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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Rev 01

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Appendices

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 NCP 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 demolition, remodelling and extension 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."* ('proposed development').

The site is located within the Holborn and Covent Garden Ward of the London Borough of Camden. The site comprises a number of individual different buildings within the red line area, 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 Thames between Covent Garden (to the south) and The British Museum (to the north) in central London (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 London Borough of Camden ('the Council') have declared borough-wide air quality management areas (AQMA).

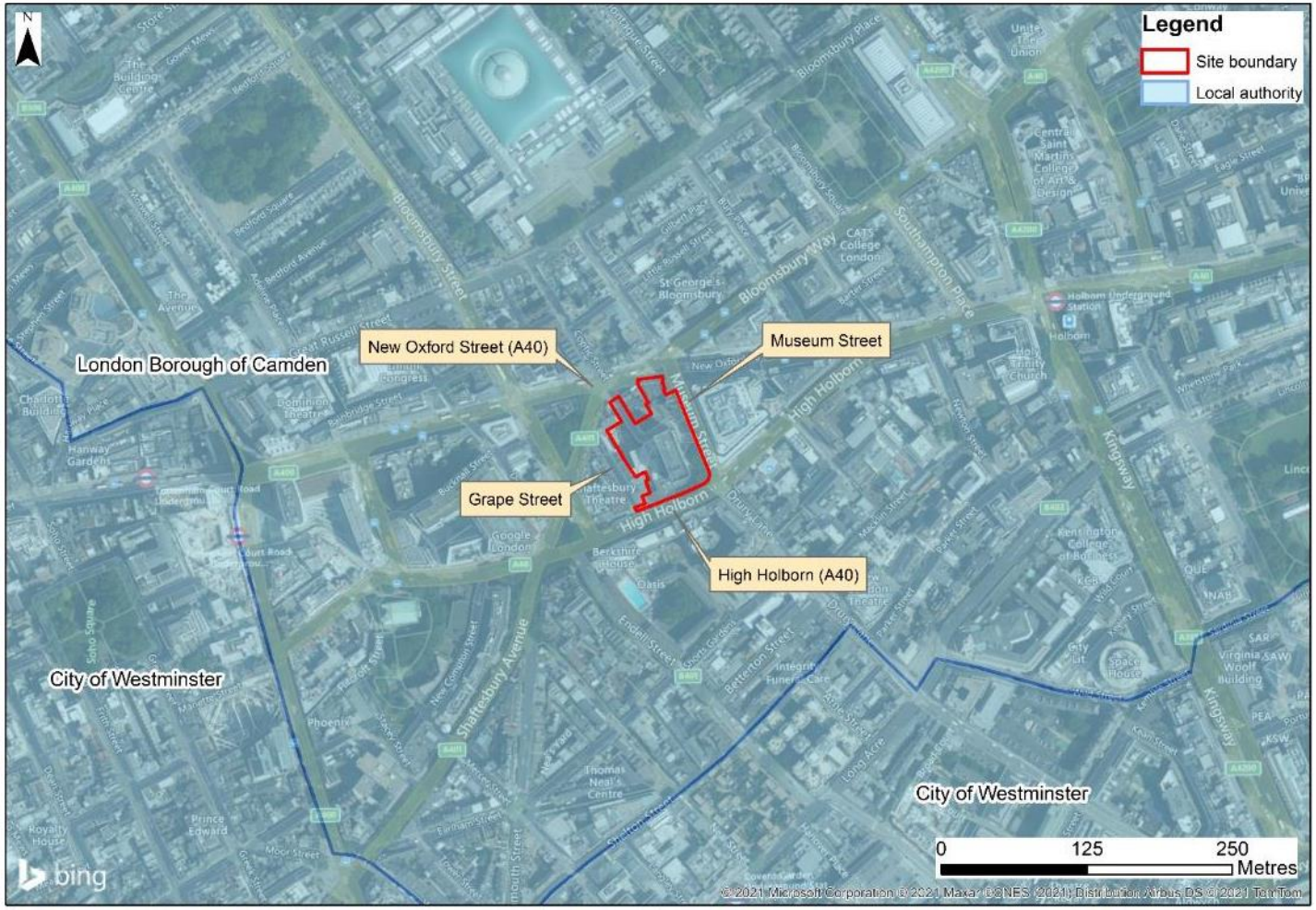
This report assesses the likely significant effects of the site on the environment in respect of air quality. Air quality studies are concerned with the presence of airborne pollutants in the atmosphere. The main pollutants of concern for local air quality are oxides of nitrogen (NOx), including nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), and dust. The assessment years of baseline 2019 and opening year 2024 have been used.

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: proposed mitigation measures for construction and operation; and

- Section 10: summary and conclusions of assessment.

Figure 1: Site location in the London Borough of Camden



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]. It also amends 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 Air Quality Management Area (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 will implement key parts of the government's Clean Air Strategy and include targets for tackling air pollution in the UK; and
- Relevant to air quality:
    - For the Secretary of state for Defra to set long-term legally binding targets on air quality. These targets must be of at least 15 years in duration, and be proposed by late 2022;
    - For the Secretary of State to publish a report reviewing the Air Quality Strategy every five years;
    - For the government to set two targets by October 2022: the first on the amount of $PM_{2.5}$ pollutant in the ambient air (the figure and deadline for compliance remain unspecified) and a second long-term target set at least 15 years ahead to encourage stakeholder investment;

[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.

- 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 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 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 1sets out the national air quality standards 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.

Camden has adopted the more stringent standards of 38µg/m^3 for NO_2, and the WHO guideline limits for PM_{10} (20µg/m^3) and $PM_{2.5}$ (10µg/m^3) annual mean concentrations.

Table 1: Air quality standards

Pollutant	Averaging period	Air quality standard
Nitrogen Dioxide (NO_2)	Annual mean	40µg/m^3
	1-hour mean	200µg/m^3*
Fine Particulate Matter (PM_{10})	Annual mean	40µg/m^3
	24-hour mean	50µg/m^3**

Very Fine Particulate Matter ($PM_{2.5}$)	Annual mean	20µg/m^3
Notes: *not to be exceeded more than 18 times a year (99.8th percentile) **not to be exceeded more than 35 times a year (90.4th percentile)		

2.1.3 Clean Air Strategy

The Department for Environment, Food and Rural Affairs (Defra) Clean Air Strategy[6] 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.

2.2 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)[7] 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*

[6] Department for Environment, Food and Rural Affairs (2019), Clean Air Strategy.
[7] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework

> *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:

> *"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[8] 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[9];
- The London Environment Strategy[10];
- Sustainable Design and Construction Supplementary Planning Guidance[11];
- The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance[12];

[8] Department for Communities and Local Government (2014), Planning Practice Guidance.
[9] 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
[10] Greater London Authority (2018), The London Environment Strategy.

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

- Local Air Quality Management Technical Guidance[13];
- London Local Air Quality Management Technical Guidance[14];
- Air Quality Neutral London Plan draft Guidance[15];
- Air Quality Positive London Plan draft Guidance[16];
- Guidance on the assessment of odour for planning[17]; and
- Odour Guidance for Local Authorities[18].

Local Policy and Guidance

- Camden Local Plan[19];
- Camden Planning Guidance: Air quality[20];
- Camden Clean Air Action Plan 2019 – 2022[21];
- Manual B – Minimising air pollution from new developments[22]; and
- London Borough of Camden Draft Holborn Vision & Urban Strategy[23].

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)[24]. 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[25], 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

[13] Department for Environment Food and Rural Affairs (2021), Local Air Quality Management Technical Guidance (TG16).
[14] Greater London Authority (2019), London Local Air Quality Management Technical Guidance.
[15] GLA (2021) *London Plan Guidance Air Quality Neutral – Consultation draft*. Available online at: https://www.london.gov.uk/sites/default/files/air_quality_neutral_lpg_-_consultation_draft_0.pdf
[16] GLA (2021) *London Plan Guidance Air Quality Positive –Consultation draft*. Available online at: https://www.london.gov.uk/sites/default/files/air_quality_positive_lpg_-_consultation_draft_0.pdf
[17] Bull M, IAQM (2014), Guidance on the assessment of odour for planning.
[18] Defra, Odour Guidance for Local Authorities, March 2010 (withdrawn September 2017).
[19] Camden Borough Council (2017), Camden Local Plan.
[20] London Borough of Camden (2021), Camden Planning Guidance Air quality January 2021.
[21] London Borough of Camden (2019), Camden Clean Air Action Plan 2019-2022.
[22] London Borough of Camden (2013), Manual B – Minimising air pollution from new developments.
[23] London Borough of Camden (2019) Holborn Vision & Urban Strategy (Draft).
[24] BS 6069-2:1994, ISO 4225:1994 Characterization of air quality.
[25] Environmental Protection Act 1990, Part 3 Statutory Nuisances and Clean Air.

