen extracts has not been undertaken in this report. Any requirement for odour emissions can be addressed by appropriate planning conditions.

3.6.2 Limitations

The assessment of baseline conditions has been undertaken for the latest calendar year of data available. The latest year of published local authority monitoring data is 2019. This is unlikely to significantly affect the assessment of baseline conditions around the site.

There is no recent traffic data available for the roads in the vicinity of the site (such as Museum Street) due to the recent Covid-19 pandemic combined with the recent change at A40 High Holborn from one-way westbound traffic to two-way traffic flow.

[40] Westminster City Council, 2021. Annual Status Report 2020.

4. Baseline Conditions

This section presents information on the baseline air quality conditions around the site.

4.1 Air Pollution Sources

4.1.1 Industrial Processes

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met, and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes and are regulated through the Pollution Prevention and Control (PPC) system[41,42]. The larger, more polluting processes are regulated by the EA and the smaller less polluting ones by the local authorities. Local authorities focus on regulation for emissions to air, whereas the EA regulates emissions to air, water and land.

There are no EA-permitted processes within 1km of the site boundary. The contribution of all industrial processes to local air quality are included in the background concentrations.

4.1.2 Road Traffic

The site is bounded by High Holborn to the south, Museum Street to the east and New Oxford Street to the north, with the rear of the properties fronting Grape Street forming the western boundary. West Central Street dissects the site and separates out Selkirk House from the New Oxford Street and West Central Street block (known as the West Central Street component of the site).

In recent decades, transport atmospheric emissions, on a national basis, have grown to match or exceed other sources in respect of many pollutants, particularly in urban areas. In this area, vehicle emissions are likely to be the dominant source of air pollutants in the vicinity of the site. The main pollutants associated with road traffic are NO_2, PM_{10} and $PM_{2.5}$.

Department for Transport traffic counts

The air quality at the site will be largely influenced by the surrounding main roads due to vehicle emissions. The roads directly adjacent to the site are West Central Street and Shaftesbury Avenue to the north, Museum Street to the east, A40 High Holborn to the south and Grape Street to the west. The A40 New Oxford Street to the north will also be a major source of air pollution.

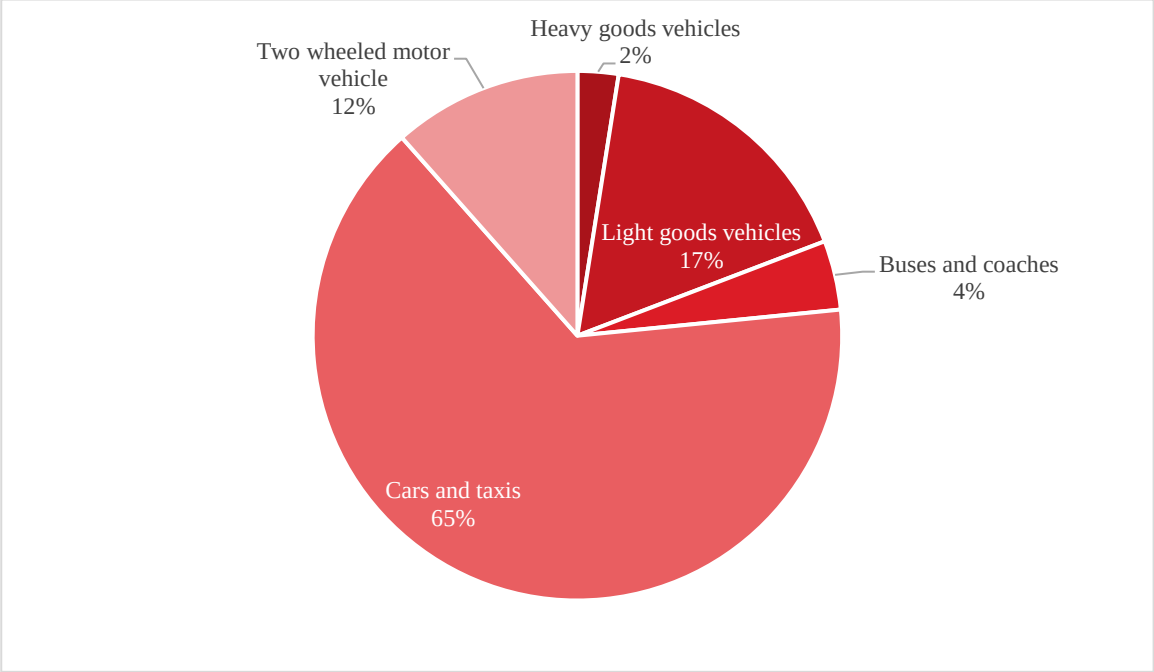
There is a manual traffic count point from the Department for Transport (DfT)[43] on the A40 High Holborn (count point ID 57538) with vehicle flow data for 2019. This traffic count was undertaken along the A40 slightly east of the site however as there are no major junctions between the count point and the site, it is considered that this data is representative of the traffic flow along the southern end of the site. The proportion of annual average daily flow from the traffic count point is presented in Figure 11.

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

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

[43] Department of Transport, Road traffic statistics, Manual count points; Available at: https://roadtraffic.dft.gov.uk/manualcountpoints/57538 [Accessed February 2021].

Figure 11: 2019 manual traffic count for A40 High Holborn (57538)



As part of the West End project[44] the Council has made major changes to the road layout in the area. Several roads in the area that the site is located have become two-way traffic (e.g. Tottenham Court Road and Gower Street/Bloomsbury Street). This is part of the project's aim to improve air quality through reduced congestion and speeding up of bus routes.

The main impact of the West End project on the site is the recent change at A40 High Holborn from one-way westbound traffic to two-way traffic flow. It is anticipated that the traffic flow along this route will decrease due to this change as strategic traffic is rerouted to more major routes. However, there is no traffic data available at present to determine what the air quality impacts will be.

National Atmospheric Emissions Inventory

National vehicle fleet predictions including assumptions on the electrification of the fleet are available from the National Atmospheric Emissions Inventory (NAEI)[45]. The fleet projections for Central London from 2019 to year of opening (2024) are presented in Figure 12. These fleet projections are typically used in air quality assessments for the calculation of vehicle emissions. It can be observed that electric vehicles in 2024 are less than 2% of the total fleet.

The data takes into account DfT predictions and includes the implementation of the Central London Ultra Low Emission Zone (ULEZ) in 2019. Updated predictions (to take into account the Government's net zero carbon targets) are expected to be published by the Government soon. These data are likely to include a larger proportion of electric vehicles in the fleet to account for new government policy and incentives.

Department for Transport TAG Data Book

The Department for Transport, transport analysis guidance (TAG) data book[46] has national fleet predictions from 2004 to 2050. The national fleet projections from baseline 2019 to future opening year 2024 are presented in Figure 13.

[44] London Borough of Camden, West End project; Available at: https://www3.camden.gov.uk/westendproject/the-project/ [Accessed June 2022].

[45] National Atmospheric Emissions Inventory (2020), London Vehicle Fleet Composition Projections (Base 2013 revised in 2018), Available at: https://naei.beis.gov.uk/data/ef-transport [Accessed February 2021].

[46] Department for Transport, TAG data book. Available at: https://www.gov.uk/government/publications/tag-data-book [Accessed May 2023]

Figure 12: Central London NAEI fleet projections from 2019 to 2024

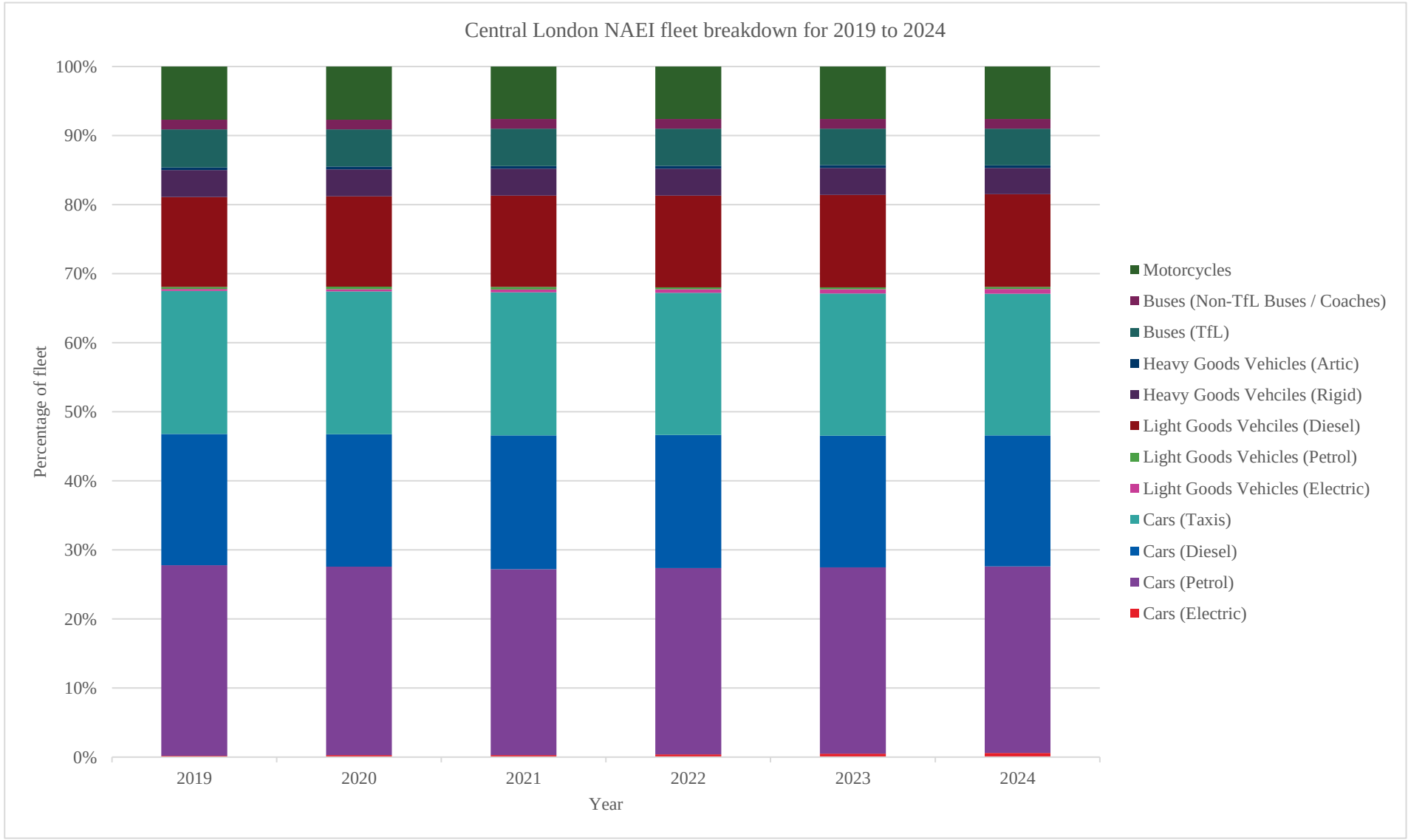
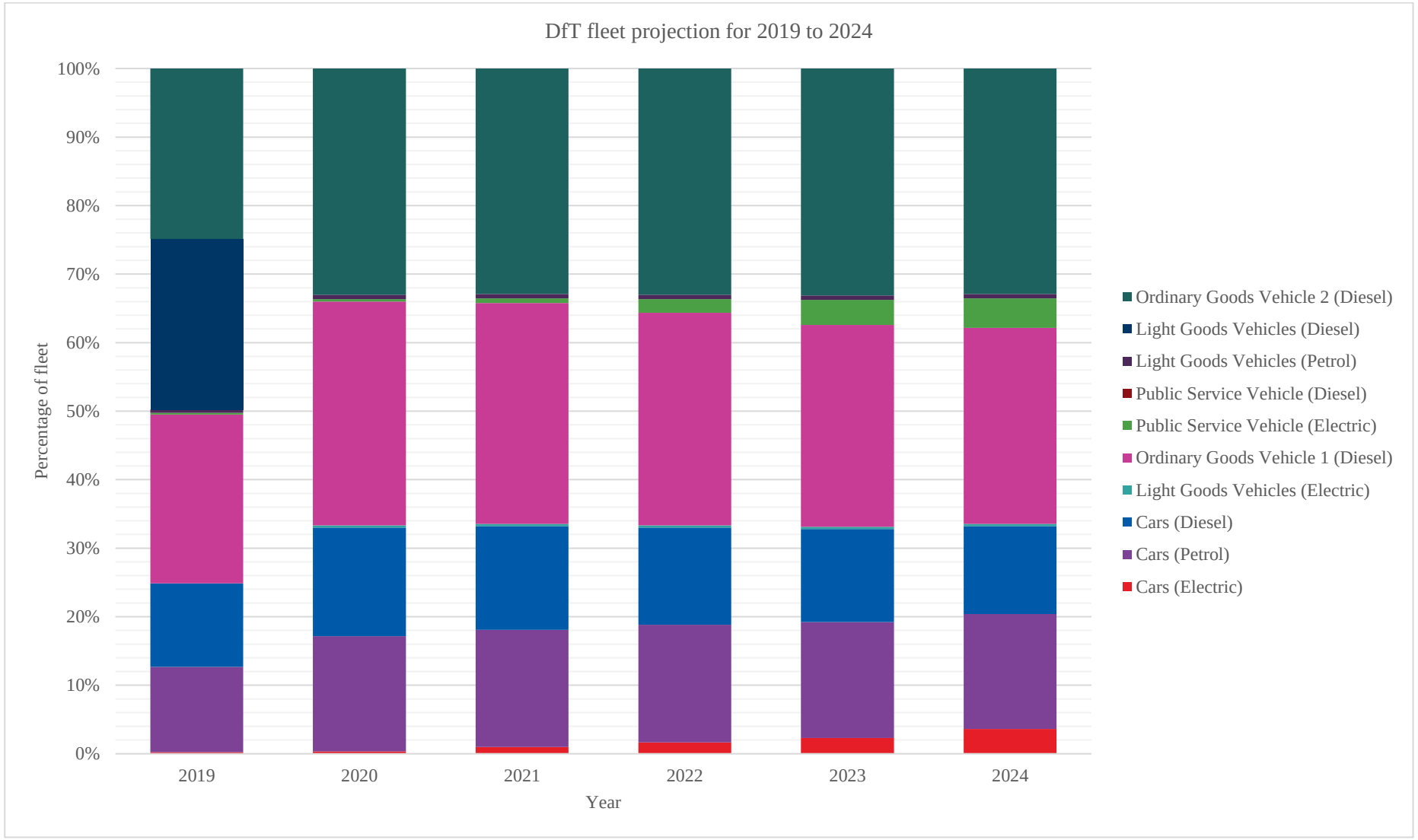


Figure 13: National DfT fleet projections from 2019 to 2024



DfT predicts no electric vehicles for OGV1, OGV2 from 2019 to 2024. DfT predicts an increase in electric PSV from 2019-2024 (1%-13%). The percentage of electric cars (4.1%) and LGVs (1.1%) in 2024 is higher in the DfT data compared to the NAEI (electric cars 0.6% and electric LGV 0.7%).

4.2 Air Quality Management Areas

The Environment Act 1995 requires local authorities to review and assess air quality with respect to the air quality standards for the pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an assessment and produce an ASR of their area every year. Where objectives are not predicted to be met, local authorities must declare the area as AQMA. In addition, local authorities are required to produce an AQAP that includes measures to improve air quality in the AQMA.

The site is located in the borough-wide Camden AQMA[47], which was declared in September 2002 for exceedances of the annual mean NO_2 and daily mean PM_{10} standards. The site is also located near the local authority City of Westminster, who have declared a borough-wide wide AQMA[48]. The AQMA was declared in March 1999 for exceedances of the NO_2 and PM_{10} standards.

4.3 Local Monitoring

This section presents data for the local air quality monitoring within 1km of the site. The Council undertake both continuous and passive monitoring of air quality. The latest year of published monitoring data is presented in this section; 2019 for Camden and Westminster and 2020 for Defra and LondonAir. Although the 2020 monitoring results are presented in the graphs, these are not deemed representative of annual mean concentrations in the local area due to the lockdowns and therefore traffic reductions of the pandemic.

Air quality monitoring is undertaken at 10 sites within 1km of the site boundary by the Council[33], WCC[49], Defra[50] and the LondonAir[51] network. The trends in monitoring data from 2015 to 2020 are presented in graphical form (Figure 14 to Figure 16) with all monitoring locations and their 2019 NO_2 concentrations shown in Appendix F. The locations of these monitoring sites are shown below in Figure 17.

It can be observed that there has been a reduction in NO_2 concentrations in recent years. In 2019, five of the sites were below the annual mean NO_2 standard (40µg/m^3). These five sites are all defined as 'Urban background' locations. However, the Council has adopted the more stringent annual mean NO_2 standard of 38µg/m^3. In 2019, three of the sites were below the the Council's annual mean standard (38µg/m^3).