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).

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.

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[26];
- The Defra Local Air Quality Management website[27];
- The London Air website[28]; and
- London Borough of Camden (LBC)[29] local air quality monitoring data and reports.

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

[26] Environment Agency website, Available at: https://environment.data.gov.uk/public-register/view/search-industrial-installations [Accessed February 2021].
[27] Defra, Air Quality Management Areas website,
Available at: https://uk-air.defra.gov.uk/aqma/list [Accessed February 2021].
[28] London Air, Available at: https://www.londonair.org.uk/LondonAir/Default.aspx [Accessed February 2021].
[29] London Borough of Camden (2020), London Borough of Camden Air Quality Annual Status Report for 2019.

3.2 Method of Construction 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)[30]. 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:

- 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.

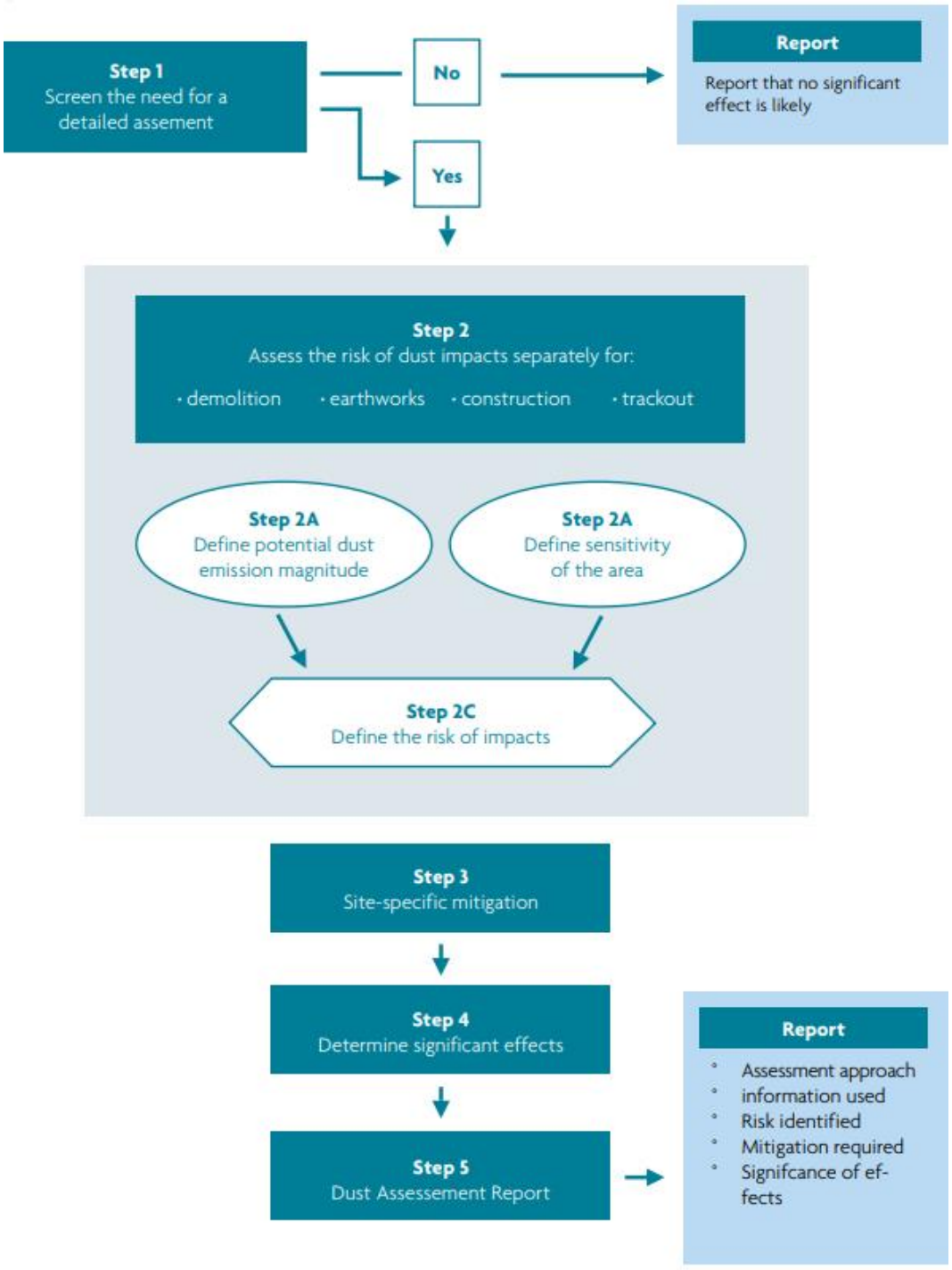
The methodology takes into account the scale at which the above effects are likely to be generated (classed as small, medium or large), the levels of background PM_{10} concentrations and the distance to the closest receptor, in order to determine the sensitivity of the area. This is then taken into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

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

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 B, Section B1.

Figure 2: IAQM dust methodology[30]



3.2.2 Construction Traffic Assessment

Construction air quality impacts from the proposed development may arise as a result of construction traffic along the local road network associated with the building of the proposed development. Construction traffic was screened against the EPUK/IAQM guidance Stage 2 criteria set out in Table 3.

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

The IAQM and Environment Protection UK (EPUK) guidance[31] includes two stages for assessing the need for an air quality assessment. Stage 1 includes the criteria shown in Table 2 which relate to the size and use of the site, provision of car parking and the inclusion of energy plant or other combustion processes. If the proposed development exceeds the Stage 1 criteria, the Stage 2 criteria apply. Stage 2 includes more specific criteria in relation to the anticipated traffic flows generated by the proposed development and nature of the local area (Table 3). As it is located within the borough wide Camden AQMA, the criteria in Table 3 relevant to AQMAs applies.

If these thresholds are not triggered, then a detailed air quality assessment can be scoped out. Should screening of the traffic data indicate that any of the criteria are met, then potential impacts at sensitive receptor locations can be assessed by calculating the predicted change in pollutant concentrations (NO_2, PM_{10} and $PM_{2.5}$) as a result of the proposed development.

Table 2: EPUK/IAQM guidance Stage 1 criteria

If any of the following apply	Coupled with any of the following
≥10 residential units or ≥0.5ha site area ≥1,000m^2 for other uses or ≥1ha site area	>10 car parking spaces centralised energy facility or other combustion process

Table 3: EPUK/IAQM guidance Stage 2 criteria

Change	In or adjacent to AQMA	Elsewhere
Change in Light Duty Vehicle (LDV) flows	≥100 Annual Average Daily Traffic (AADT)	≥500 AADT
Change in Heavy Duty Vehicle (HDV) flows	≥25 AADT	≥100 AADT
Change in road alignment	≥5m	n/a

[31] Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London.

3.3.2 Assessment of Significance

Should the thresholds in Section 3.3.1 be triggered and a detailed air quality assessment undertaken, then the assessment of impacts and significance of effects at sensitive receptors can be determined following the EPUK/IAQM guidance. This is best practice for undertaking air quality assessments.

Impact descriptors are determined based on the magnitude of incremental change as a proportion of the relevant assessment level, in this instance the air quality standards. The change is then examined in relation to the predicted total pollutant concentrations in the assessment year and its relationship with the relevant air quality standard (Table 4).

Table 4: Impact descriptors from EPUK/IAQM guidance

Predicted concentration relative to air quality standard	**% Change in concentrations relative to air quality standard**			
	1%	**2-5%**	**6-10%**	**> 10%**
< 75%	Negligible	Negligible	Slight	Moderate
76-94%	Negligible	Slight	Moderate	Moderate
95-102%	Slight	Moderate	Moderate	Substantial
103-109%	Moderate	Moderate	Substantial	Substantial
> 110%	Moderate	Substantial	Substantial	Substantial
Changes of less than 0.5% are described as negligible.				