Oxford Street East is not presented in the figure as there are only two years of data for the site therefore cannot be used to determine a trend. The three monitoring locations closest to the site boundary (Oxford Street East, Bloomsbury Street and Camden – Holborn) measured NO_2 concentrations of 51.0µg/m^3, 48.5µg/m^3 and 55.0µg/m^3 respectively in 2019. These are over the annual mean NO_2 standard (40µg/m^3) and the more stringent Council standard (38µg/m^3). These sites have been classed as 'Roadside' (Oxford Street East) and 'Kerbside' (Bloomsbury Street and Camden – Holborn). As the site boundary abuts the road, the site can be classed as 'Kerbside' therefore these concentrations are deemed representative of the concentrations at the site boundary.

[47] Defra, UK AIR Air Information Resource, Camden AQMA. Available from: https://uk-air.defra.gov.uk/aqma/details?aqma_ref=24 [Accessed February 2021].

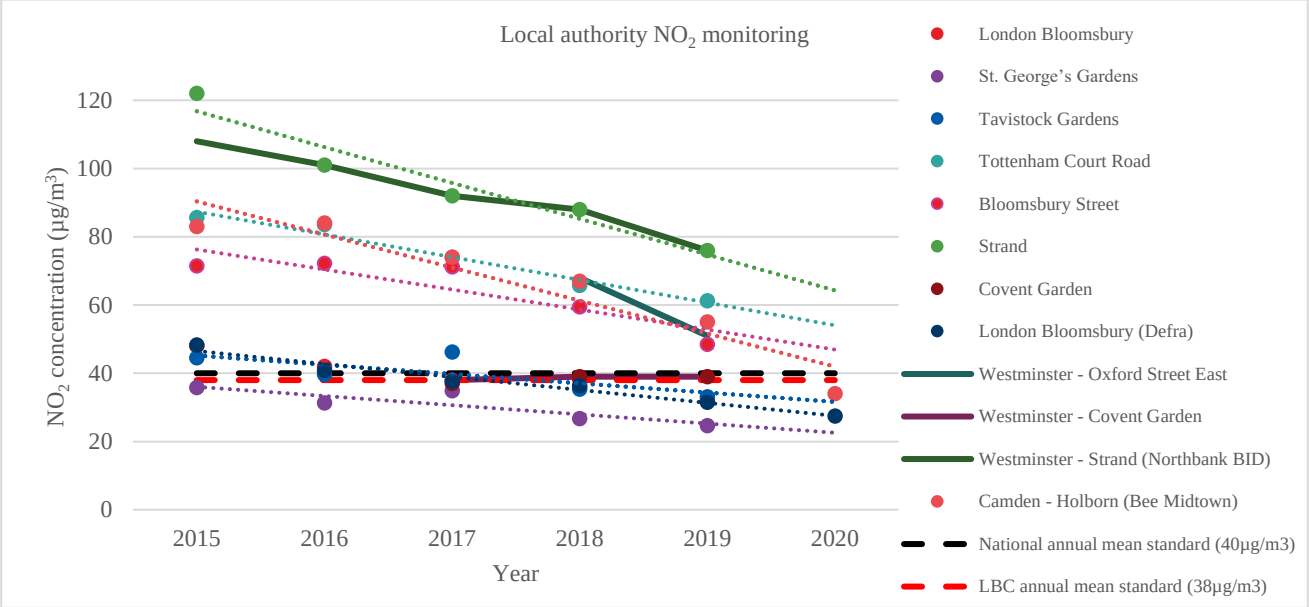
[48] Defra, UK AIR Air Information Resource, Westminster AQMA. Available from: https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=358 [Accessed May 2023]

[49] Westminster City Council (2020), Air Quality Annual Status Report for 2019

[50] Department for Environment Food & Rural Affairs, Interactive monitoring networks map; Available at: https://uk-air.defra.gov.uk/interactive-map?network=aurn [Accessed February 2021].

[51] LondonAir, LAQN Monitoring Sites; Available at: http://www.londonair.org.uk/london/asp/publicdetails.asp

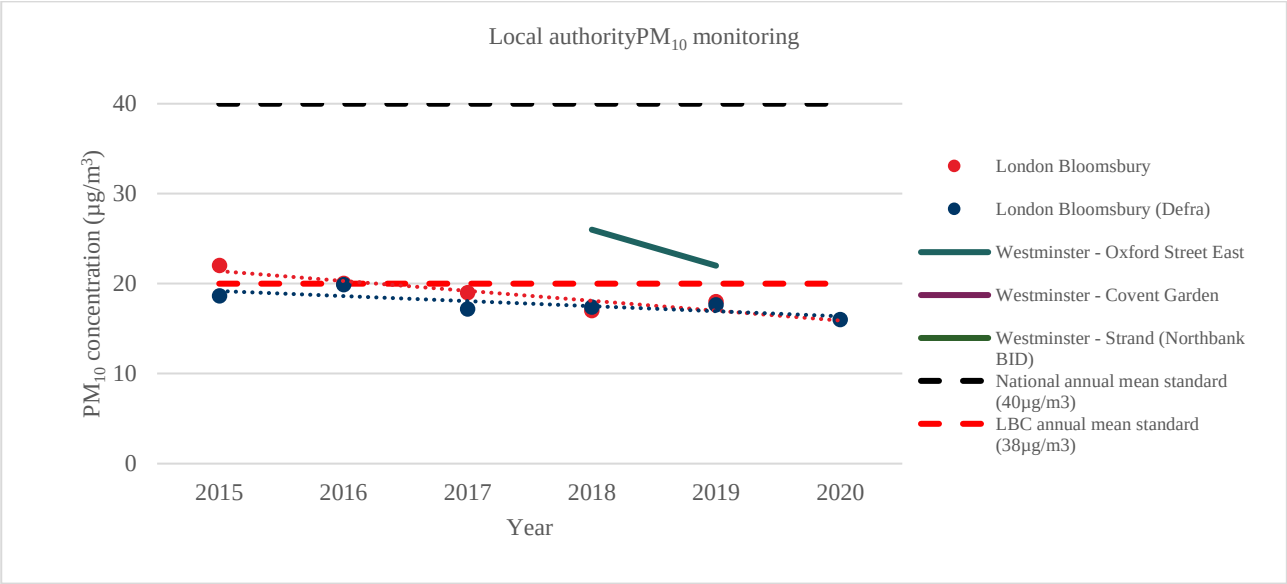
Figure 14: Local authority NO_2 monitoring within 1km of the site boundary



There is an overall decreasing trend seen in the PM_{10} monitoring in the past six years although there is a plateau/slight increase seen since 2017. From 2015 to 2019 all three sites monitored concentrations well below the annual mean PM_{10} standard (40µg/m^3). Camden's adopted annual mean PM_{10} standard (20µg/m^3) however is exceeded in 2015 for London Bloomsbury and for both years of data (2018 and 2019) for Oxford Street East. For Oxford Street East there are only two years of data, so this cannot be used to determine a trend but is included in the figure to provide the data.

The three monitoring locations measuring PM_{10} concentrations (London Bloomsbury, Oxford Street East and London Bloomsbury (Defra)) measured concentrations of 18.0µg/m^3, 24.0µg/m^3 and 17.6µg/m^3 respectively in 2019. These are all below the annual mean PM_{10} standard (40µg/m^3). However, the measurements at the Oxford Street East site were above the more stringent Council annual mean PM_{10} standard of 20µg/m^3.

Figure 15: Local authority PM_{10} monitoring within 1km of the site boundary



There is no defined trend seen in the $PM_{2.5}$ monitoring in the past six years. From 2015 to 2019 both sites within 1km of the site boundary monitored concentrations well below the annual mean $PM_{2.5}$ standard (20µg/m^3). All sites across from 2015 to 2020 monitored concentrations greater than the Council's more stringent annual mean standard of 10µg/m^3, except for Defra London Bloomsbury measuring 9.3µg/m^3 in 2020. Additionally, the Environment Act 2021[1] have set a target for a maximum concentration of 10µg/m^3 to be met across England by 2040 for $PM_{2.5}$. As previously mentioned, data for 2020 is presented in the graphs but not deemed a representative year of monitoring due to the pandemic.

The two monitoring locations at London Bloomsbury established by Camden and Defra measured concentrations of 11.0µg/m^3 and 10.8µg/m^3 respectively in 2019. These are all below the annual mean $PM_{2.5}$ standard (20µg/m^3), but above the Council's annual mean standard (10µg/m^3).

Figure 16: Local authority $PM_{2.5}$ monitoring within 1km of the site boundary

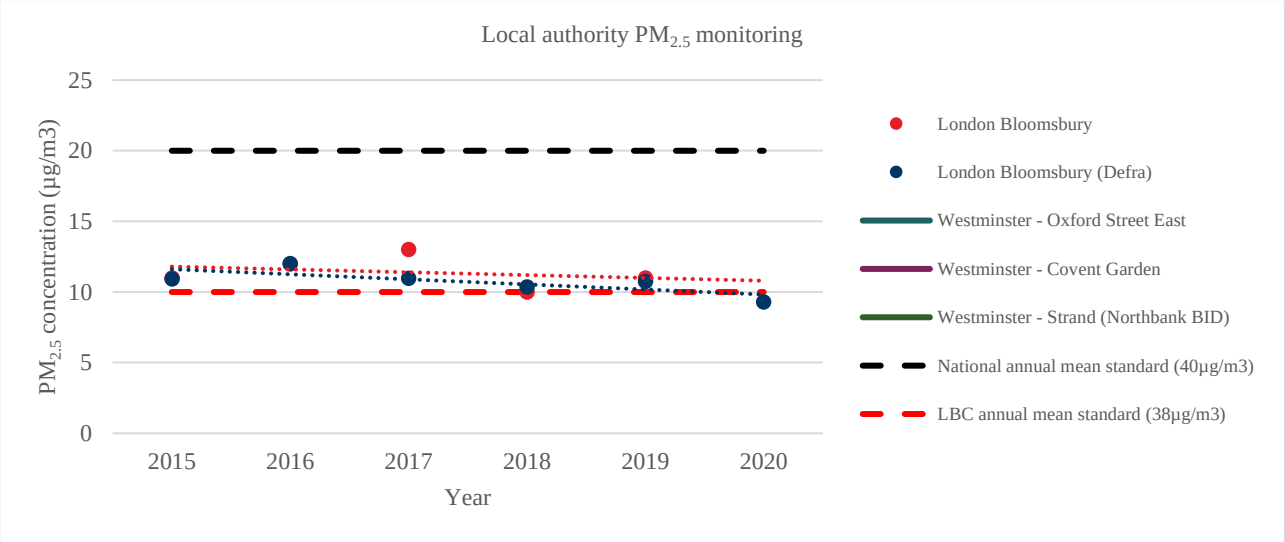
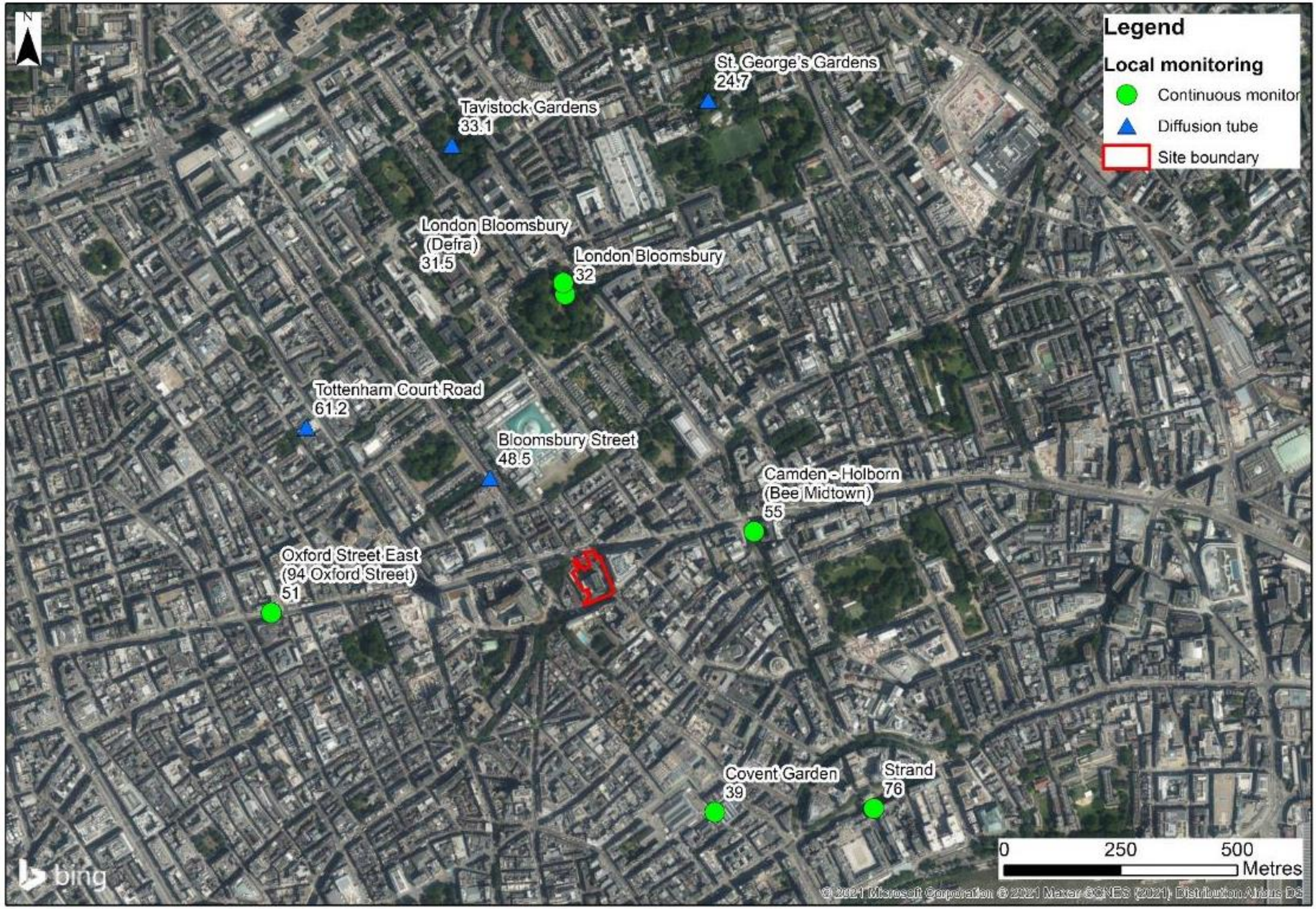


Figure 17 Local authority monitoring and 2019 NO_2 concentrations within 1km of the site boundary



4.4 Background Concentrations

4.4.1 Defra background concentrations

Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes. Defra has produced estimates of background air pollution concentrations (NO_x, NO_2, PM_{10} and $PM_{2.5}$) for each 1x1km OS grid square for each local authority area[52]. Background maps are available for 2018 and projected through to 2030.

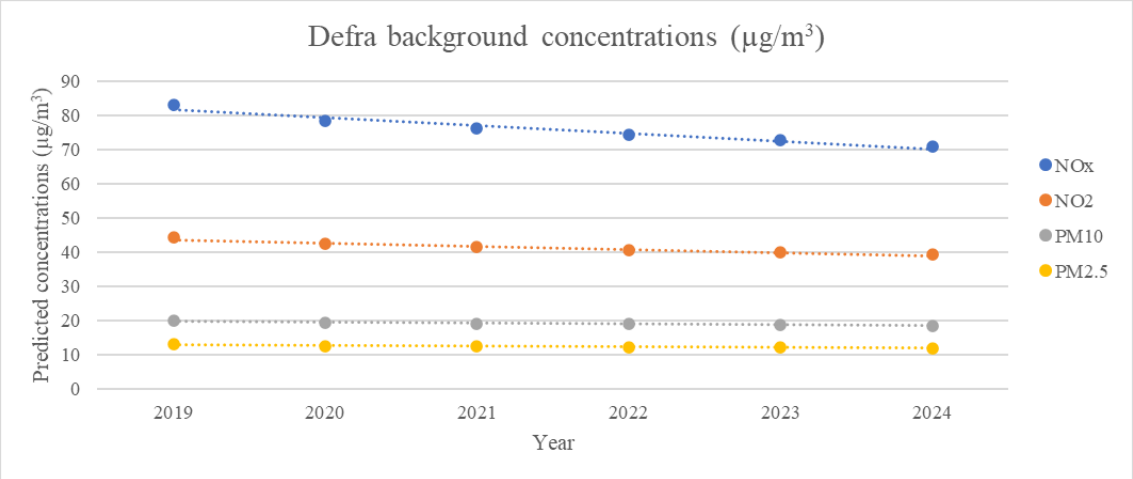
Background pollutant concentrations for the baseline year of 2019 and the current year of 2022 (as a conservative assessment for the opening year of 2024) have been obtained for the grid square in which the site is located (530500, 181500) and are shown in Table 6. It can be observed that the annual mean background concentrations for 2019 are above both the national and the Council's NO_2 air quality standards, below the national PM_{10} and $PM_{2.5}$ standards but above the Council's $PM_{2.5}$ standard. For the operational year (2022) NO_2 and $PM_{2.5}$ still exceed the Council's annual mean standards.

Table 6: Defra background pollutant concentrations in 2019 and 2022

Year	OS grid square		Annual mean concentrations (µg/m³)			
	X	Y	NO_x	NO_2	PM_{10}	$PM_{2.5}$
2019	530500	181500	83.1	**44.2**	19.9	**12.9**
2022			74.2	**40.6**	18.9	**12.2**
National annual mean standard			-	40	40	20
LBC annual mean standard			-	38	20	10
Notes: Exceedances of the annual mean standard are denoted in **bold**						

Table 6 presents the trend in predicted Defra background concentrations in the grid square in which the site is located. It can be observed that background pollutant concentrations are anticipated to reduce year on year. However, in 2024 background pollutant concentrations are still anticipated to be close to or over the more stringent Council's annual mean standards.

Figure 18: Defra background pollutant concentrations from 2019 to 2024 for NO_x, NO_2, PM_{10} and $PM_{2.5}$ (µg/m³)



A comparison against monitoring background concentrations has also been undertaken for the five urban background sites within 1km of the Site (London Bloomsbury, St George's Gardens, Tavistock Gardens and

[52] Defra, UK AIR, Air Information Resource, Available at: https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2018 [Accessed February 2021].

Covent Garden). The comparison has been undertaken for the latest year of available monitoring data (2019). Table 7 presents the comparison of the monitored NO_2, PM_{10} and $PM_{2.5}$ (where available) in 2019 against the Defra backgrounds for the same year.

Table 7: Comparison between Defra and monitored urban background concentrations in 2019

Pollutant	Estimated Defra background concentration (µg/m^3)	Measured concentration (µg/m^3)	Difference between measured and monitored (µg/m^3) and %	
London Bloomsbury (530119, 182039)				
NO_2	39.3	31.5	7.8	24.6%
PM_{10}	20.3	17.6	2.7	15.6%
$PM_{2.5}$	12.9	10.8	2.1	19.6%
St George's Gardens (530430, 182430)				
NO_2	39.3	24.7	15	58.9%
Tavistock Gardens (529880, 182334)				
NO_2	39.6	33.1	6.5	19.5%
Covent Garden (530444, 180903)				
NO_2	43.3	39.0	4.3	11.0%

It can be observed that the monitored 2019 background concentrations are lower than the Defra background maps for all sites and pollutants. As such, Defra background concentrations have been used to provide a conservative assessment.

4.4.2 London Atmospheric Emissions Inventory (LAEI)

The London Atmospheric Emissions Inventory (LAEI)[53] provides emissions estimates of key pollutants by source type with the current base year of 2019. Concentrations of NO_2, NO_x, PM_{10} and $PM_{2.5}$ for OS grid squares with a resolution of 20m by 20m are estimated. These concentrations include the impact of transport, industrial and domestic sources and other emissions sources in London and are therefore 'total' rather than 'background' concentrations. The LAEI data (including major roads) for the area surrounding the site boundary is shown in Figure 19.

The majority of the site is within the 35-40µg/m^3 concentration band for NO_2 for the LAEI baseline year 2019. The northern and southern ends of the site are within the 55-60µg/m^3 and >60µg/m^3 concentration bands.

Table 8 presents the estimated 2019 LAEI concentrations for three points across the site.

The LAEI data also includes 5-year predictions for 2025 and 2030. The 2025 prediction (a year after the future opening year) is shown in Figure 20. As seen in the figure, the concentrations are predicted to be below the annual mean NO_2 standard at the majority of the site.

[53] Greater London Authority (2019), London Atmospheric Emissions (LAEI); Available at: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2019 [Accessed May 2023].

Table 8: LAEI's estimated 2019 pollutant concentrations

Site location	2016 annual mean concentrations (µg/m^3)			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
Centre (530180, 181400)	68.7	39.2	22.4	14.0
Northern edge (530160, 181460)	143.5	**62.6**	33.5	16.6
Southern edge (530200, 181360)	163.6	**69.1**	32.7	17.6
National annual mean standard	-	40	40	20
LBC annual mean standard	-	38	20	10
Notes: Exceedances of the annual mean standard are denoted in **bold**				

Figure 19: LAEI baseline annual mean NO_2 for the area surrounding the site boundary

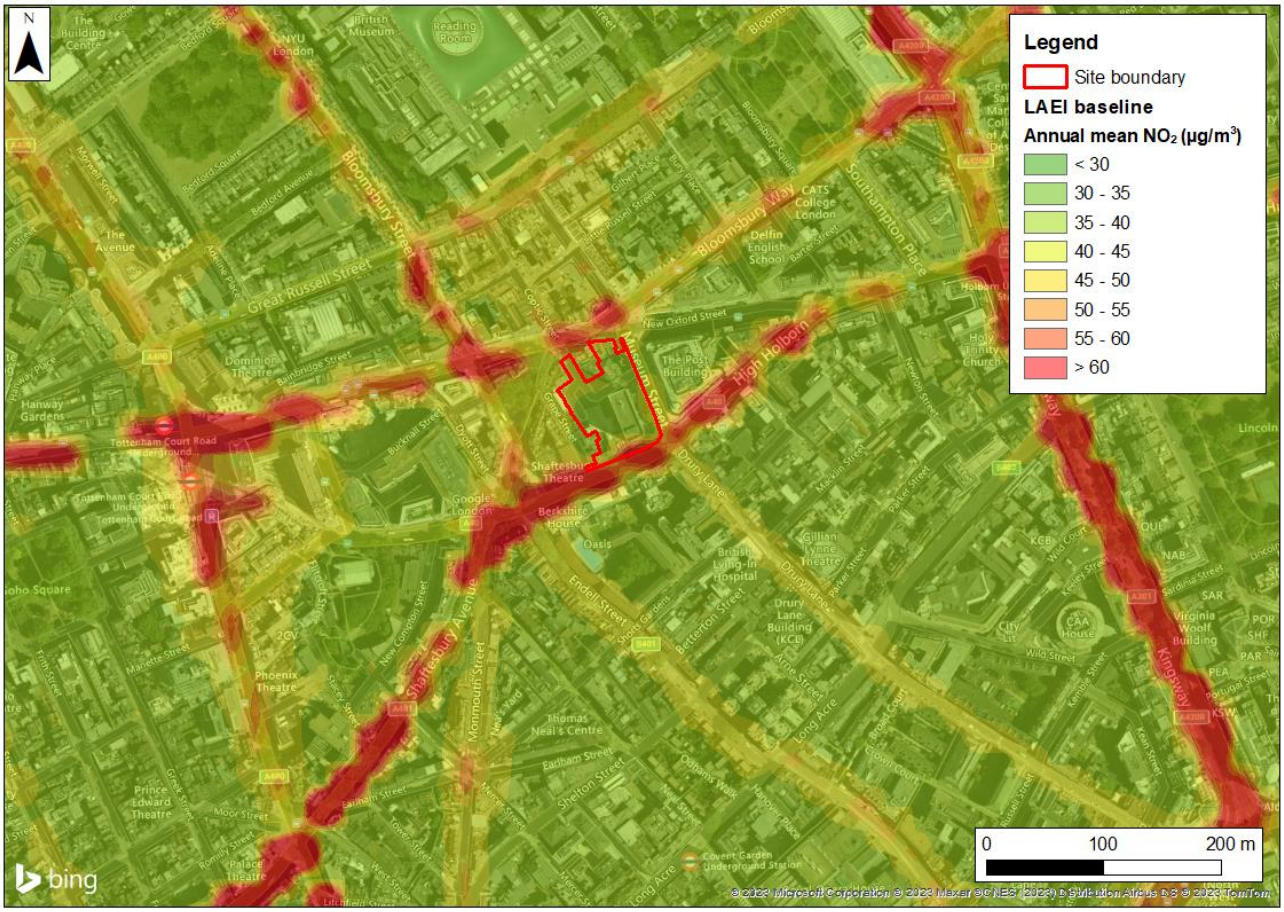
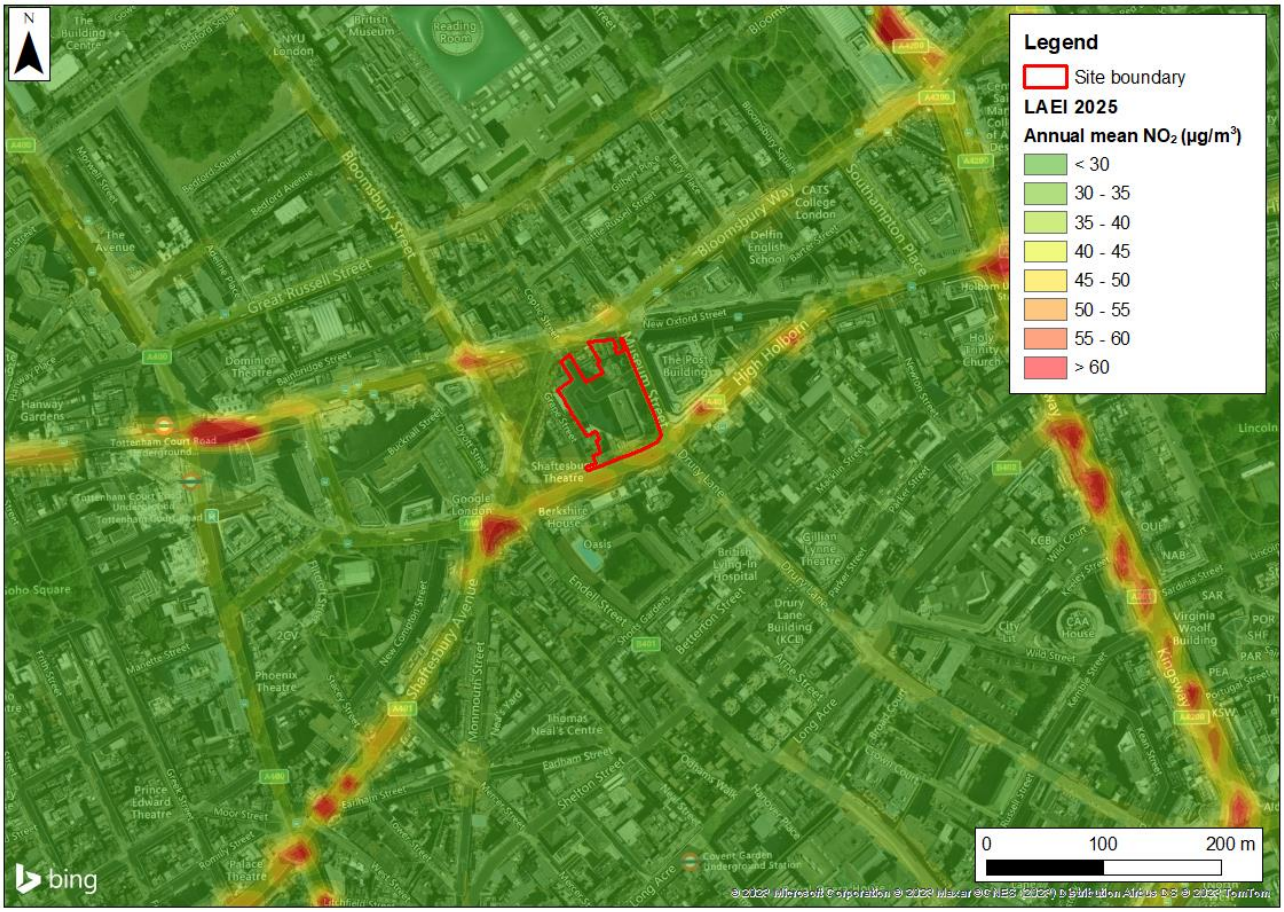


Figure 20: LAEI predicted 2025 annual mean NO_2 for the area surrounding the site boundary



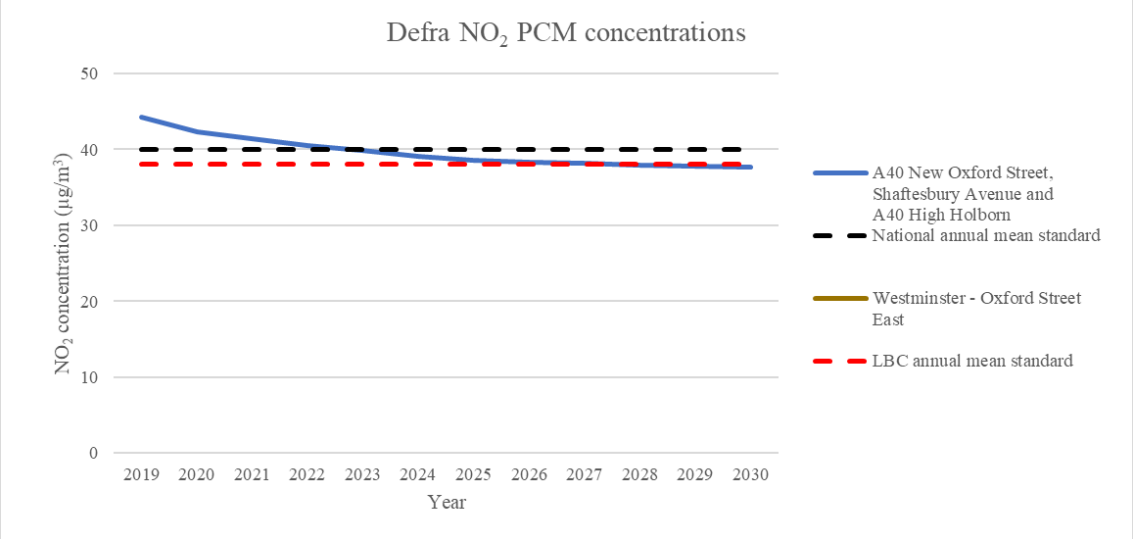
4.5 Pollution Climate Mapping (PCM)

Defra models future year pollution concentrations using the Pollution Climate Mapping (PCM) model in order to report to the European Union (EU) on compliance with the EU air quality limit values. For compliance reporting purposes the UK was divided into 43 zones and agglomerations.

Three of the roads surrounding the site (A40 New Oxford Street, Shaftesbury Avenue and A40 High Holborn) are included in the report on compliance against the air quality standards to the EU. Therefore, the site has the potential to impacts these three PCM links in the 'Greater London' agglomeration.

The current PCM model results have concentrations predicted up to 2030, with a reference year of 2018[54,55]. As seen in Figure 21, NO_2 concentrations are currently above the annual mean standard of 40µg/m^3 on the A40 New Oxford Street, Shaftesbury Avenue and the A40 High Holborn, none of the PCM links around the site are predicted to exceed the NO_2 annual mean standard 40µg/m^3 in the future opening year (2024). Defra predicts that these roads will be in compliance (just under the 40µg/m^3) in 2023 and that concentrations will reduce further year on year.

Figure 21: Defra PCM concentrations from 2019 to 2030

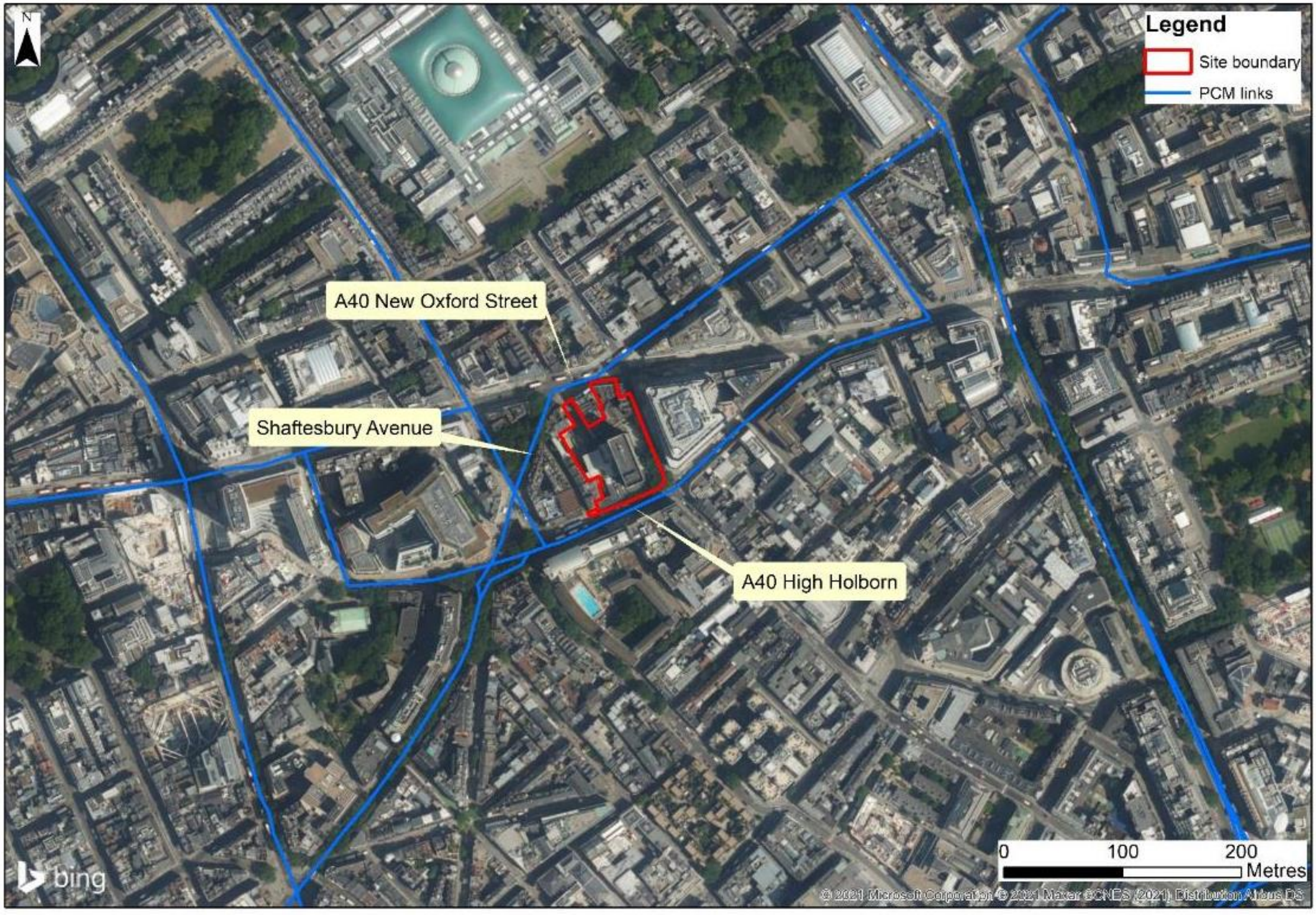


The location of PCM links with the potential to be affected by the proposed development are presented in Figure 22.