The impact descriptors at each of the assessed receptors can be used as a starting point to make a judgement on the overall significance of effect of the proposed development, however other influences are also accounted for, such as:

- The existing future air quality in the absence of the proposed 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.

In circumstances where the proposed development can be judged in isolation, the guidance suggests that a ‘moderate’ or ‘substantial’ impact is likely to give rise to a significant effect and a ‘negligible’ or ‘slight’ is not likely to result in a significance effect.

3.4 Method of Air Quality Neutral Assessment

The Air Quality Neutral London Plan Guidance[11] has set an 'air quality neutral' policy through the use of emissions benchmarks. As stated in the SPG, "*developments that do not exceed these benchmarks will be considered to avoid any increase in NOx and PM emissions across London as a whole and therefore be air quality neutral*".

The Air Quality Neutral London Plan Guidance is currently a consultation draft[11] having recently been consulted on. As the updated document is still currently in the format of consultation draft, the published guidance from the SPG has been followed in this assessment.

The major changes between the 2014 and the 2021 guidance relate to land use categories and changes to the benchmarks. As such, it is not predicted that the outcome of the assessment would change substantially if the consultation draft methodology was used.

Transport Emission Benchmarks (TEBs) and Building Emission Benchmarks (BEBs) have been set for NOx and PM_{10} according to the land-use classes of the proposed development. NOx and PM_{10} emissions (kg/annum) for each land-use class in the proposed development need to be calculated and summed to give the total transport and building emissions. The TEBs and BEBs for the proposed development are then subtracted from the total transport emissions and total building emissions for the proposed development. The TEBs are presented in Table 5 and BEBs in Table 6.

Benchmark trip rates have been set for each land-use type and each area of London: CAZ, inner and outer. These are presented in Table 7. In order to calculate the emissions from the proposed development, the following information has been used:

- Gross floor area (GFA) (m^2); and
- Proposed development trip rates (trips/m^2/annum).

Should the outcome of the difference between the benchmark and the development trip rate be negative, this indicates that the transport emissions from the development are within the benchmark, and no mitigation or offsetting would be required.

Table 5: Transport Emissions Benchmarks for land-use classes

Land use	**CAZ**	**Inner**	**Outer**
NOx (g/m^2/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NOx (g/dwelling/annum)			
Residential (C3)	234	558	1,553

PM_{10} (g/m^2/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3)	40.7	100	267

Table 6: Building Emissions Benchmarks (g/m^2/annum) for land-use classes

Land use	**Type**	**NOx (g/m^2/annum)**	**PM_{10} (g/m^2/annum)**
Class A1	Retail	22.6	1.29
Class A3-A5	Restaurants, drinking establishments, takeaway	75.2	4.32
Class A2 and B1	Financial/professional services/business	30.8	1.77
Class B2 to Class B7	General Industrial	36.6	2.95
Class B8	Storage and Distribution	23.6	1.90
Class C1	Hotels	70.9	4.07
Class C2	Residential Institutions	68.5	5.97
Class C3	Residential Dwellings	26.2	2.28
Class D1 (a)	Medical and Health Services	43.0	2.47
Class D1 (b)	Creche, day centres	75.0	4.30
Class D1 (c-h)	Schools, Libraries	31.0	1.78
Class D2 (a-d)	Cinemas, concert halls	90.3	5.18
Class D2 (e)	Swimming Pools, gymnasium	284	16.3

Table 7: Benchmark trip rates (trips/m^2/annum) for land-use classes

Land-use	**CAZ**	**Inner**	**Outer**
Retail (A3)	153	137	170
Retail (A4)	2.0	8.0	-
Retail (A5)	-	32.4	590
Commercial (B2)	-	15.6	18.3
Commercial (B8)	-	5.5	6.5
Residential (C1)	1.9	5.0	6.9
Residential (C2)	-	3.8	19.5
Institutional (D1)	0.07	65.1	46.1

Land-use	CAZ	Inner	Outer
Institutional (D2)	5.0	22.5	49.0
Other (Sui Generis)	-	-	-

3.5 Method of Air Quality Positive Statement

A draft Air Quality Positive (AQP) Statement has been produced as per the GLA's Draft Air Quality Positive London Plan Guidance[16]. The air quality positive approach should be applied to developments at the plan making and application stages, shown in Figure 3. The AQP Statement structure is shown in Figure 4**.** For this assessment, the AQP statement has been produced using the 'planning application route'.

Figure 3: Routes to applying the air quality positive approach

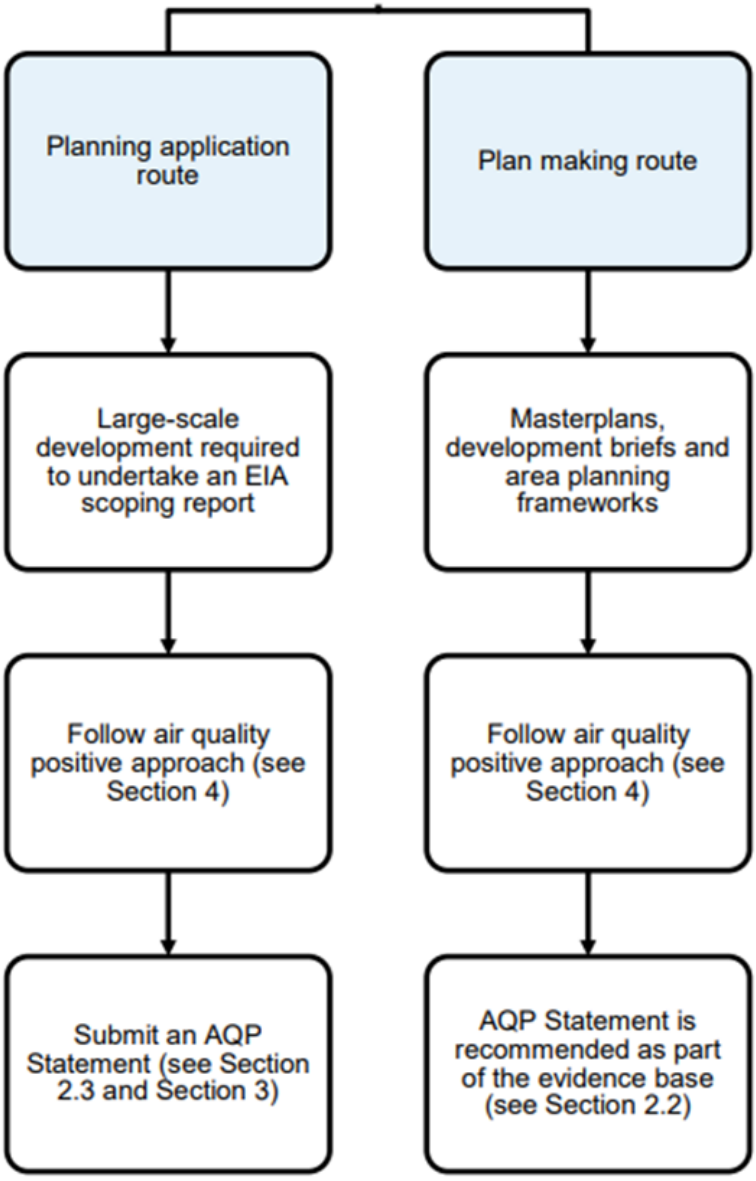


Figure 4: Air quality positive statement structure

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 that will benefit air quality and minimise exposure to poor air quality on the site 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 covering how measures will be secured, e.g. against variation in the future and actions to be taken if the predicted outcomes are not achieved. 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.

Further justification for scoping out the generators relates to 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(16) guidance[13], 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 (described in detail in Section 4.3), in the Camden ASR[29], the LondonAir website[28] and the Westminster 2020 ASR[32]. 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[11] 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 A class uses (the new E use class), 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. Odour regulations and guidance are presented in Appendix A, Section A3. Defra's guidance on the Control on Odour and Noise from Commercial Kitchen Exhaust Systems in January 2005[33] includes recommended odour abatement to mitigate odour risk. These should be taken into account when designing the commercial kitchens and extraction systems.

3.7 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.

Traffic data with sufficient detail of the recent road changes was unavailable at the time of writing this report, therefore a detailed assessment of road traffic emissions was not undertaken in this assessment. Further details are provided in Section 6.1.