[54] Department for Environment Food & Rural Affairs (2017), Air quality plan for nitrogen dioxide (NO_2) in the UK

[55] Department for Environment Food & Rural Affairs (2017), Air Quality Plan for tackling roadside nitrogen dioxide concentrations in Greater London Urban Area (UK0001)

Figure 22 PCM links surrounding the site boundary



4.6 Summary of Baseline Conditions

The air quality concentrations currently at the site are close to or exceeding the Council's annual mean standards for all pollutants of interest (NO_2, PM_{10}, $PM_{2.5}$). The site is located in the Camden AQMA which has been declared for exceedances in the annual mean NO_2 and daily mean PM_{10} standards.

Pollutant concentrations are expected to decrease with height however due to the high-rise buildings surrounding the site there may be a street canyon effect which would predict higher concentrations than those seen at the same height from the local monitoring data.

Air quality is anticipated to improve in future years across the UK and around the area of the site due to policy implementation and electrification of the fleet. Improvement in traffic emissions is also expected through the introduction of two-way flow on roads around the site (A40 High Holborn) and the redevelopment of the multi-storey car park currently occupying the site location.

Even though air quality is anticipated to improve in future years, pollutant concentrations are likely to exceed Camden's more stringent standards in the opening year (2024).

5. Construction Phase

5.1 Construction Dust Assessment

The IAQM[34] and GLA[16] guidance consider four dust-generating activities: demolition, earthworks, construction and trackout. The site covers an area of approximately 0.53 hectares.

5.1.1 Sensitive Receptors

Sensitive receptors are defined as those properties/schools/hospitals that are likely to experience a change in pollutant concentrations and/or dust nuisance due to the construction of the proposed development.

There are between 10 to 100 sensitive receptors within 20m of the site. These include residential properties and flats located on the surrounding roads (e.g. Grape Street). Residential properties are considered 'high sensitivity receptors' by the IAQM guidance.

St Joseph's Primary School is located approximately 170m south-east of the proposed development.

There are no sensitive ecological sites sensitive within 50m of the site; therefore, this element of the assessment has not been considered further.

Figure 23 displays the construction dust buffers around the site. Trackout may also occur along the public highway, however as the construction traffic routes are not yet known, trackout buffers have not been considered for construction traffic routes, only for the redline boundary.

5.1.2 Dust Emission Magnitude

Each dust generating activity has been assigned a dust emission magnitude as shown in Table 9.

Table 9: Dust emission magnitude for dust generating activities

Activity	Dust emission magnitude	Reasoning
Demolition	Large	Demolition of the existing buildings assumed to be greater than 50,000m^3; Potentially dusty material of existing building to be demolished (e.g, concrete, brick/block); and On-site crushing and screening of material anticipated as preferred solution to avoid removal of spoil for reimportation.
Earthworks	Medium	Total volume of material to be moved assumed to be less than 20,000 tonnes; Number of heavy earth-moving vehicles active at any one time estimated to be between 5 and 10; and No bunds will be created.
Construction	Large	Assumed total building volume greater than 100,000m^3; All activities assumed to be undertaken with dust suppression through direct water or water mist systems.; No on-site concrete batching; and Dusty nature of construction material (e.g. concrete, brick/block).
Trackout	Medium	Assumed between 10 and 50 heavy duty vehicle (HDV) movements in any one day; Length of unpaved roads on the site assumed to be less than 50m; and HDVs will access the site from a left hand turn from Museum Street coming from the south.

5.1.3 Sensitivity of Area

The sensitivity of the area to dust soiling has been assigned as **high**, due to the presence of sensitive receptors within 20m of the site.

The criterion for background PM_{10} concentrations in the IAQM guidance is 24µg/m^3 (shown in Appendix E). The estimated Defra PM_{10} background concentration is 19.9µg/m^3 for 2019 and 19.3µg/m^3 for 2020. The sensitivity of the area to human health impacts has therefore been assigned as **low**.

5.1.4 Risk of Impacts

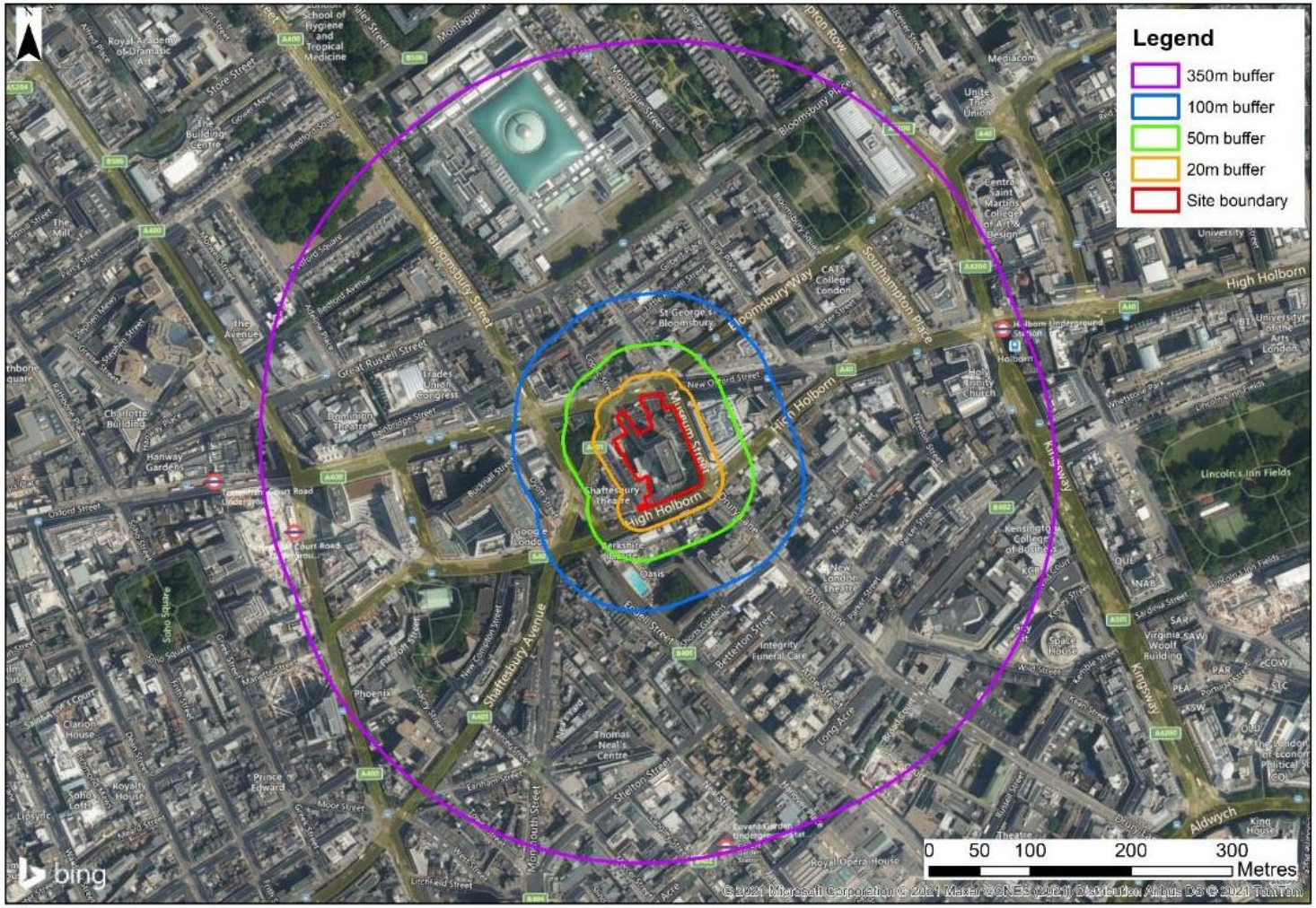
Due to the lack of detailed construction information at the time of writing a conservative approach has been undertaken with high level assumptions presented in Table 9. Taking into consideration the dust emission magnitude and the sensitivity of the area, the risk of dust impacts due to the site has been determined, as outlined in Table 10. This shows that the site has been classified as **high risk** to dust soiling and **medium risk** to human health at worst prior to the implementation of mitigation measures.

The dust emitted by the activities discussed can be greatly reduced or eliminated by applying the site-specific mitigation measures for **high risk** sites according to the IAQM guidance (Section 9.1).

Table 10: Summary dust risk table prior to mitigation

Activity	Dust soiling	Human health
Demolition	High risk	Medium risk
Earthworks	Medium risk	Low risk
Construction	High risk	Low risk
Trackout	Medium risk	Low risk

Figure 23: Construction dust buffers



6. Operational Phase

6.1.1 Model Verification

Model verification used the Council NO_2 monitoring data from the diffusion tube at site CA21 and WCC continuous monitoring station CM7, which are monitoring sites on the modelled road network. The locations of these monitoring sites are shown in Figure 14.

Other monitoring sites were not included in the model verification as they were not located on the modelled road network, or, in the case of monitoring site CA11, were considered to be unsuitable for model verification.

Although CA11 is located on the modelled road network, it was excluded from model verification because it is a kerbside monitoring site, which are generally not recommended for adjustment of road traffic modelling results as they may lead to an over-adjustment according the LAQM.TG22[36]. CA11 is also located adjacent to a HGV loading bay, however no data is available for these vehicle movements and therefore an accurate representation of the emissions at this site cannot be determined using the data available.

Monitoring results for these locations for 2019 were obtained from the 2021 Council ASR[33] (the most recent available year of data) and were compared with modelled concentrations at the same locations. The model verification was undertaken following the methodology described in LAQM.TG22[36].

A comparison of monitored and modelled annual mean NO_2 concentrations for 2019 before and after adjustment are shown in Table 11. The percentage difference between the monitored and modelled results before adjustment is -6.5% and -14.6%, which are within the recommended guideline stated in LAQM.TG22[36] of ±25%.

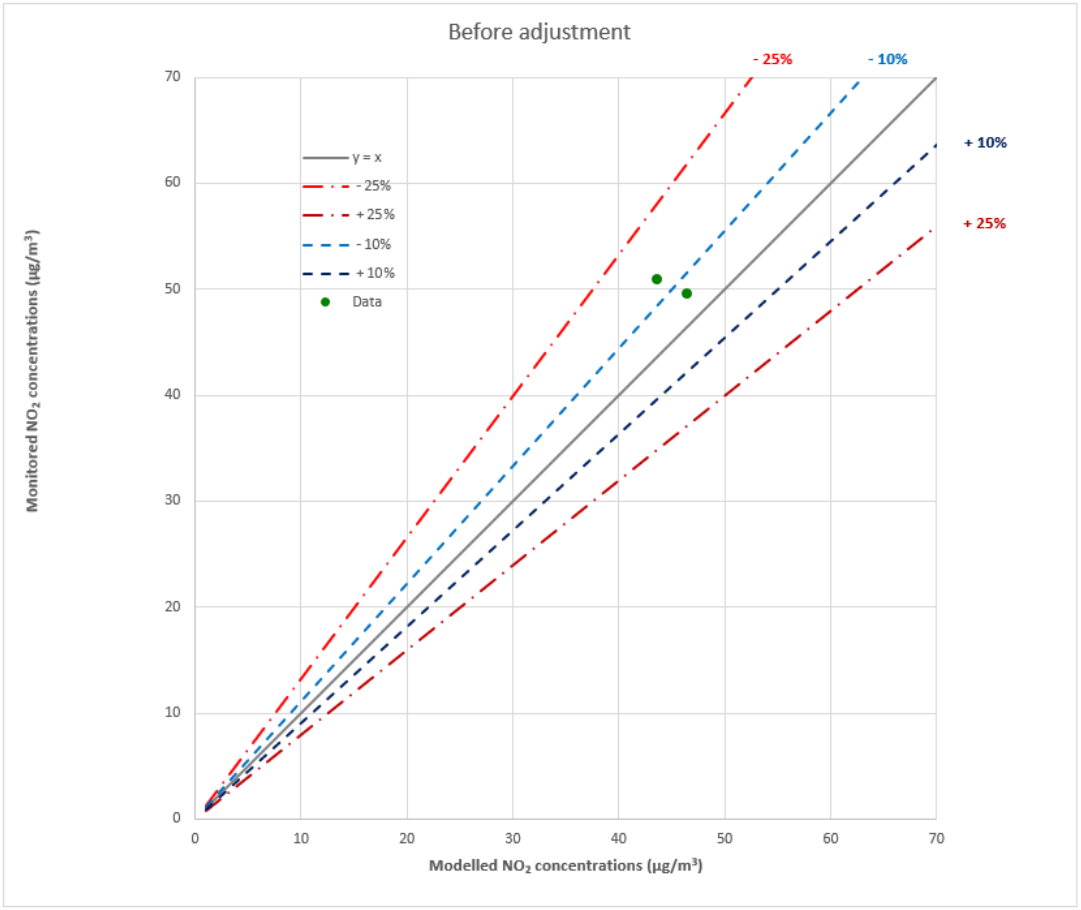
The model slightly under-predicted concentrations at the two verification sites, although both sites were within ±25%. However, as both verification sites were underpredicting concentrations, an adjustment factor was calculated and applied to results as a conservative approach. An adjustment factor of 2.1 has been calculated and applied to all modelled NO_x concentrations (which increases the resulting NO_2 concentrations).

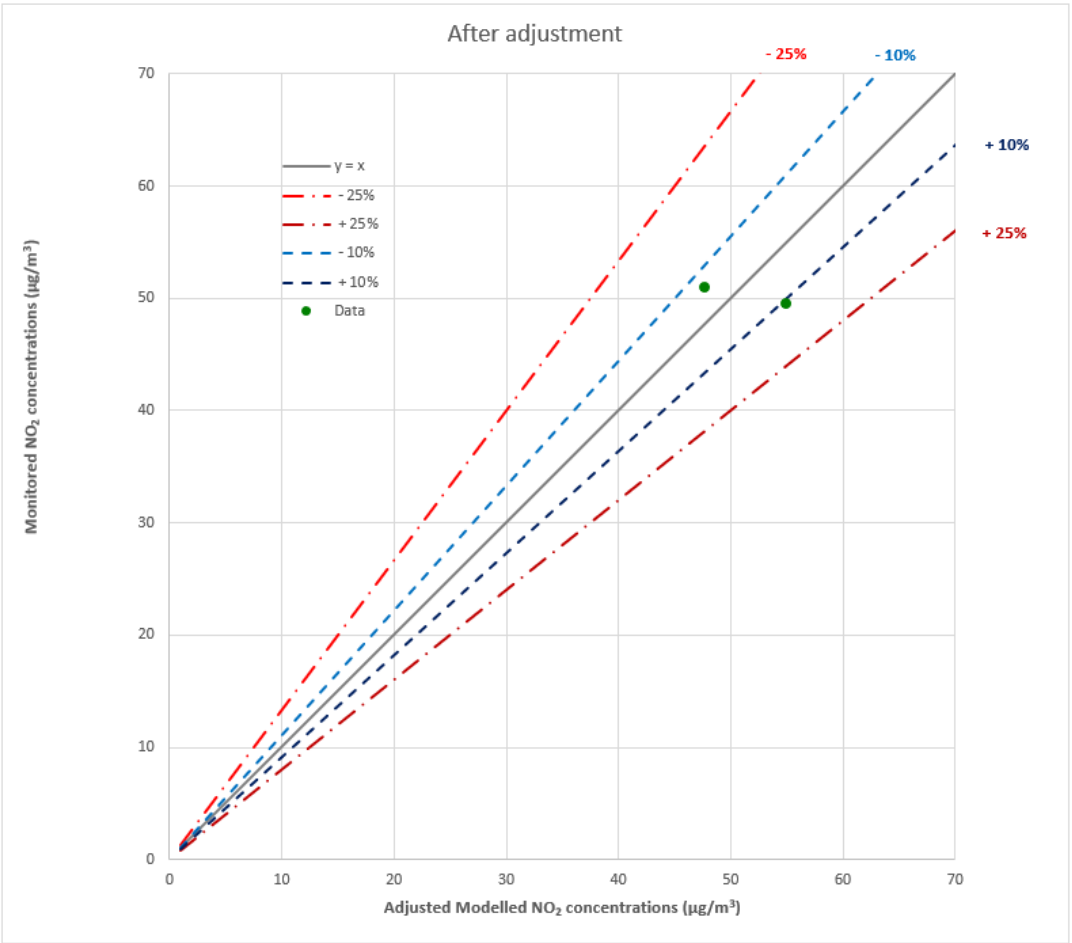
Graphs showing the model verification before and after adjustment are shown below in Figure 24.