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[33] Defra (2005), Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems (withdrawn September 2017).

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[34,35]. 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 (Figure 1). 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.

[34] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control).
[35] The Environmental Permitting (England and Wales) (Amendment) Regulations 2013, SI 2013/390.

There is a manual traffic count point from the Department for Transport (DfT)[36] 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 annual average daily flow from the traffic count point is presented in Table 8.

Table 8: 2019 manual traffic count for A40 High Holborn (57538)

Year	All motor vehicles	Heavy goods vehicles	Light goods vehicles	Buses and coaches	Cars and taxis	Two wheeled motor vehicles	Pedal cycles
2019	10,004	250	1,670	423	6,506	1,154	933

As part of the West End project[37] LBC are making 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.

There is also no recent traffic data available for the roads in the vicinity of the site 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.

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)[38]. The fleet projections for Central London from 2019 to year of opening (2024) are presented in Table 9. 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.

[36] Department of Transport, Road traffic statistics, Manual count points; Available at: https://roadtraffic.dft.gov.uk/manualcountpoints/57538 [Accessed February 2021].
[37] London Borough of Camden, West End project; Available at: https://www3.camden.gov.uk/westendproject/the-project/ [Accessed June 2022].
[38] 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].

Table 9: Central London NAEI fleet projections from 2019 to 2024

Vehicle type	2019	2020	2021	2022	2023	2024
Cars						
Electric	0.2%	0.3%	0.3%	0.4%	0.5%	0.6%
Petrol	27.6%	27.3%	26.9%	27.0%	27.0%	27.0%
Diesel	19.0%	19.2%	19.4%	19.3%	19.1%	19.0%
Taxis	20.7%	20.7%	20.7%	20.6%	20.6%	20.5%
Light Good Vehicles (LGV)						
Electric	0.3%	0.3%	0.4%	0.5%	0.6%	0.7%
Petrol	0.3%	0.4%	0.4%	0.3%	0.3%	0.3%
Diesel	13.0%	13.1%	13.2%	13.3%	13.4%	13.4%
Heavy Good Vehicles (HGV)						
Rigid	3.9%	3.9%	3.9%	3.9%	3.9%	3.8%
Artic	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Buses						
TfL	5.5%	5.4%	5.4%	5.4%	5.3%	5.3%
Non-TfL Buses / Coaches	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Motorcycles						
Motorcycles	7.7%	7.7%	7.6%	7.6%	7.6%	7.6%

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 has national fleet predictions from 2004 to 2050. The national fleet projections from baseline 2019 to future opening year 2024 are presented in Table 10.

Table 10: National DfT fleet projections from 2019 to 2024

Vehicle type	2019	2020	2021	2022	2023	2024
Cars						
Electric	0.9%	1.2%	1.7%	2.3%	3.1%	4.1%
Petrol	48.3%	48.7%	49.0%	49.3%	49.5%	49.8%
Diesel	50.7%	50.1%	49.3%	48.4%	47.3%	46.1%
Light Good Vehicles (LGV)						
Electric	0.2%	0.2%	0.3%	0.4%	0.7%	1.1%

Vehicle type	2019	2020	2021	2022	2023	2024
Petrol	1.4%	1.3%	1.3%	1.2%	1.2%	1.1%
Diesel	98.3%	98.4%	98.5%	98.4%	98.2%	97.8%
Ordinary Goods Vehicle 1 (OGV1) - All larger rigid vehicles with two or three axles (up to 26 tonnes)						
Diesel	100%	100%	100%	100%	100%	100%
Electric	0%	0%	0%	0%	0%	0%
Ordinary Goods Vehicle 2 (OGV2) – Includes all rigid vehicles with four or more axles and all articulated vehicles (over 26 tonnes, and artics)						
Diesel	100%	100%	100%	100%	100%	100%
Electric	0%	0%	0%	0%	0%	0%
Public Service Vehicle (PSV)						
Diesel	100%	100%	100%	100%	100%	100%
Electric	0%	0%	0%	0%	0%	0%

As seen in Table 10, DfT predicts no electric vehicles for OGV1, OGV2 or PSV from 2019 to 2024. This is a conservative national prediction with the assumption that the roads around the site will have electric buses (PSV) as part of the fleet composition. 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 Annual Status Report (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[39], which was declared in September 2002 for exceedances of the annual mean NO_2 and daily mean PM_{10} standards.

4.3 Local Monitoring

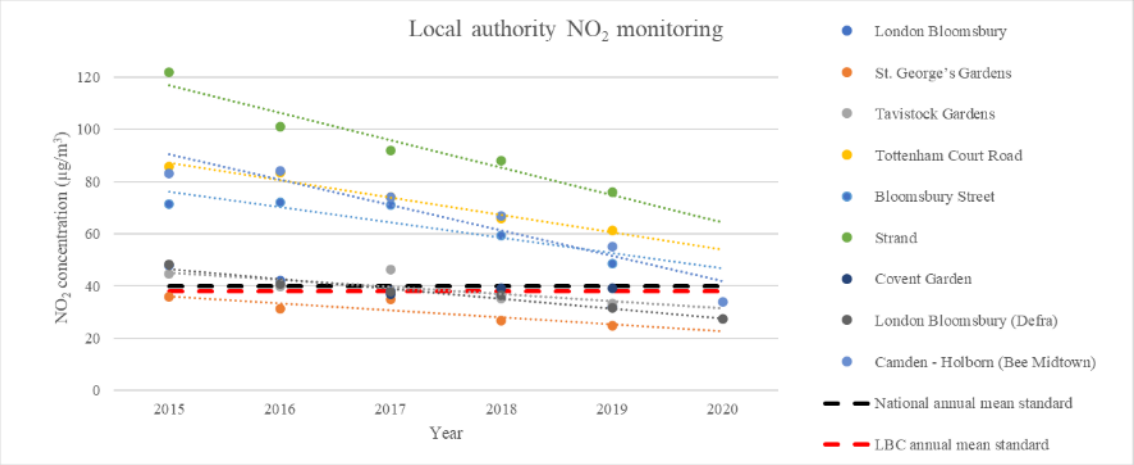
This section presents data for the local air quality monitoring within 1km of the site. The Council undertake both continuous and passive monitoring of air quality. The latest year of published monitoring data is presented in this section; 2019 for Camden and Westminster and 2020 for Defra and LondonAir.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

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

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 Ccouncil[29], WCC[40], Defra[41] and the LondonAir[42] network. The trends in monitoring data from 2015 to 2020 are presented in graphical form (Figure 5 to Figure 7) with all monitoring locations and their 2019 NO_2 concentrations shown in Figure 8. The measurements (where available) from 2015 to 2020 are presented in Appendix C.

Figure 5: Local authority NO_2 monitoring within 1km of the site boundary

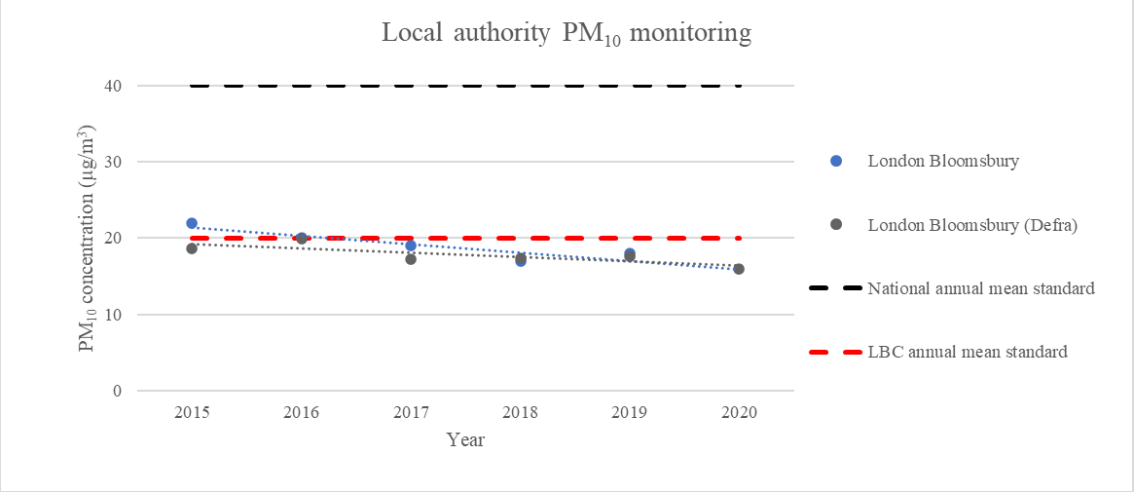


It can be observed that there has been a reduction in NO_2 concentrations in recent years. In 2019, five of the sites were below the annual mean NO_2 standard (40µg/m^3). These five sites are all defined as 'Urban background' locations. However, LBC has adopted the more stringent annual mean NO_2 standard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