Table 11: Comparison of modelled and monitored annual mean NO_2 concentrations

Site ID	Site type	Background NO_2 concentration (µg/m^3)	Monitored NO_2 concentration (µg/m^3)	Modelled NO_2 concentration (µg/m^3)	% Difference (modelled - monitored)/ monitored
Before adjustment					
CM7	Roadside	41.2	51.0	43.6	-14.6%
CA21		41.2	49.6	46.4	-6.5%
After adjustment					
CM7	Roadside	41.2	51.0	47.7	-6.5%
CA21		41.2	49.6	54.9	10.7%

Figure 24: Model verification graphs for before and after adjustment





6.1.2 Predicted Impacts

The impact of the operational traffic associated with the proposed development on sensitive receptors was predicted to be negligible for all assessed pollutants.

Exceedances were predicted at the receptor locations for annual mean NO_2, for each of the three scenarios assessed, including the baseline scenario. It should be noted that the Defra background NO_2 concentrations used in this assessment exceed the air quality objective for receptors 4 to 26 and are close to exceeding for receptors 1 to 3.

Predicted concentrations of $PM_{2.5}$ are above the Council's standard. As with NO_2, it should be noted that the background concentrations are already exceeding this standard for all receptors.

No exceedances were predicted for PM_{10} as concentrations are below the national and the Council's air quality standards at all receptors in all three scenarios.

The predicted annual mean concentrations for all three scenarios (Baseline, DM and DS) at each receptor are presented in Appendix G for all pollutants. The change in concentrations and the resulting impact descriptor following the EPUK/IAQM guidance[35] are also presented in this appendix.

6.1.2.1 NO_2 Results

Predicted concentrations are above the Council annual mean air quality objective (38µg/m^3) at all sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor 16 (a future residential receptor at 1.5m high) and was 45.4µg/m^3 in the DM and DS scenarios (to one decimal place). The predicted concentrations decrease with height and are always highest at ground level.

The greatest change in predicted concentrations was found at receptor 16 and was an increase in annual mean NO_2 of 0.04µg/m^3 (to two decimal places).

The magnitude of change in predicted annual mean NO_2 concentrations at all receptor locations is considered to be negligible.

6.1.2.2 PM_{10} Results

Predicted concentrations are below the annual mean air quality objective (20µg/m^3) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptors 1 (an existing ground floor (1.5m high) residential receptor) and 16 (a future residential receptor at 1.5m high) and was 19.5µg/m^3 in the DM and DS scenarios (to one decimal place).

The greatest change in predicted concentrations was found at receptors 16, 22, 24, 28 and 30 and was an increase in annual mean PM_{10} of 0.01µg/m^3 (to two decimal places).

The magnitude of change to annual mean PM_{10} concentrations at all receptor locations is considered to be negligible.

6.1.2.3 $PM_{2.5}$ Results

Predicted concentrations are above the annual mean air quality objective (10µg/m^3) at all of the sensitive receptor locations for each modelled scenario. The highest concentration was predicted at receptor 1 (an existing ground floor (1.5m high) residential receptor) and was 12.7µg/m^3 in the DM and DS scenarios (to one decimal place).

The greatest change in predicted concentrations was found at receptors 5, 18 and 23 and was an increase in annual mean $PM_{2.5}$ of 0.01µg/m^3 (to two decimal places).

The magnitude of change to annual mean $PM_{2.5}$ concentrations at all receptor locations is considered to be negligible, according to EPUK/IAQM guidance[35].

6.1.3 Assessment of Significance

The effect of the operational traffic associated with the proposed development on these receptors is considered to be not significant, as a negligible impact was predicted at all assessed existing and future receptors for all pollutants.

6.2 Cumulative Impacts

According to the Camden air quality proforma[29], cumulative impacts must be considered for the proposed development as there is another development within 100m[56], which is at Enterprise House 190 High Holborn approximately 95m south-west. This is for a change to an existing application for a change of use from office use class (B1) to educational use class (D1).

In terms of the construction phase, it is not considered that there would be cumulative air quality impacts resulting from the two schemes, since the proposed development already includes high risk construction dust mitigation measures and the other planning application is a change of land class use. Any construction works would adhere to best practice measures set out in the relevant construction environmental management plan and therefore no cumulative construction dust effects would be anticipated.

For the operational phase, it should be noted that there is a general trend of decreasing traffic volumes in Central London over recent years. The site is located in Central London and is highly accessible by public transport (it has the highest possible Public Transport Accessibility Level of 6b). London Plan policy requires new developments in the area to have no general car parking – this applies to the proposed development which will be car-free. Data in TfL's latest Travel in London Report (15)[57] for road traffic volumes in different areas of London show significant reductions in traffic volumes in Central London over the last 15 years (Figure 25). This was occurring prior to the Covid-19 pandemic in 2020/21, with traffic being around 25% lower in 2020/21 than in 2008/09. Following the Covid-19 pandemic, traffic volumes in Central London have also reduced significantly, with traffic volumes being around 15% in 2022/23 than in 2020/21. The clear trend of reductions in traffic in Central London over the last 15 years is likely to be owing to a number of reasons including the implementation of the Congestion Charge zone, the more recent implementation of the Low and Ultra-Low Emissions Zones, planning policy requiring car-free developments, significant walking / cycling / public transport improvements (including the West End Project local to the site) as well as changing travel patterns in recent years following the Covid-19 pandemic.

The approach taken in the air quality assessment to not include background growth in vehicles or committed developments is considered to be appropriate and reflective of the long-term trend of reduced vehicle trips / traffic volumes in Central London over the last 15 years.

There is currently no information available as to whether the other site also has backup generators, but it is considered that they would be tested at the same time.

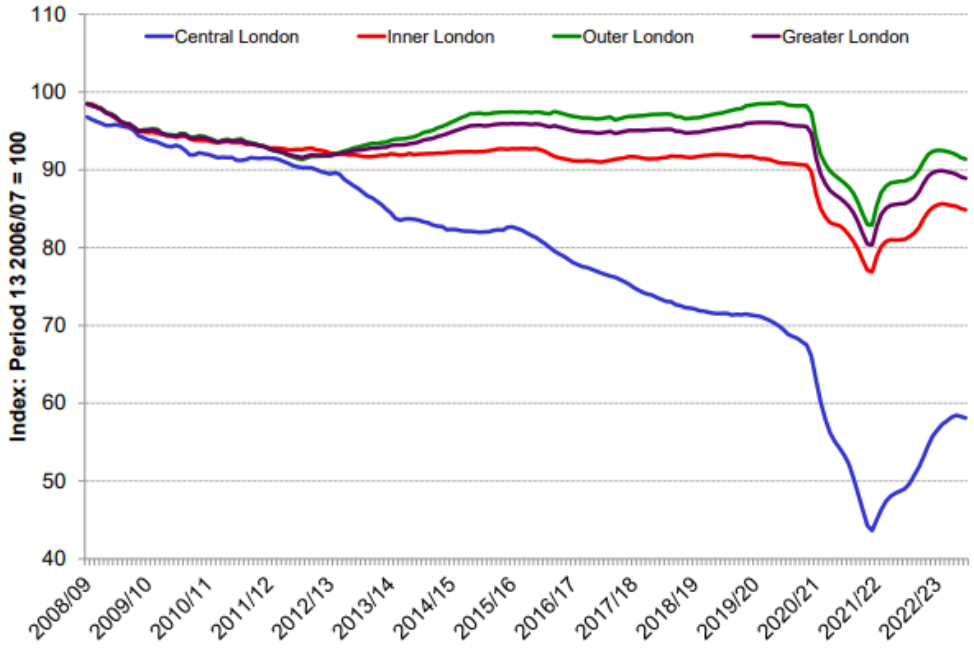
As such, it is not considered that there would be cumulative impacts and no additional mitigation measures are considered necessary.

[56] LBC. Available at: https://ssa.camden.gov.uk/connect/analyst/mobile/#/main?mapcfg=%2FMapProjects%2FCamdenPlanningConstraints [Accessed: May 2023]

[57] TfL, 2022. Travel in London report 15. Available at: https://content.tfl.gov.uk/travel-in-london-report-15.pdf [Accessed May 2023]

Figure 25: Figure 6.2 taken from the Travel in London report 15 showing traffic flow trends in London[57]

Figure 6.2 Traffic flows by area, all motor vehicles, 13-period moving average, 2008/09-2022/23.



Source: TfL traffic data.

7. Air Quality Neutral Assessment

7.1 Building Emissions

The proposed development does not include any combustion plant that would be in regular use. The building includes air source heat pumps with no combustion emissions to the atmosphere. The only combustion plant that is present in the proposed development are the generators (one on Grape Street and one of West Central Street), which are for back-up emergency use only. Emissions from back-up generators are not included in an air quality neutral assessment and are therefore excluded.

There are no other building emissions to consider and no assessment of building emissions is required in accordance with the Air Quality Neutral London Planning Guidance.

7.2 Transport Emissions

In order to assess the proposals against the 'air quality neutral' policy, the Total Transport Emissions (TTEs) and the TEBs for the proposed development have been calculated. These have been calculated for the land use classes in the proposed development (Class A1, A3, B1 and C3). A comparison has then been undertaken to derive the outcome of the assessment and establish whether the TTEs of the proposed development are within the benchmarks, or, if not, whether on/off site mitigation measures or offsetting may be required.

The GIA has been used to calculate the development trip rates. This is considered to be a conservative approach as the GIA is likely to be smaller than the GFA, as recommended to be used in the GLA SPG.

Information on GIA and development trip rates were provided by the Arup transport consultants for the main land-uses of the site.

Table 12: Input data to the Air Quality Neutral assessment

Land use	GIA (m^2)	Development trip rate (trips/annum)
Residential	48	38
Offices	25,824	1 (no decimal places)
Retail	1,676	5
	Total	43 (to 0 decimal places)

Transport Emission Benchmark (TEB)

The TEB has been calculated using the GIA and the relevant benchmarks from the guidance and the calculated benchmark are presented in Table 13.

Table 13: TEB of the Proposed Development

Land-use	GIA (m^2)	Benchmark trip rate (trips/m^2/annum)	Total benchmark trip rate (trips/annum)
Residential	48	68	3,264
Offices	25,824	2	51,648
Retail	1,676	18	30,168
		Total	85,080

7.2.1 Results and Summary

A comparison between the development trips and the TEB presented in Table 14 shows that the number of development trips are below the total benchmark trips. Therefore, the proposed development is considered to be air quality neutral and does not require mitigation.

Table 14: Comparison of development trips and TEB (trips/annum)

Development trips (total)	Benchmark trips (per annum) rate	Difference (benchmark trip rate – development trip rate)
43	85,080	85,037

It can be observed that the proposed development emissions and trip rates are below the relevant benchmarks for all land-use classes. Therefore, it is considered that the proposed development complies with the 'air quality neutral' criteria.

7.3 Summary

The only combustion plant that is present in the proposed development are the two back-up emergency use only generators. Back-up generators are excluded from consideration and no building emissions require assessment.

The annual emissions calculated from the predicted traffic movements are below the benchmarks and therefore, the proposed development is considered to be 'air quality neutral'.

8. Air Quality Positive Statement

The AQP statement has been prepared following the structure below, in line with the Air Quality Positive Guidance[21] as outlined in Section 3.5.

According to the London Plan[14] a development should "*…consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach*". The proposed development is car-free (replacing a 196 space Multi Storey Car Park) and promotes active travel through the inclusion of cycle parking provision (in accordance with the London Plan Cycle Parking Standards[14]) in the basement. In addition, the proposed development will use high efficiency air source heat pumps rather than more polluting combustion plant. The two standby generators are for emergency and life saving purposes only, with their use kept to a minimum.

8.1 Introduction

The planning description of the proposed development can be found in Section 1. Air quality positive measures have been discussed with the transport team, and a number of measures are detailed further in the Transport Assessment for the proposed development.

8.2 Constraints and Opportunities

The Proposed Development is in close proximity to the heavily trafficked A40 New Oxford Street and A40 High Holborn north and south respectively, this is the main constraint as they are the main source of emissions in the vicinity of the Proposed Development.

The main impact of the West End project on the site resulted in the recent change at A40 High Holborn from one-way westbound traffic to two-way traffic flow. It is anticipated that the traffic flow along this route will decrease due to this change as strategic traffic is rerouted to more major routes. However, there is no traffic data available at present to determine what the air quality impacts will be.

The Proposed Development is also located within the borough-wide Camden AQMA.

The constraints and opportunities information can be found in the documents as part of this planning application, summarised in Table 15.

Table 15: Constraints and opportunities for the Proposed Development.

Constraints and opportunities	Documents as part of the planning application
Statutory designations (AQMA)	Air Quality Assessment
There are sensitive human receptors within the vicinity of the site.	
Major off-site sources of air pollution such as traffic emissions	
Improvements to pedestrian access and improved cycle parking facilities	Design Access Statement (DAS)

8.3 Measures Adopted

The AQP measures are outlined below in Table 16.

8.4 Implementation and Monitoring

The means of implementing the above measures are outlined below in Table 17, in addition to any requirements for monitoring.

Table 16: Mitigation Matrix for the Proposed Development

Measure	Summary of the measure	Reasons for undertaking measure	Expected benefits	Assessment and reporting			How will this measure be secured
				Method	Quantitative	Qualitative	
Better design and reducing exposure							
Best practice construction mitigation measures relating to dust.	Best practice controls will be put in place to mitigate demolition and construction dust.	Reducing exposure of demolition and construction phase dust to existing and future residents.	Negligible effects from demolition and construction dust.	Dust assessment in the air quality assessment.	No	Yes	Agreed through the Construction Environmental Management Plan (CEMP).
Best practice construction mitigation measures relating to emissions.	The construction logistics will be designed to reduce exposure for existing residents nearby and to reduce exposure for the workforce. NRMM will meet and where possible exceed the GLA requirements. Euro IV HGVs will be used.	Reducing emissions from the construction phase.	Reduced emissions from the construction phase.	Reported via commitment from contractors.	No	Yes	Agreed through the CEMP.
Building emissions							
Electrically driven heat pumps	No onsite combustion. The building will be fully electric, except for a life safety diesel generator	Reduces emissions to air from boilers or CHP units.	Reduced emissions of NO_x to the local area	Air quality assessment	N	Y	Secured through approved plans
Mechanical Ventilation and Heat Recovery (MVHR) and particulate filtration	All inlets are situated away from sources of pollution as far as is practicable.	Reduce emissions and exposure.	Reduced emissions from ambient sources in the indoor air.	DAS	No	Yes	Secured through approved plans
Encourage the use of green energy suppliers.	Future tenants will be encouraged to use green energy suppliers wherever possible.	Reducing emissions from the operational phase.	Reducing emissions from the operational phase.	As part of occupier engagement and marketing.	No	Yes	Through occupier engagement and marketing.
Transport emissions							

Measure	Summary of the measure	Reasons for undertaking measure	Expected benefits	Assessment and reporting			How will this measure be secured
				Method	Quantitative	Qualitative	
Creation of a new public pedestrian route.	Creation of a new public pedestrian route through the site known as Vine Lane, to improve access and connectivity through the site.	To improve access and connectivity through the site, via non-vehicular modes of transport.	Reduced emissions from the operational phase.	DAS	No	Yes	Secured through agreed plans.
Visitor, office, and resident cycle parking spaces	Provision of 465 cycle parking spaces, including short stay and long stay for office use, visitors and residents.	Reducing emissions from the operational phase.	Reduced emissions from the operational phase.	DAS	Yes	No	Secured through agreed plans.
Short stay cycle contribution	To address the shortfall of short stay cycle parking in the public realm, a financial contribution will be made to the local authority to provide off-site facilities.	Reducing emissions.	Reducing emissions.	DAS	Yes	No	Secured through appropriate planning obligations.
Travel Plan	The travel plan for the proposed development will encourage active travel (walking and cycling) for access to the site.	Reducing emissions from the operational phase.	Reduced emissions from the operational phase.	Travel Plan	Yes	No	Secured through agreed plans.
Car free development	Car free development (with the exception of servicing trips).	Reducing emissions from the operational phase.	Reduced emissions from the operational phase.	Design and Access Statement	Yes	No	Secured through agreed plans.
Timed deliveries	Deliveries will be timed to site to flatten the profile and avoid a distinct time period with peak vehicle movements for servicing. This will also avoid delivery vehicles queuing and idling.	Reducing emissions from the operational phase.	Reducing emissions from the operational phase.	Delivery and Servicing Management Plan	Yes	Yes	Ongoing monitoring of the plan.
No-idling	The facilities management team would be on hand to ensure any delivery vehicles do not idle whilst unloading.	Reducing emissions from the operational phase.	Reducing emissions from the operational phase.	Delivery and Servicing Management Plan	No	Yes	Ongoing monitoring of the plan.
Innovation and future-proofing							
Air pollution alerts	Future tenants will be encouraged to sign up to LondonAir air quality alerts to identify air pollution episodes.	Managing exposure	Allow residents and employees to manage their own	As part of occupier engagement	No	Yes	Through occupier engagement and marketing.

Measure	Summary of the measure	Reasons for undertaking measure	Expected benefits	Assessment and reporting			How will this measure be secured
				Method	Quantitative	Qualitative	
			exposure and bring awareness to air quality.	and marketing.			
Indoor air quality	Building occupier to raise awareness for indoor air quality and encourage the use of low emission materials / products.	Managing exposure and reducing emissions from the operational phase.	Bring awareness to indoor air quality. Reducing emissions from the operational phase.	As part of occupier engagement and marketing.	No	Yes	Through occupier engagement and marketing.
Raise awareness of the Camden Climate Change Alliance	The Camden Climate Change Alliance is a network of hundreds of businesses in Camden working together to tackle air pollution and the climate crisis. Awareness will be raised about this opportunity for future tenants.	Reducing emissions from the operational phase.	Reducing emissions from the operational phase.	As part of occupier engagement and marketing.	No	Yes	Through occupier engagement and marketing.

Table 17: Details of Measures and Responsibility for Securing Measures

Measure	Method of securing measure	Responsibility for implementation	Method of reporting	Provision of details	Monitoring
Better Design and Reducing Exposure					
Best practice demolition and construction – dust mitigation	Agreed through the CEMP.	Contractor.	Reported via updated CEMP and dust management plans.	Plans to be provided prior to commencement of works on-site.	On-site updates and information on local air quality monitoring, where necessary, to be provided to the local authority.
Best practice demolition and construction – Site emissions	Agreed through the CEMP.	Contractor.	Reported via updated CEMP.	Plans to be provided prior to commencement of works on-site.	On-site updates and information on local air quality monitoring, where necessary, to be provided to the local authority.
Building emissions					
Electrically driven heat pumps	Secured through approved plans	Applicant	Detailed design plans	To be agreed at detailed planning application stage.	None required.
MVHR and particulate filtration	Secured through approved plans	Applicant	Detailed design plans	To be agreed at detailed planning application stage.	None required.
Encourage the use of green energy suppliers.	Through occupier engagement and marketing.	Applicant	As part of occupier engagement and marketing.	To be agreed at detailed planning application stage.	None required.
Transport Emissions					
The creation of a new pedestrian access route	Secured through approved plans.	Applicant	Detailed design plans	Plans to be provided for agreement and secured through detailed planning application.	None required.
Visitor, office and resident cycle parking	Secured through approved plans.	Applicant	Transport statement	Number of each cycling parking to be agreed and secured through detailed planning application.	None required.

Measure	Method of securing measure	Responsibility for implementation	Method of reporting	Provision of details	Monitoring
Short stay cycle contribution	Secured through approved plans	Applicant	Design and Access Statement	Plans to be provided prior to commencement of works on-site.	None required.
Travel Plan	Secured through approved plans	Applicant	Travel Plan	Plans to be provided prior to commencement of works on-site.	None required.
Car free development	Secured through approved plans.	Applicant	Detailed design plans	Plans to be provided for agreement and secured through detailed planning application.	None required.
Timed deliveries	Ongoing monitoring of the plan.	Applicant	Delivery and Servicing Management Plan	Details are provided in the Delivery and Servicing Management Plan.	None required.
No-idling	Ongoing monitoring of the plan.	Applicant	Delivery and Servicing Management Plan	Details are provided in the Delivery and Servicing Management Plan.	None required.
Innovation and future-proofing					
Air pollution alerts	Through occupier engagement and marketing.	Applicant	As part of occupier engagement and marketing.	To be agreed at detailed planning application stage.	None required.
Indoor air quality	Through occupier engagement and marketing.	Applicant	As part of occupier engagement and marketing.	To be agreed at detailed planning application stage.	None required.
Raise awareness of the Camden Climate Change Alliance	Through occupier engagement and marketing.	Applicant	As part of occupier engagement and marketing.	To be agreed at detailed planning application stage.	None required.

9. Mitigation

9.1 Construction Phase

The dust-emitting activities assessed in section 5.1 can be greatly reduced or eliminated by applying the site-specific mitigation measures for **high risk** sites according to the IAQM guidance[34]. The GLA construction guidance also contains a number of mitigation measures, which have also been included below. The IAQM guidance notes that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

The following measures from the guidance are relevant and should be included in the Construction Management Plan for the site.

9.1.1 Mitigation for All Sites

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager; and
- Display the head or regional office contact information.

Dust Management

- Develop and implement a Dust Management Plan (DMP), which will include measures to control other emissions, approved by the local authority. In London, additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include monitoring of dust deposition, dust flux, real-time PM_{10} continuous monitoring and/or visual inspections.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- Make the complaints log available to the local authority when asked; and
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site and the action taken to resolve the situation in the log book; and
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

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 window sills within 100m of site boundary, with cleaning to be provided if necessary;
- Carry out regular site inspections to monitor compliance with the DMP, record inspection results and make an inspection log available to the local authority, when asked;

- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions; and
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the local authority.

Site Maintenance

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards;
- Ensure all vehicles switch off engines when stationary – no idling vehicles;
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph 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);
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

- Cutting, grinding or sawing should be avoided by using pre-fabricated materials wherever possible. Where necessary to use on site, equipment fitted or in conjunction with suitable dust suppression techniques, such as water sprays or local extraction;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use the fine water sprays on such equipment wherever appropriate; and
- 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; and

- Avoid bonfires and burning of waste materials.

9.1.2 Measures Specific to Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground;
- Mobile crushing plants are inherently dusty so the following measures should be undertaken if used on site:
- Notify the local authority if a crusher is to be used;
- Keep a copy of the permit on-site and adhere to the imposed conditions;
- Use best available techniques within the Process Guidance Note PG 3.16 (04)12.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

9.1.3 Measures Specific to Earthworks

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.

9.1.4 Measures Specific to Construction

- Avoid scabbing (roughening of concrete surfaces) if possible. If required, best practices measures such as pre-washing surfaces, screening work areas and sweeping away should be implemented;
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.

9.1.5 Specific to Trackout

- Use water-assisted dust sweepers on access and local roads, to remove, as necessary, any material tracked out of the site;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book;

- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
- Implement a wheel washing system; and
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and
- Access gates to be located at least 10m from receptors where possible.

9.2 Operational Phase

Though the proposed development is expected to have a negligible impact at all receptor locations for each pollutants assessed, there are exceedances of the Council's air quality standards for NO_2 and $PM_{2.5}$ at all receptor locations both at ground level and at height. It is therefore recommended that no operable panels (natural ventilation) are provided for the proposed development. Even though pollutant concentrations reduce with height, the background concentrations are already in excess of the air quality standards for these pollutants, and as such it is not considered to be suitable to employ natural ventilation at higher floors.

In addition, it has been advised that air inlets/outlets for mechanical ventilation are located at the sides of the building away from the main roads and that they are also located at height (not at pavement/ground level or first floor).

10. Summary and Conclusions

This report assessed the likely significant effects of the proposed development on local air quality. A review of current legislation and planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the site have been undertaken.

The site is located in the Camden AQMA, which has been declared for exceedances in the annual mean NO_2 and 24-hour mean PM_{10} standards. Camden has adopted more stringent standards for air pollution: 38µg/m^3 for NO_2 (as opposed to the 40µg/m^3 national standard), 20µg/m^3 for PM_{10} (as opposed to 40µg/m^3) and 10µg/m^3 (as opposed to 20µg/m^3). Even though air quality is anticipated to improve in future years, pollutant concentrations are likely to be in excess of the more stringent Camden standard at the year of opening in 2024.

Monitoring data within 1km of the site showed that five of the ten monitoring sites exceeded the annual mean NO_2 air quality standard (40µg/m^3) and six exceeded the Council annual mean NO_2 air quality standard (38µg/m^3) in 2019. All of the sites that exceeded the national NO_2 annual mean standard in 2019 were at 'roadside' or 'kerbside' locations. The 'urban background' site Covent Garden exceed the Council annual mean NO_2 air quality standard in 2019. The rest of the monitoring locations within 1km of the site measured concentrations below the relevant air quality standards for all pollutants of concern (NO_2, PM_{10} and $PM_{2.5}$). As the site abuts the road, the environment into which the new receptors are being introduced is likely to be close to or over the national annual mean NO_2 air quality standard (40µg/m^3) and the Council's annual mean NO_2 air quality standard (38µg/m^3).

As a conservative assumption, due to the lack of detailed construction information, the site was classified as high risk to dust soiling and low risk to human health effects from dust generating activities prior to the application of any mitigation measures. With the implementation of mitigation measures detailed in Section 8, the residual effects would be negligible and not significant.

Air quality is anticipated to improve in future years across the UK and around the area of the site. The improvement in traffic emissions is also expected through the introduction of two-way flow on roads around the site (A40 High Holborn) and the redevelopment of the 196 space multi-storey car park currently occupying the site location.

During operation of the site, there will be approximately 68 deliveries a day. The proposed development is car-free, so no additional traffic is anticipated from the operation of the proposed development. The effect of the operational traffic associated with the proposed development on these receptors is considered to be not significant, as a negligible impact was predicted at all selected existing and future receptors for all pollutants.

An assessment against the 'air quality neutral' criteria was undertaken in relation to building and transport emissions. The proposed development emissions and development trip rates were calculated to be below the relevant benchmarks for all land-use classes, and therefore, the proposed development complies with the 'air quality neutral' criterion.

An air quality positive statement has also been prepared, which includes relevant measures to maximise potential benefits to local air quality and how measures will be implemented to minimise pollution exposure.

10.1 LBC Air Quality Planning Checklist

All major developments in Camden require the completion of the checklist[58] alongside an air quality assessment. The checklist has been copied below with answers.

Travel and Transport

1. *If there will be parking in the development, will electric vehicle charging point/s be included?*

Answer: The proposed development is car-free.

[58] London Borough of Camden (2019), Air Quality Planning Checklist.

2. *Will secure cycle storage be provided for users of the building?*

Answer: There will be cycle parking in the basement. The provision will be in accordance with the London Plan Cycle Parking Standards[14].

Energy

3. *If a CHP is to be included, did you ensure that this technology is suitable for the energy requirements of the building? Please see Camden's Boiler Guidance Manual B for more information.*

Answer: There is no CHP, two generators will be used for emergency back-up only. Testing on full load once a month, so maximum testing would be 12 hours a year.

4. *If CHP is to be included, will it adhere to the GLA CHP Emissions Limits outlined in the GLA's Sustainable Design and Construction SPG[59]?*

Answer: Not applicable

5. *Has the impact of the CHP been modelled within the air quality assessment?*

Answer: Not applicable

Exposure

6. *If located in an area of poor air quality and/or next to a busy road or diesel railway line, does the AQA include details of the way in which the building has been designed to reduce the exposure of occupants (e.g. through orientation, greening, placement of residential properties, or, only for developments in areas of very poor air quality, mechanical ventilation?)*

Answer: Building air intakes have been located away from main roads and generators exhausts. Natural ventilation is not recommended.

Construction dust

7. *Does the project have a Construction Management Plan written in accordance with the recommendations in the Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, including an assessment of the risk? And, if the risk is Medium or High, a real time monitoring proposal?*

Answer: A conservative assumption of high risk of construction dust and corresponding high risk mitigation is included in this air quality assessment. The mitigation will be included in the Construction Environmental Management Plan for the site.

Air Quality Neutral

8. *Does the AQA include an assessment against the GLA's Air Quality Neutral Standard?*

Answer: An air quality neutral assessment has been undertaken and presented in Section 7 of this report. The proposed development does not exceed the benchmarks for building or transport emissions.

[59] Greater London Authority (2014), Sustainable Design and Construction Supplementary Planning Guidance.

Appendix A

Regional and Local Policy Guidance

A.1 Regional Policy and Guidance

A.1.1 The London Plan

The London Plan[14] was published in March 2021 and is the spatial development strategy for Greater London.

The plan sets out a framework for London's development in the next 20 to 25 years integrating all economic, environmental, transport and social frameworks.

Policy SI1 relates to improving air quality and states:

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:

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.

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:

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

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

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

Passive ventilation is mentioned in the London Plan 'cooling hierarchy'. The statement that new developments submit to the Council needs to include information on how this has been taken into account in the building design.

Policy SI 4 Managing heat risk sets out the cooling hierarchy:

A. "Development proposals should minimise adverse impacts on the urban heat island through design, layout, orientation, materials and the incorporation of green infrastructure.

B. Major development proposals should demonstrate through an energy strategy how they will reduce the potential for internal overheating and reliance on air conditioning systems in accordance with the following cooling hierarchy:

- reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure
- minimise internal heat generation through energy efficient design
- manage the heat within the building through exposed internal thermal mass and high ceilings
- provide passive ventilation
- provide mechanical ventilation
- provide active cooling systems."

It is also mentioned that "Passive ventilation should be prioritised, taking into account external noise and air quality in determining the most appropriate solution".

This is discussed in terms of the high energy requirements of mechanical ventilation such as air conditioning systems.

A.1.2 The London Environment Strategy

The London Environment Strategy (LES)[15] was published in May 2018 and sets out the Mayor's vision for London's environment in 2050. It is a strategy that brings together approaches from multiple aspects of London's environment in an integrated document. In relation to planning, the LES proposes new large-scale developments in London to be 'air quality positive'. It aims for larger development to go further than being 'air quality neutral' and implement effective design and integration to surrounding area to boost local air quality. The key aim is to ensure that emissions and exposure to pollution are reduced and air quality positive emphasises the importance of considering air quality very early in the design process.

A.1.3 The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance

The GLA published the Control of Dust and Emissions during Construction and Demolition SPG[17] in July 2014 under the implementation of the 2011 London Plan, this was then adopted by the London Plan 2021. This SPG seeks to reduce emissions of dust, PM_{10} and $PM_{2.5}$ from construction and demolition activities in London. It also aims to manage emissions of NO_x from construction and demolition machinery by means of a new non-road mobile machinery (NRMM) ultra-low emissions zone (ULEZ).

A.1.4 London Local Air Quality Management Technical Guidance

The Defra Local Air Quality Management Technical Guidance (TG22)[18] provides guidance on air quality assessments for local authorities. This applies to all UK local authorities, however there is specific guidance for the London boroughs. The Local London Local Air Quality Management technical guidance (LLAQM.TG(19))[19] applies only to London's 32 boroughs (and the City of London). Although the LLAQM.TG(19) technical guidance has many common elements with the updated national guidance, it incorporates London-specific elements of the LAQM system.

This guidance is designed to support London authorities in carrying out their duties to review and assess air quality in their area. Where relevant, this guidance has been taken into account in this assessment.

A.2 Local Policy and Guidance

A.2.1 London Borough of Camden

Camden Local Plan

The Camden Local Plan[22] was adopted in 2017 replacing the Core Strategy and Development Policies planning document and sets out policies from 2016 to 2031. Air quality is mentioned specifically in the following two policies.

Policy A1 Managing the impact of development states:

"The Council will seek to protect the quality of life of occupiers and neighbours. We will grant permission for development unless this causes unacceptable harm to amenity."… "The factors we will consider include:" "… odour, fumes and dust;".

Policy CC4 Air Quality states:

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

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

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

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan."

The Council provides further details on their website on the requirements and need for an air quality assessment and what this should be include. They also provide an air quality planning checklist[58]. The checklist has been completed in Section 10.1.

There is no mention of natural ventilation with relation to air quality in the Camden Local Plan. Natural ventilation is mentioned under the Design of housing section of the plan, stating:

"All residential developments are required to be designed and built to create high quality homes. The Council will seek to ensure that residential development, both new build and change of use:…

has good natural light and ventilation…"

Camden Planning Guidance: air quality

To support the Local Plan[22], in 2021 the Council prepared an air quality Camden Planning Guidance (CPG)[23]. This guidance supports Policy CC4 in the Local Plan to further improve air quality in the borough. The CPG states that:

"Camden has adopted the World Health Organisation guideline limits for nitrogen dioxide (40µg/m^3), PM_{10} (20µg/m^3) and $PM_{2.5}$ (10µg/m^3) annual mean concentrations. For the determination of planning applications and appraisal of Construction Management Plans, consideration must be paid to uncertainty in NO_2 data, therefore 38µg/m^3 (the 40µg/m^3 WHO limit less 5%) shall be taken as the limit for this pollutant. Camden's overarching objective is to achieve WHO limits by 2030 and this will be steered by the Council's Clean Air Action Plan[24]".

Building ventilation is specifically addressed in Section 4 of the CPG – Minimising emissions into the air:

"Indoor air quality needs early consideration in building design. The location of ventilation inlets, flues, opening windows should be on higher floors away from the sources of air pollution at ground level, but also stationary sources of plant. If mechanical ventilation (air conditioning) is considered acceptable (following the cooling hierarchy, see Chapter 10 CPG Energy efficiency and adaptation), they should be fitted with proven filtration technology appropriate for the pollutants of concern and should be maintained. Developments should also consider the location of neighbouring receptors."