[40] Westminster City Council (2020), Air Quality Annual Status Report for 2019
[41] 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].
[42] LondonAir, LAQN Monitoring Sites; Available at: http://www.londonair.org.uk/london/asp/publicdetails.asp

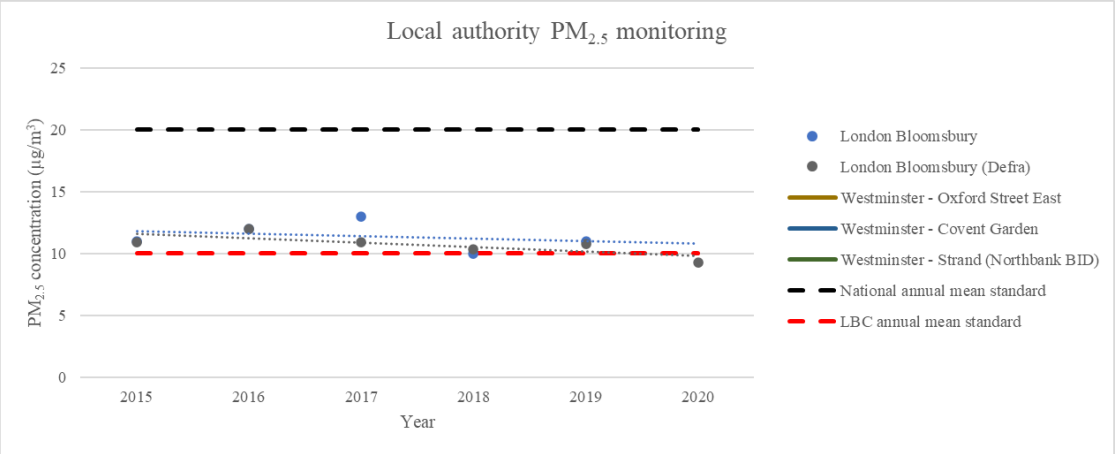
Figure 6: Local authority PM_{10} monitoring within 1km of the site boundary



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. 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 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 LBC annual mean PM_{10} standard of 20µg/m^3.

Figure 7: Local authority $PM_{2.5}$ monitoring within 1km of the site boundary

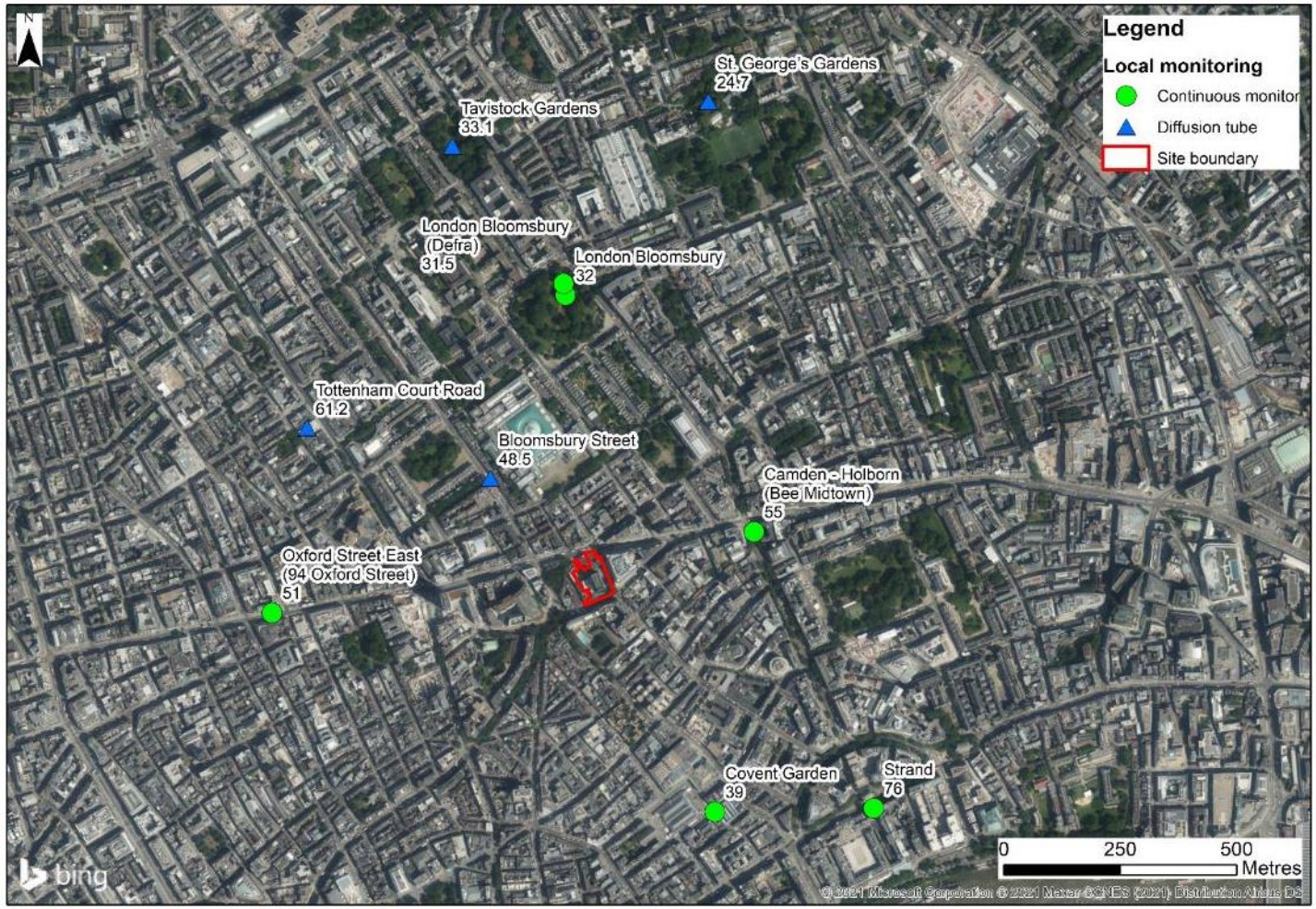


There is no defined trend seen in the $PM_{2.5}$ monitoring in the past six years. From 2015 to 2019 both sites within 1km of the site boundary monitored concentrations well below the annual mean $PM_{2.5}$ standard (20µg/m^3). All sites across from 2015 to 2020 monitored concentrations greater than LBC's more stringent annual mean

standard of 10µg/m^3, except for Defra London Bloomsbury measuring 9.3µg/m^3 in 2020. As previously mentioned, data from 2021 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 LBC's annual mean standard (10µg/m^3).

Figure 8: 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 (NOx, NO_2, PM_{10} and $PM_{2.5}$) for each 1x1km OS grid square for each local authority area[43]. Background maps are available for 2017 and projected through to 2030.

Background pollutant concentrations for the baseline year of 2019 and the future opening year of 2024 have been obtained for the grid square in which the site is located (530500, 181500) and are shown in Table 11. It can be observed that the annual mean background concentrations for 2019 are above both the national and LBC NO_2 air quality standards, below for PM_{10} and below the national $PM_{2.5}$ standard but above the LBC $PM_{2.5}$ standard. For the future opening year (2024) NO_2 and $PM_{2.5}$ still exceed the LBC annual mean standards.