In terms of outside space in the development it states:

"The location of outside space is also an important consideration and any exposure of gardens and roof terraces should be screened and, where practicable, minimised through appropriate positioning and orientation. Applicants should take care not to locate flues and exhaust vents in close proximity to recreational areas such as roof terraces or gardens."

Camden Clean Air Action Plan 2019 – 2022

The Camden Clean Air Action Plan[24] has been produced as part of the local authority's obligation to LLAQM. It provides a summary of the current air quality in the borough and sets out the actions to improve it between 2019 and 2022. It should also be noted that Camden has formally adopted the WHO air quality guidelines. The goal is to achieve WHO limits by 2030 and this will be steered by the Council's Clean Air Action Plan. The Plan is the first of three aiming to bring Camden into compliance.

The Clean Air Action Plan is organised around the seven broad themes of building emissions; construction emissions; transport emissions; communities and schools; delivery servicing and freight; public health and awareness raising; and lobbying.

Natural ventilation in relation to air quality is not specifically mentioned in Camden's Clean Air Action Plan.

Manual B – Minimising air pollution from new developments

Manual B is part of a "*series of manuals for operator. designers & developers*" helping to minimise air pollution in the borough. This manual is specifically for new developments, with the Council recommending that "*all developments that are subject to an Air Quality Assessment should review and follow the advice in the Council's 'Manual B - Reducing Air Pollution In New Developments*".

The main principles to reduce air pollution from the building are stated as:

"1. Design the building to maximise energy efficiency.

2. Use low polluting systems to meet the remaining energy demand."

The document discusses ways to minimise the emissions from the building and transport that may related to your building. It does this by setting out the legal regulations, standards and requirements, considerations for an energy efficient design and looking at duel and abatement for the buildings heating and cooling requirements.

London Borough of Camden Draft Holborn Vision & Urban Strategy

The Council has set out its views and key aims for the Holborn area in this draft document. Public consultation was held on this document between May and July 2019 however works have been paused due to Covid-19. The document acknowledges the poor air quality in this traffic dominated area. Under the objective to create "*A green and sustainable place that delivers for its communities*" it states to "*ensure that development contributes towards improving Holborn's air quality*."

Camden air quality Proforma

Proforma for development proposals in Camden to inform assessment of Air Quality v1a

All relevant yellow boxes **must** be completed on this and all relevant tabs
Complete orange cells with source document and section/page references, required to support/justify responses
See guidelines / notes in column M
Complete the summary tab and relevant tab depending on the type of Air Quality Assessment required

Introduction: **This Proforma is intended to help you understand the air quality considerations we will take into account when considering an application in Camden, as well as helping us to consider the application. This does not replace the requirement to provide an Air Quality Assessment or the detailed guidance in the Camden Planning Guidance (CPG) on Air Quality. Any information provided should be referenced to the relevant section of submitted supporting documents. This summary page will help provide key details on the application.**

Application details:

Application number (when known)						
Scheme name	Museum Street					
Scheme address	Selkirk House, 166 High Holborn and 1 Museum Street, 10-12 Museum Street, 35-41 New Oxford Street and 16A-18 West Central Street, London, WC1A 1JR					
Postcode	WC1A 1JR					
Type of development (choose drop down options)	Mixed use					
No. of residential units	48					
Scale of development details (m^2)	Existing	Proposed				
	TOTAL pre-development	For demolition	New-build incl. infills, re-build, extensions	Retained (refurbished or Change of Use)	TOTAL post-development	Net UPLIFT post-development
Total floor area of development (GIA)	21553		28309		28309	6756
of which residential	1817		3992		3992	2175
of which non- residential	19736		24317		24317	4581
Air Quality Assessment document details	Full air quality assessment provided. Model verification year of 2019 as this is the most recent year of freely available monitored data. The development year was taken as the most recent full calendar year.					
Baseline scenario year used (projections not accepte	2019					
Development year used for scenarios	2022					

Approve/Condition/Refuse	1. Air Quality Assessment (AQA) requirement			Location of justification /	
	Air Quality in development area (to determine assessment requirement)	Response		Document	Page/ section reference
	a. NO_2 at development site	39.2	$\mu g/m^3$ per annum	LAEI dataset - Air Quality Assessment	Section 4.4.2
	b. PM_{10} at development site	22.4	$\mu g/m^3$ per annum	LAEI dataset - Air Quality Assessment	Section 4.4.2
	c. $PM_{2.5}$ at development site	14	$\mu g/m^3$ per annum	LAEI dataset - Air Quality Assessment	Section 4.4.2
	d. Does the proposal introduce new receptors?	YES		Air Quality Assessment	Section 3.3.3
	e. Will the proposals include sensitive receptors?	YES		Air Quality Assessment	Section 3.3.3
	f. Is there a likely increase in traffic levels from existing base?	NO		Transport Assessment	Exec summary
	g. Includes biomass boilers or CHP (combined heat and power)	NO		Air Quality Assessment	Section 3.4.1
	h. Includes connections to existing decentralised energy networks	NO		n/a	n/a
	i. Involves substantial earthworks or demolition?	YES		Air Quality Assessment	Section 5
			Response		
	j. Given responses above (using flow chart below) what minimum level of AQA is required		Detailed	**Go to relevant AQA tab (if required)**	

Criteria met				Assessments Required		
Scale	**Area of Poor Air Quality**	**Scheme brings sensitive receptors**	**Scheme brings air quality Impacts**	**Air Quality Assessment type**	**Air Quality Neutral**	**Construction and Demolition Impacts**
Major	YES	YES	YES	**Detailed**	Required	Required
			NO			
		NO	YES	**Detailed**		
			NO	Basic		
	NO	YES	YES	**Detailed**		
			NO	Basic		
		NO	YES	**Detailed**		
			NO	Basic		
Minor	YES	YES	YES	**Detailed**	Not required	May be required
			NO	Basic		
		NO	YES	Basic		
			NO	*Not required*		
	NO	YES	YES	**Detailed**		
			NO	*Not required*		
		NO	YES	Basic		
			NO	*Not required*		

Proforma for development in Camden - Air Quality Requirements

All relevant yellow boxes must be completed

Complete orange cells with source document and section/page references, required to justify/support responses

See guidelines / notes in column M

Recommendation (Council to complete)

2. Background AQ

Recommendation	Background concentrations used for modelling	Response		Document	Page/ section reference
Approve/Condition/Refuse	a. Background annual NO_2 in vicinity of development	40.6	$\mu g/m^3$	Air Quality Assessment	Section 4.4
Approve/Condition/Refuse	b. Background annual PM_{10} in vicinity of development	18.9	$\mu g/m^3$	Air Quality Assessment	Section 4.4
Approve/Condition/Refuse	c. Background annual $PM_{2.5}$ in vicinity of development	12.2	$\mu g/m^3$	Air Quality Assessment	Section 4.4
	d. Background data source	DEFRA background maps		Air Quality Assessment	Section 4.4

3. Operational impact of development on local area

Recommendation		Response		Document	Page/ section reference
Approve/Condition/Refuse					
	a. If gas boilers are proposed what is the NO_x rating?	n/a	$\mu g/m^3$	n/a	n/a
	b. Is the development "zero on-site emission" (energy sources)	YES		Energy Statement	Section 5.1
	c. Is the development "zero on-site emission" (non-energy sources)	YES		n/a	n/a
	d. Is the development car free?	YES		Transport Assessment	Executive summary
	e. Is CHP proposed?	NO		Energy Statement	Section 5.1
	f. Is a biomass boiler proposed?	NO		Energy Statement	Section 5.1
	g. Is any stack at least 1m above the highest part of the development?	NO		Air Quality Assessment	Section 3.6.1
	h. What output capacity of emergency or STOR generation is proposed?	250kVA for \	kWe	Energy Statement	Section 5.1
	i. Emergency or STOR generation fuel source?	Diesel (temporarily)		Energy Statement	Section 5.1

use of HVO and other technologies are being reviewed.

3a. Air Quality Neutral Assessment (required for all Major developments)

Recommendation		NO_x kg per annum	PM_{10} kg per annum	Document	Page/ section reference
Approve/Condition/Refuse					
	Building Emissions Benchmark (BEB)	867.3	52.1	Air Quality Assessment	Section 7.1
	Total Building Emissions for development	57.6	0.4	Air Quality Assessment	Section 7.1
	Difference	-809.7	-51.7		
	Transport Emissions Benchmark (TEB)	284	49	Air Quality Assessment	Section 7.2
	Total Transport Emissions for development	54	9	Air Quality Assessment	Section 7.2
	Difference	-230	-40		
	Air Quality Neutral	Yes			

4. Operational impact of development on occupants

Recommendation	Model details	Response
	a. Emissions factor toolkit version used	v11.0
	b. Air quality modelling software used (names and versions)	ADMS-Roads version 5.0.

Recommendation	Modelled annual expected (worst case) air quality at the development	Response	Document	Page/ section reference
Approve/Condition/Refuse				
	a. Are any expected 'with development' NO_2 levels for the site above 38µg/m³	YES	Air Quality Assessment	Appendix G
	b. Are any expected 'with development' NO_2 levels for the site above 42µg/m³	YES	Air Quality Assessment	Appendix G
	c. Are any expected 'with development' NO_2 levels for the site above 60µg/m³	NO	Air Quality Assessment	Appendix G
	d. Are any expected 'with development' PM_{10} levels for the site above 20µg/m	NO	Air Quality Assessment	Appendix G
	e. Are any expected 'with development' $PM_{2.5}$ levels for the site above 10µg/m	YES	Air Quality Assessment	Appendix G
	f. Has air quality been modelled at all levels and all facades?	YES	Air Quality Assessment	Section 3.3.3

Recommendation	Mitigation proposed to protect internal air quality	Response	Document	Page/ section reference
Approve/Condition/Refuse				
	a. Is MVHR proposed?	YES	Energy Statement	Section 5.1
	b. Will the MVHR inlet(s) be at roof level and away from busy roads and other emission sources such as extract systems and flues?	YES	Energy Statement	Section 5.1
	c. Is NO_x filtration proposed?	NO	n/a	n/a
	d. Is particulate filtration proposed?	YES	Energy Statement	Section 5.1
	e. Will windows be openable?	No	Air Quality Assessment	Section 9.2
	f. Are winter gardens proposed?	NO	n/a	n/a
	g. Other mitigation proposed (provide reference for details)	YES	Air Quality Assessment	Section 8 and Section 9

5. Demolition and construction impact

Recommendation		Response	Document	Page / section reference
	a. What is the highest demolition/construction dust risk ***before*** mitigation?	high	Air quality assessment	Section 5.1.4
Approve/Condition/Refuse	b. Has mitigation been proposed in line with the GLA checklist for risk level in	YES	Air quality assessment	Section 9.1
	c. Is real time dust monitoring proposed?	YES	Demolition Management Plan Construction Management Plan	Section 9.1
Approve/Condition/Refuse	d. How many real time dust monitors are proposed?	TBC	To be agreed with the local authority	Section 9.1.1
	e. Are there any other developments within a 100m radius of the developmen	YES	Air quality assessment	Section 6.2
	f. Is the site within 10m of a school or hospital?	NO	Air quality assessment	Section 5.1.1
	g. Is the site within 500m of a school or hospital?	YES	Air quality assessment	Section 5.1.1

Additional comments / notes (please use cover letter or provide references to sections in documents in orange boxes for significant details):

Appendix C

Modelled Roads Data

C.1 Operational Road Network

Table 18: Operational road network

Traffic ID	Air Quality ID	Road Name	Road Width	Junction	Canyon Height (m)
13_1	13_1_1	A40 Oxford Street West	8.5	N	21
13_1	13_1_5	A40 Oxford Street West	9.5	Y	0
12_2	12_2_1	A40 High Holborn (west of development)	9	N	21
12_2	12_2_3	A40 High Holborn (west of development)	11.5	Y	0
2_5	2_5_1	Shaftesbury avenue	5.5	Y	0
2_5	2_5_2	Shaftesbury avenue	4	Y	0
12_2	12_2_4	A40 High Holborn (west of development)	7.5	Y	18
2_4	2_4_1	Bloomsbury Street	6.5	Y	0
1_4	1_4_2	Tottenham Court Road	8.5	N	0
13_1	13_1_9	A40 Oxford Street West	8.5	Y	0
13_1	13_1_2	A40 Oxford Street West	8.5	Y	0
13_1	13_1_3	A40 Oxford Street West	9.5	Y	0
13_1	13_1_4	A40 Oxford Street West	9.5	N	21
13_1	13_1_6	A40 Oxford Street West	8.5	Y	0
13_1	13_1_7	A40 Oxford Street West	8.5	N	0
13_1	13_1_8	A40 Oxford Street West	8.5	Y	0
1_4	1_4_3	Tottenham Court Road	8.5	Y	0
1_4	1_4_1	Tottenham Court Road	8.5	Y	0
12_2	12_2_2	A40 High Holborn (west of development)	9	Y	0
13_1	13_1_10	A40 Oxford Street West	8.5	Y	21

C.2 Operational Traffic Data

Table 19: Operational traffic data used in the assessment

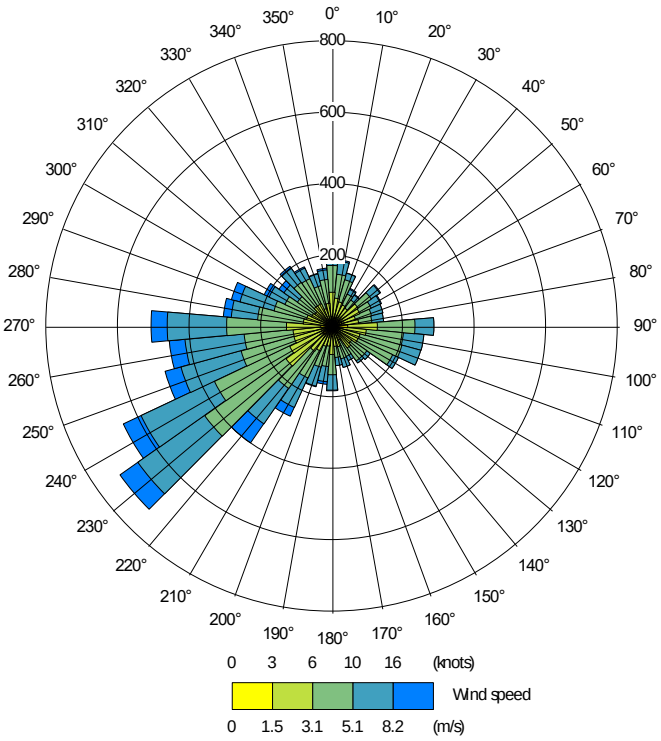
Traffic ID	Air Quality ID	Road Name	Baseline 2019			Do Minimum			Do Something		
			AADT	HGV (%)	Speed (kph)	AADT	HGV (%)	Speed (kph)	AADT	HGV (%)	Speed (kph)
13_1	13_1_1	A40 Oxford Street West	10,736	1%	32	10,736	1%	32	10,788	2%	32
13_1	13_1_5	A40 Oxford Street West	10,736	1%	20	10,736	1%	20	10,788	2%	20
12_2	12_2_1	A40 High Holborn (west of development)	9,250	2%	32	9,250	2%	32	9,302	3%	32
12_2	12_2_3	A40 High Holborn (west of development)	9,250	2%	20	9,250	2%	20	9,302	3%	20
2_5	2_5_1	Shaftesbury avenue	9,753	2%	20	9,753	2%	20	9,753	2%	20
2_5	2_5_2	Shaftesbury avenue	9,753	2%	20	9,753	2%	20	9,753	2%	20
12_2	12_2_4	A40 High Holborn (west of development)	9,250	2%	20	9,250	2%	20	9,302	3%	20
2_4	2_4_1	Bloomsbury Street	11,065	1%	20	11,065	1%	20	11,065	1%	20
1_4	1_4_2	Tottenham Court Road	8,407	1%	32	8,407	1%	32	8,407	1%	32
13_1	13_1_9	A40 Oxford Street West	10,736	1%	20	10,736	1%	20	10,788	2%	20
13_1	13_1_2	A40 Oxford Street West	0,736	1%	20	10,736	1%	20	10,788	2%	20
13_1	13_1_3	A40 Oxford Street West	10,736	1%	20	10,736	1%	20	10,788	2%	20
13_1	13_1_4	A40 Oxford Street West	10,736	1%	32	10,736	1%	32	10,788	2%	32
13_1	13_1_6	A40 Oxford Street West	10,736	1%	20	10,736	1%	20	10,788	2%	20
13_1	13_1_7	A40 Oxford Street West	10,736	1%	32	10,736	1%	32	10,788	2%	32
13_1	13_1_8	A40 Oxford Street West	10,736	1%	20	10,736	1%	20	10,788	2%	20
1_4	1_4_3	Tottenham Court Road	8,407	1%	20	8,407	1%	20	8,407	1%	20
1_4	1_4_1	Tottenham Court Road	8,407	1%	20	8,407	1%	20	8,407	1%	20

Appendix D

Comparison of NWP data with Heathrow Airport meteorological data

D.1 Wind rose for 2019 NWP data

Figure 26: The wind rose for the NWP data for 2019



D.2 Comparison of modelled NO_x concentrations

Table 20: Predicted annual mean road NO_x concentrations comparison

Receptor ID	Height (m)	Annual mean NO_x predicted concentrations ($\mu g/m^3$)		Difference
		2019 Heathrow Airport meteorological site	2019 NWP site	
1	1.5	13.2	11.6	1.6
2	4.5	4.0	3.4	0.6
3	4.5	3.8	3.2	0.6
4	1.5	5.3	4.5	0.8
5	4.5	5.0	4.2	0.7
6	7.5	4.4	3.8	0.6
7	10.5	3.7	3.1	0.5
8	13.5	3.0	2.5	0.4
9	16.5	2.3	2.0	0.3
10	1.5	5.2	4.5	0.7
11	4.5	4.9	4.2	0.7
12	7.5	4.3	3.7	0.6
13	10.5	3.6	3.1	0.5
14	13.5	2.9	2.5	0.4
15	16.5	2.3	2.0	0.3
16	1.5	15.8	13.1	2.7
17	4.5	10.1	8.7	1.5
18	7.5	5.1	4.7	0.5
19	10.5	3.3	3.1	0.2
20	13.5	2.5	2.3	0.1
21	16.5	1.9	1.8	0.1
22	1.5	8.5	6.9	1.6
23	4.5	6.9	5.7	1.2
24	7.5	4.9	4.2	0.7
25	10.5	3.4	3.0	0.4
26	13.5	2.5	2.3	0.2
27	16.5	1.9	1.8	0.2
28	1.5	11.6	9.4	2.1
29	4.5	11.8	9.2	2.5
30	4.5	8.1	6.4	1.6

Appendix E

Construction Dust Methodology

E.1 Method of Construction Dust Assessment

Step 1: Need for Assessment

The first step is the initial screening for the need for a detailed assessment. According to the IAQM guidance, an assessment is required where there are sensitive receptors within 350m of the site boundary (*for ecological receptors this is 50m)* and/or within 50m of the route(s) used by the construction vehicles on the public highway and up to 500m from the site entrance(s).