Table 11: Defra background pollutant concentrations in 2019 and 2024

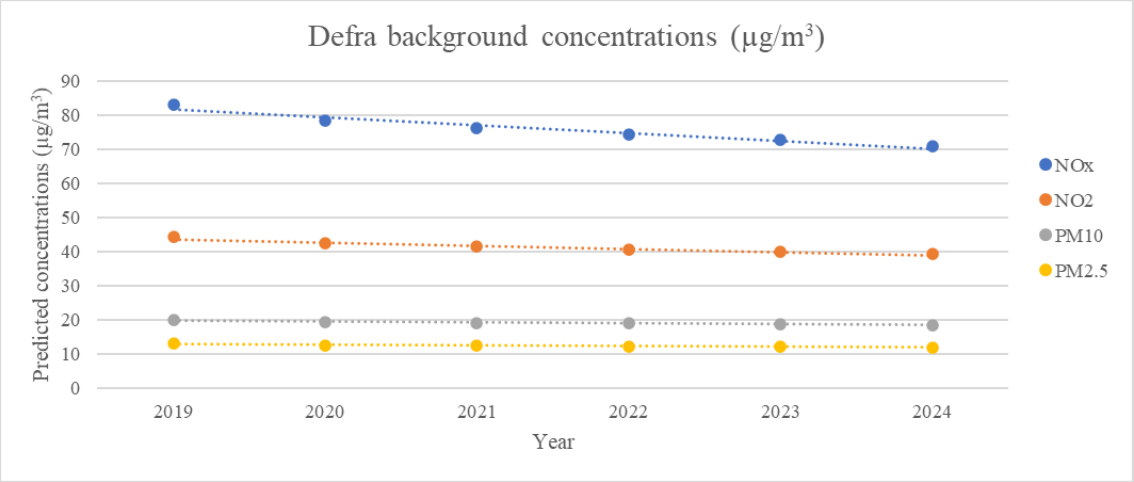
Year	OS grid square		Annual mean concentrations (µg/m^3)			
	X	Y	NOx	NO_2	PM_{10}	$PM_{2.5}$
2019	530500	181500	83.1	**44.2**	19.9	12.9
2024			71.0	39.1	18.5	11.9
National annual mean standard			-	40	40	20
LBC annual mean standard			-	38	20	10

Exceedances of the annual mean standard are denoted in **bold**

Figure 9 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 LBC annual mean standards.

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

Figure 9: Defra background pollutant concentrations from 2019 to 2024 for NOx, NO_2, PM_{10} and $PM_{2.5}$ ($\mu g/m^3$)



A comparison against monitoring background concentrations has also been undertaken for the five urban background sites within 1km of the Site (London Bloomsbury, London Bloomsbury (Defra), St George's Gardens, Tavistock Gardens and Covent Garden). The comparison has been undertaken for the latest year of available monitoring data (2019). Table 12 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 12: Comparison between Defra and monitored urban background concentrations in 2019

Pollutant	Estimated Defra background concentration ($\mu g/m^3$)	Measured concentration ($\mu g/m^3$)	Difference between measured and monitored ($\mu g/m^3$) and %	
London Bloomsbury				
NO_2	39.3	32.0	7.3	22.7%
PM_{10}	20.3	18.0	2.3	13.0%
$PM_{2.5}$	12.9	11.0	1.9	17.4%
London Bloomsbury (Defra)				
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				
NO_2	39.3	24.7	15	58.9%
Tavistock Gardens				
NO_2	39.6	33.1	6.5	19.5%
Covent Garden				
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.

4.4.2 London Atmospheric Emissions Inventory (LAEI)

The London Atmospheric Emissions Inventory (LAEI)[44] provides emissions estimates of key pollutants by source type with the current base year of 2016. Concentrations of NO_2, NOx, 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 10.

The majority of the site is within the 45-50µg/m^3 and 50-55µg/m^3 concentration bands for NO_2 for the LAEI baseline year 2016. The northern and southern ends of the site are within the 55-60µg/m^3 and >60µg/m^3 concentration bands.

Table 13 presents the estimated 2016 (latest year published) LAEI concentrations for three points across the site.

Table 13: LAEI's estimated 2016 pollutant concentrations

Site location	**2016 annual mean concentrations (µg/m^3)**			
	NOx	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
Centre	100.9	49.4	26.7	16.4
Northern edge	103.9	50.3	26.9	16.4
Southern edge	100.1	49.2	26.7	16.4
National annual mean standard	-	40	40	20
LBC annual mean standard	-	38	20	10

Exceedances of the annual mean standard are denoted in **bold**

The previous LAEI data (2013) included 5-year predictions for 2020, 2025 and 2030. These future predictions are not currently available for the 2016 dataset. The 2013 prediction for 2025 (the year after future opening year) is shown in Figure 11. As seen in the figure, the concentrations are predicted to be below the annual mean NO_2 standard at the majority of the site. It is expected that the 2016 data would show a similar decrease in concentrations however as the data is not available this cannot be determined. It is noted that this figure is provided for reference only as the data is out of date.

[44] Greater London Authority (2016), London Atmospheric Emissions (LAEI); Available at: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016 [Accessed February 20201].

Figure 10: LAEI baseline annual mean NO_2 for the area surrounding the site boundary

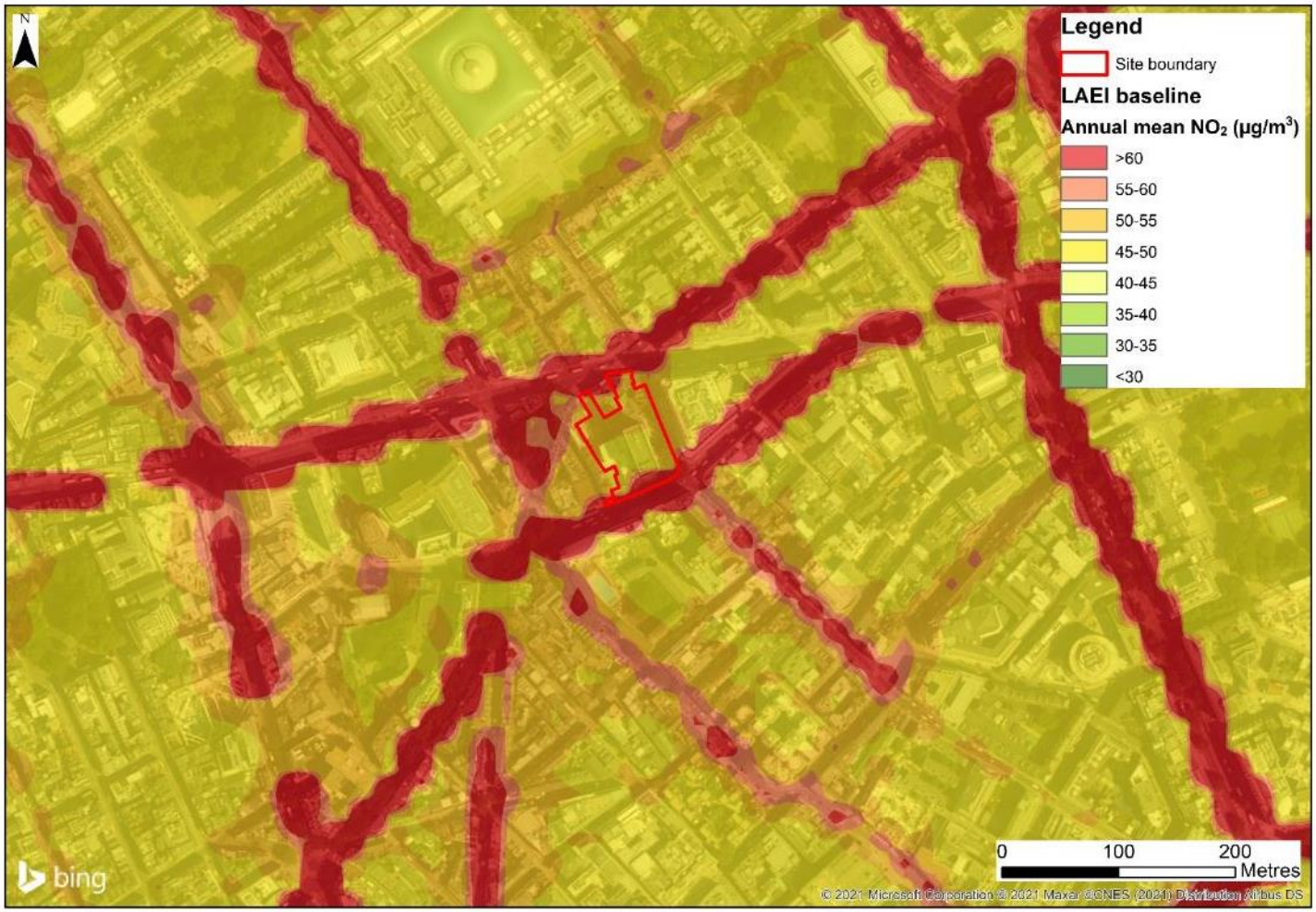
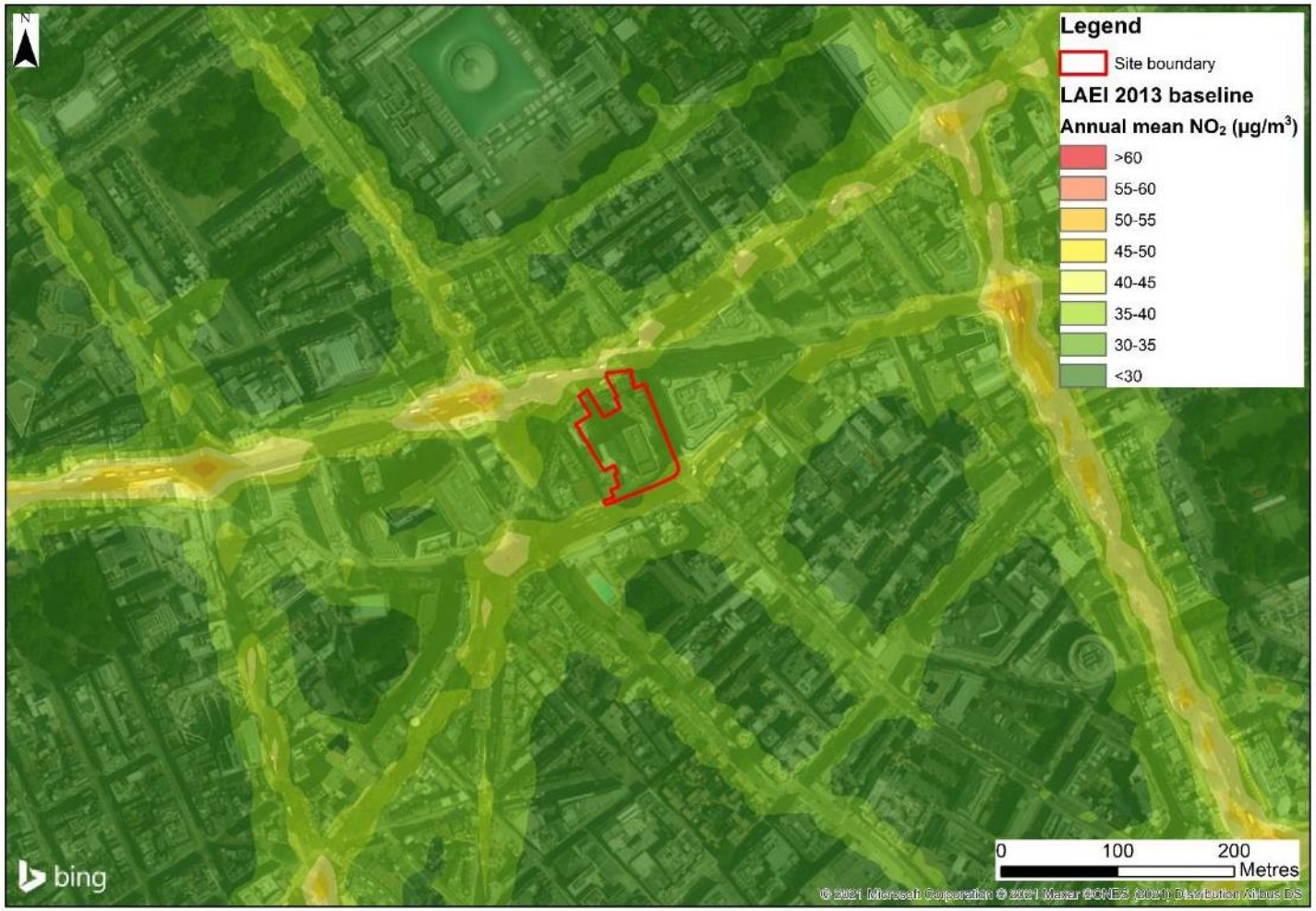


Figure 11: LAEI predicted 2025 annual mean NO_2 for the area surrounding the site boundary using superseded 2013 data



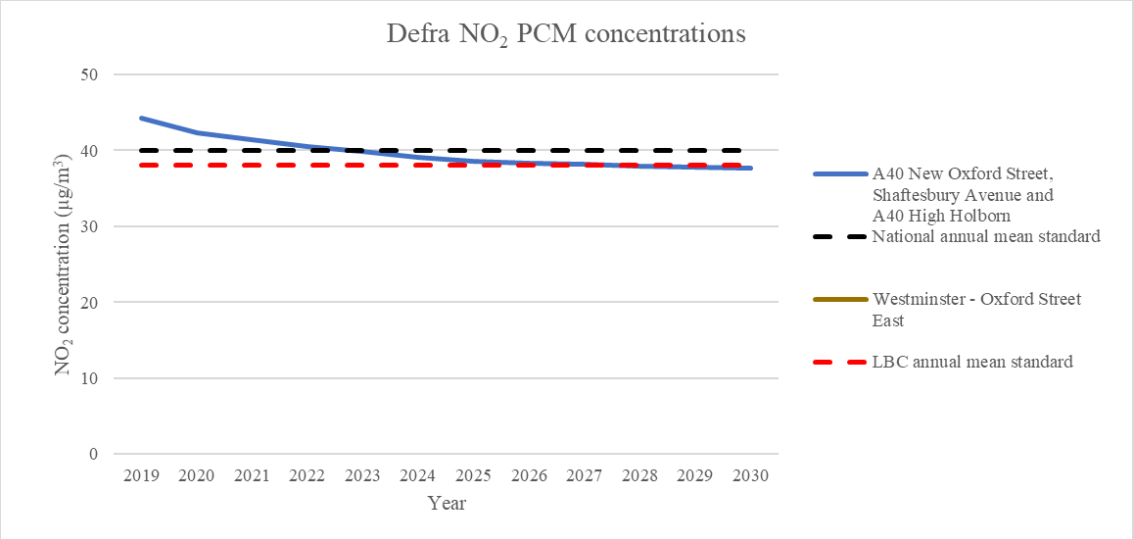
4.5 Pollution Climate Mapping (PCM)

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 has been 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[45,46]. As seen in Figure 12, 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 12: 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 13.

4.6 Summary of Baseline Conditions

The air quality concentrations currently at the site are close to or exceeding the LBC annual mean standards for all pollutants of interest (NO_2, PM_{10}, $PM_{2.5}$). The

[45] Department for Environment Food & Rural Affairs (2017), Air quality plan for nitrogen dioxide (NO_2) in the UK
[46] Department for Environment Food & Rural Affairs (2017), Air Quality Plan for tackling roadside nitrogen dioxide concentrations in Greater London Urban Area (UK0001)