Step 2: Assess the Risk of Dust Impacts

This step is split into three sections as follows:

2A. Define the potential dust emission magnitude;

2B. Define the sensitivity of the area; and

2C. Define the risk of impacts.

Each of the dust-generating activities is given a dust emission magnitude depending on the scale and nature of the works (step 2A) based on the criteria shown in Table B1.1.

The sensitivity of the surrounding area is then determined (step 2B) for each dust effect from the above dust-generating activities, based on the proximity and number of receptors, their sensitivity to dust, the local PM_{10} background concentrations and any other site-specific factors.

Table B1.2 to Table B1.4 show the criteria for defining the sensitivity of the area to different dust effects.

The overall risk of the impacts for each activity is then determined (step 2C) prior to the application of any mitigation measures and an overall risk for the site derived (Table B1.5).

Step 3: Determine the Site-Specific Mitigation

Once each of the activities is assigned a risk rating, appropriate mitigation measures are identified. Where the risk is negligible, no mitigation measures beyond those required by legislation are necessary.

Step 4: Determine any Significant Residual Effects

Once the risk of dust impacts has been determined and the appropriate dust mitigation measures identified, the final step is to determine whether there are any residual significant effects. The IAQM guidance notes that it is anticipated that with the implementation of effective site-specific mitigation measures, the environmental effect will not be significant in most cases.

Step 5: Prepare a Dust Assessment Report

The last step of the assessment is the preparation of a dust assessment report. This forms part of this report (Section 5.1).

Table B1.1: Dust emission magnitude

Dust emission magnitude		
Small	**Medium**	**Large**
Demolition		
• total building volume <20,000m^3 • construction material with low potential for dust release (e.g. metal cladding or timber) • demolition activities <10m above ground • demolition during wetter months	• total building volume 20,000 - 50,000m^3 • potentially dusty construction material • demolition activities 10 - 20m above ground level	• total building volume >50,000m^3 • potentially dusty construction material (e.g. concrete) • on-site crushing and screening • demolition activities >20m above ground level

Dust emission magnitude		
Earthworks		
• total site area <2,500m^2 • soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • formation of bunds <4m in height • total material moved <20,000 tonnes • earthworks during wetter months	• total site area 2,500m^2 - 10,000m^2 • moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • formation of bunds 4 - 8m in height • total material moved 20,000 - 100,000 tonnes	• total site area >10,000m^2 • potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • formation of bunds >8m in height • total material moved >100,000 tonnes
Construction		
• total building volume <25,000 m^3 • construction material with low potential for dust release (e.g. metal cladding or timber)	• total building volume 25,000 - 100,000m^3 • potentially dusty construction material (e.g. concrete) • on-site concrete batching	• total building volume >100,000m^3 • on-site concrete batching • sandblasting
Trackout		
• <10 HDV (>3.5t) outward movements in any one day • surface material with low potential for dust release • unpaved road length <50m	• 10 – 50 HDV (>3.5t) outward movements in any one day • moderately dusty surface material (e.g. high clay content) • unpaved road length 50 – 100m;	• >50 HDV (>3.5t) outward movements in any one day • potentially dusty surface material (e.g. high clay content) • unpaved road length >100m

Table B1.2: Sensitivity of the area to dust soiling effects

Receptor sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	> 100	High	High	Medium	Low
	10 – 100	High	Medium	Low	Low
	< 10	Medium	Low	Low	Low
Medium	> 1	Medium	Low	Low	Low
Low	> 1	Low	Low	Low	Low

Table B1.3: Sensitivity of the area to human health impacts

Receptor Sensitivity	Annual Mean PM_{10} concentration	Number of receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^3	>100	High	High	High	Medium	Low
		10-100		High	Medium	Low	
		1-10		Medium	Low		
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100		Medium	Low		
		1-10					
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100					
		1-10	Medium	Low			
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low				
		1-10					
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low			
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low				
	24-28µg/m^3	>10	Low	Low	Low	Low	Low
		1-10					
	<24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10					
Low	-	>1	Low	Low	Low	Low	Low

Table B1.4: Sensitivity of the area for ecological impacts

Receptor sensitivity	Distance from the source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table B1.5: Risk of dust impacts

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High risk site	Medium risk site	Medium risk site
Medium	High risk site	Medium risk site	Low risk site
Low	Medium risk site	Low risk site	Negligible
Earthworks			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Construction			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Medium risk site	Low risk site
Low	Low risk site	Low risk site	Negligible
Trackout			
High	High risk site	Medium risk site	Low risk site
Medium	Medium risk site	Low risk site	Negligible
Low	Low risk site	Low risk site	Negligible

Appendix F

Local Monitoring Data

F.1 Local Monitoring Data

Table C1.1: Local authority NO_2 (µg/m^3) monitoring within 1km of the site boundary (2015 to 2020)

Site name	Site ID	OS grid square		Local authority	Continuous /Passive	Site type	Height (m)	2015	2016	2017	2018	2019	2020
		X	Y										
London Bloomsbury	B0	530123	182014	Camden	Continuous	Urban background	4	**48.0**	**42.0**	**38.0**	36.0	32.0	n/a
St. George's Gardens (previously 'Wakefield Gardens')	CA6	530430	182430	Camden	Passive	Urban background	1.8	35.8	31.3	34.8*	26.7	24.7	n/a
Tavistock Gardens	CA10	529880	182334	Camden	Passive	Urban background	2.5	**44.6**	**39.7**	**46.2***	35.4	33.1	n/a
Tottenham Court Road	CA11	529568	181728	Camden	Passive	Kerbside	3.5	**85.6**	**83.6**	**74.0***	**65.8**	**61.2**	n/a
Bloomsbury Street	CA21	529962	181620	Camden	Passive	Kerbside	2.2	**71.4**	**72.2**	**71.2***	**59.4**	**48.5**	n/a
Strand	CM4	530785	180911	Westminster	Continuous	Roadside	1.8	**122.0**	**101.0**	**92.0**	**88.0**	**76.0**	n/a
Covent Garden	CM5	530444	180903	Westminster	Continuous	Urban background	2	n/a	n/a	37.0	**39.0**	**39.0**	n/a
Oxford Street East (94 Oxford Street)	CM7	529493	181331	Westminster	Continuous	Roadside	1.7	n/a	n/a	n/a	**76.0***	**51.0**	n/a
London Bloomsbury (Defra)	UKA00211	530119	182039	Defra	Continuous	Urban background	4.0	**48.2**	**40.9**	37.7	36.4	31.5	27.5
Camden - Holborn (Bee Midtown)	LACM9	530528	181505	LondonAir	Continuous	Kerbside	2	**83.0**	**84.0**	**74.0**	**67.0**	**55.0**	34.0

Notes:

Exceedances of the LBC annual mean NO_2 standard (38µg/m^3) are denoted in **bold**

Data that has been annualised as data capture was below 75% is denoted by '*'

NO_2 annual means in excess of 60µg/m^3, indicating a potential exceedance of the hourly mean NO_2 standard are underlined

Site name	Site ID	OS grid square		Local authority	Continuous /Passive	Site type	Height (m)	2015	2016	2017	2018	2019	2020
		X	Y										
n/a denotes no available data for year of monitoring Camden ASR states “The diffusion tube on Tottenham Court Road (CA11) had to be moved in November 2019 due to major streetworks necessitating the removal of the lighting column to which the tube had previously been attached. The new tube location is five metres to the north, and is the same distance from the kerb, and is fixed at a marginally lower height.”													

Table C1.2: Local authority PM_{10} and $PM_{2.5}$ (µg/m^3) monitoring within 1km of the site boundary (2015 to 2020)

Site name	OS grid square		Local authority	Continuous/ Passive	Site type	Height (m)	2015	2016	2017	2018	2019	2020
	X	Y										
PM_{10} monitoring (µg/m^3)												
London Bloomsbury	530123	182014	Camden	Continuous	Urban background	4	22.0	20.0	19.0	17.0	18.0	n/a
Oxford Street East (94 Oxford Street)	529493	181331	Westminster	Continuous	Roadside	1.7	n/a	n/a	n/a	28.0*	24.0*	n/a
London Bloomsbury (Defra)	530119	182039	Defra	Continuous	Urban background	n/a	18.6	19.9	17.2	17.4	17.6	16.0
$PM_{2.5}$ monitoring (µg/m^3)												
London Bloomsbury	530123	182014	Camden	Continuous	Urban background	4	**11.0**	**12.0**	**13.0**	**10.0**	**11.0**	n/a
London Bloomsbury (Defra)	530119	182039	Defra	Continuous	Urban background	n/a	**10.9**	**12.0**	**11.0**	**10.4**	**10.8**	9.3

Notes:

Exceedances of the LBC annual mean PM_{10} standard (20µg/m^3) and $PM_{2.5}$ (10µg/m^3) standard are denoted in **bold**

Data that has been annualised as data capture was below 75% is denoted by '*'

n/a denotes no available data for year of monitoring

Appendix G

Predicted Concentrations

G.1 Operational assessment results

Table 21: Operational model results for annual mean NO_2

Receptor ID	Height (m)	DM 2022 (µg/m^3)	DS 2022 (µg/m^3)	Change	Impact Descriptor
1	1.5	41.5	41.5	<0.1	Negligible
2	4.5	38.7	38.7	<0.1	Negligible
3	4.5	38.6	38.6	<0.1	Negligible
4	1.5	42.2	42.2	<0.1	Negligible
5	4.5	42.1	42.1	<0.1	Negligible
6	7.5	41.9	41.9	<0.1	Negligible
7	10.5	41.7	41.7	<0.1	Negligible
8	13.5	41.5	41.5	<0.1	Negligible
9	16.5	41.3	41.3	<0.1	Negligible
10	1.5	42.2	42.2	<0.1	Negligible
11	4.5	42.1	42.1	<0.1	Negligible
12	7.5	41.9	41.9	<0.1	Negligible
13	10.5	41.7	41.7	<0.1	Negligible
14	13.5	41.5	41.5	<0.1	Negligible
15	16.5	41.3	41.3	<0.1	Negligible
16	1.5	45.4	45.4	<0.1	Negligible
17	4.5	43.7	43.7	<0.1	Negligible
18	7.5	42.1	42.1	<0.1	Negligible
19	10.5	41.6	41.6	<0.1	Negligible
20	13.5	41.3	41.3	<0.1	Negligible
21	16.5	41.2	41.2	<0.1	Negligible
22	1.5	43.2	43.2	<0.1	Negligible

Receptor ID	Height (m)	DM 2022 (µg/m^3)	DS 2022 (µg/m^3)	Change	Impact Descriptor
23	4.5	42.7	42.7	<0.1	Negligible
24	7.5	42.1	42.1	<0.1	Negligible
25	10.5	41.6	41.6	<0.1	Negligible
26	13.5	41.3	41.3	<0.1	Negligible
27	16.5	41.2	41.2	<0.1	Negligible
28	1.5	44.1	44.1	<0.1	Negligible
29	4.5	44.2	44.2	<0.1	Negligible
30	4.5	43.1	43.1	<0.1	Negligible
Note: Results are to 1 decimal place					

Table 22: Operational model results for annual mean PM_{10}

Receptor ID	Height (m)	DM 2022 (µg/m^3)	DS 2022 (µg/m^3)	Change	Impact Descriptor
1	1.5	19.5	19.5	<0.1	Negligible
2	4.5	19.2	19.2	<0.1	Negligible
3	4.5	19.2	19.2	<0.1	Negligible
4	1.5	19.1	19.1	<0.1	Negligible
5	4.5	19.1	19.1	<0.1	Negligible
6	7.5	19.1	19.1	<0.1	Negligible
7	10.5	19.0	19.0	<0.1	Negligible
8	13.5	19.0	19.0	<0.1	Negligible
9	16.5	19.0	19.0	<0.1	Negligible
10	1.5	19.1	19.1	<0.1	Negligible
11	4.5	19.1	19.1	<0.1	Negligible
12	7.5	19.1	19.0	<0.1	Negligible
13	10.5	19.0	19.0	<0.1	Negligible
14	13.5	19.0	19.0	<0.1	Negligible
15	16.5	19.0	19.0	<0.1	Negligible
16	1.5	19.5	19.5	<0.1	Negligible
17	4.5	19.3	19.3	<0.1	Negligible
18	7.5	19.1	19.1	<0.1	Negligible
19	10.5	19.0	19.0	<0.1	Negligible
20	13.5	19.0	19.0	<0.1	Negligible
21	16.5	19.0	19.0	<0.1	Negligible
22	1.5	19.2	19.2	<0.1	Negligible
23	4.5	19.1	19.1	<0.1	Negligible
24	7.5	19.1	19.1	<0.1	Negligible
25	10.5	19.0	19.0	<0.1	Negligible

Receptor ID	Height (m)	DM 2022 (µg/m^3)	DS 2022 (µg/m^3)	Change	Impact Descriptor
26	13.5	19.0	19.0	<0.1	Negligible
27	16.5	19.0	19.0	<0.1	Negligible
28	1.5	19.4	19.4	<0.1	Negligible
29	4.5	19.3	19.3	<0.1	Negligible
30	4.5	19.2	19.2	<0.1	Negligible
Note: Results are to 1 decimal place					

Table 23: Operational model results for annual mean $PM_{2.5}$

Receptor ID	Height (m)	DM 2022 (µg/m^3)	DS 2022 (µg/m^3)	Change	Impact Descriptor
1	1.5	12.7	12.7	<0.1	Negligible
2	4.5	12.5	12.5	<0.1	Negligible
3	4.5	12.5	12.5	<0.1	Negligible
4	1.5	12.3	12.3	<0.1	Negligible
5	4.5	12.3	12.3	<0.1	Negligible
6	7.5	12.3	12.3	<0.1	Negligible
7	10.5	12.3	12.3	<0.1	Negligible
8	13.5	12.3	12.3	<0.1	Negligible
9	16.5	12.3	12.3	<0.1	Negligible
10	1.5	12.3	12.3	<0.1	Negligible
11	4.5	12.3	12.3	<0.1	Negligible
12	7.5	12.3	12.3	<0.1	Negligible
13	10.5	12.3	12.3	<0.1	Negligible
14	13.5	12.3	12.3	<0.1	Negligible
15	16.5	12.3	12.3	<0.1	Negligible
16	1.5	12.6	12.6	<0.1	Negligible
17	4.5	12.4	12.4	<0.1	Negligible
18	7.5	12.3	12.3	<0.1	Negligible
19	10.5	12.3	12.3	<0.1	Negligible
20	13.5	12.3	12.3	<0.1	Negligible
21	16.5	12.3	12.3	<0.1	Negligible
22	1.5	12.4	12.4	<0.1	Negligible
23	4.5	12.4	12.4	<0.1	Negligible
24	7.5	12.3	12.3	<0.1	Negligible
25	10.5	12.3	12.3	<0.1	Negligible

Receptor ID	Height (m)	DM 2022 (µg/m^3)	DS 2022 (µg/m^3)	Change	Impact Descriptor
26	13.5	12.3	12.3	<0.1	Negligible
27	16.5	12.3	12.3	<0.1	Negligible
28	1.5	12.5	12.5	<0.1	Negligible
29	4.5	12.5	12.5	<0.1	Negligible
30	4.5	12.4	12.4	<0.1	Negligible
Note: Results are to 1 decimal place					