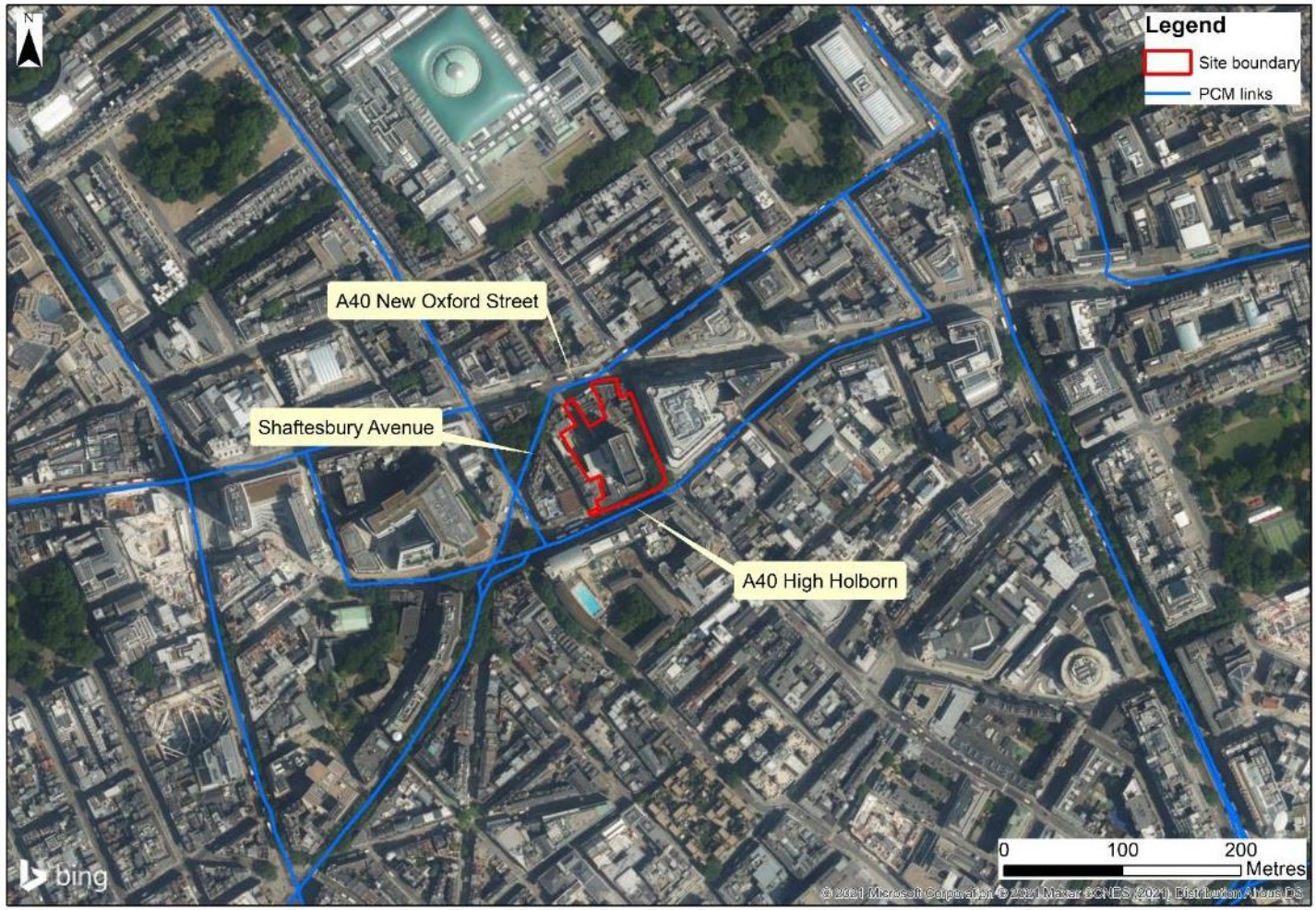
site is located in the Camden AQMA which has been declared for exceedances in the annual mean NO_2 and daily mean PM_{10} standards.

As the site boundary abuts the road, the site can be classed as ‘kerbside’. 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. 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).

Figure 13: PCM links surrounding the site boundary



5 Construction Phase

5.1 Construction Dust Assessment

The IAQM[30] and GLA[11] 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.

There are no sensitive ecological sites sensitive within 50m of the site; therefore, this element of the assessment has not been considered further. Figure 14 displays the construction dust buffers around the site.

5.1.2 Dust Emission Magnitude

Each dust generating activity has been assigned a dust emission magnitude as shown in Table 14.

Table 14: 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

Activity	Dust emission magnitude	Reasoning
		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 lower criterion for background PM_{10} concentrations in the IAQM guidance is 24µg/m^3. 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

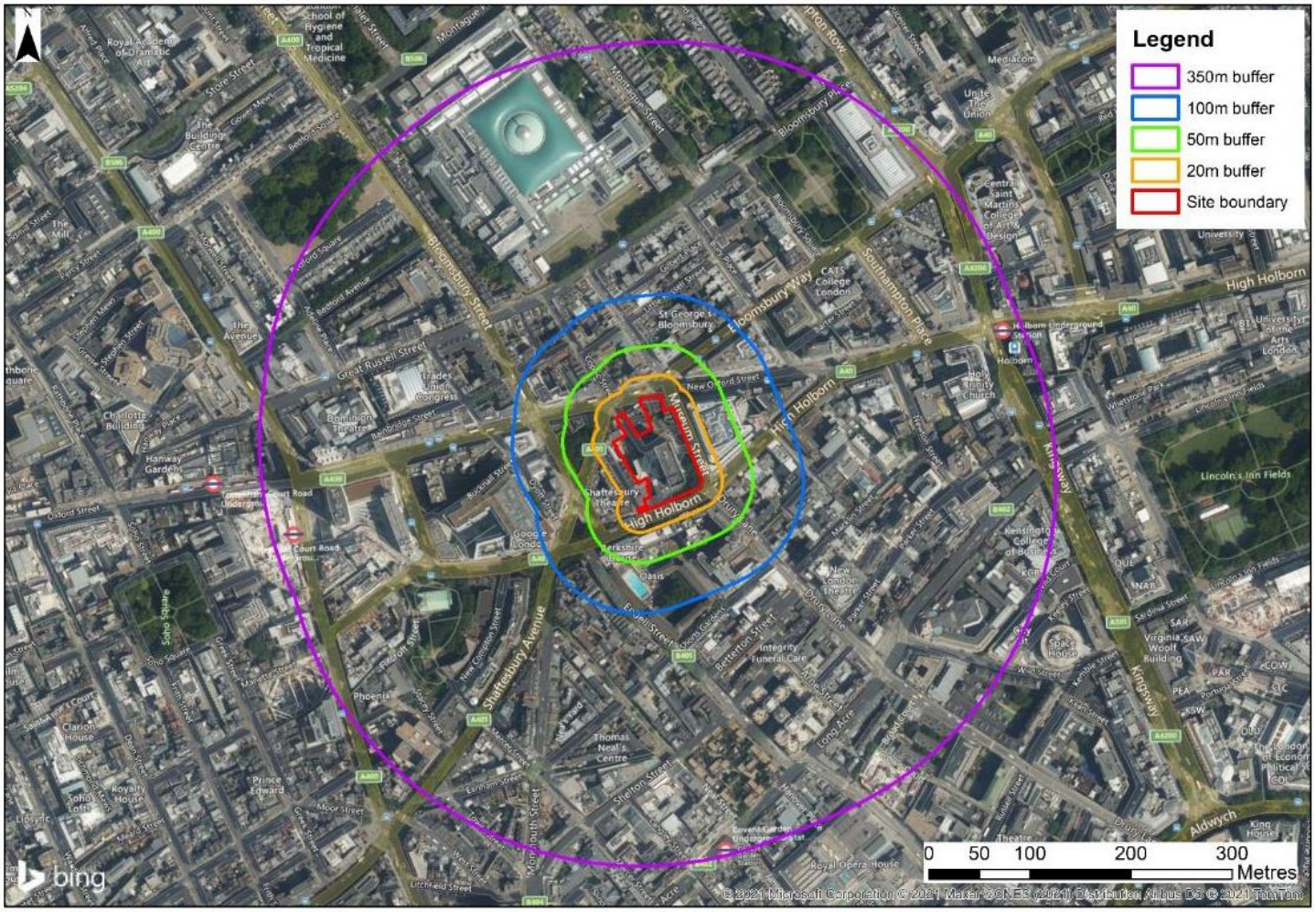
Due to the lack of detailed construction information at the time of writing a conservative approach has been undertaken with high level assumptions presented in Table 14. Taking into consideration the dust emission magnitude and the sensitivity of the area, the risk of dust impacts due to the site has been determined, as outlined in Table 15. 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 15: 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 14: Construction dust buffers



5.2 Construction Traffic Emissions

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 flow is yet to be determined in detail, when it is known it will be screened against the EPUK/IAQM screening criteria (Table 2 and Table 3) to determine whether a detailed assessment using dispersion modelling needs to be included in this assessment. It is not anticipated that traffic emissions associated with the construction of the site would result in any significant local air quality effects.

6 Operational Phase

6.1 Road Traffic Emissions

To fully understand the impact of the proposed development on the air quality conditions in the vicinity of the site, traffic flow data for the main roads around the site are required. This traffic data would reflect any recent changes to the road network (e.g. West End Project (WEP) including High Holborn becoming two-way to traffic between Shaftesbury Avenue and Museum Street). This change would redistribute local traffic around the site. It is also noted that current traffic flows are expected to be significantly impacted by Covid-19 travel restrictions and therefore are not representative of a typical baseline, meaning local traffic surveys without adjustment would not be a valid source of data. The Council advised Arup transport consultants that traffic data reflecting these recent road changes is not available.

A review of alternative data sources from other studies was undertaken. The availability, age (e.g. Centre Point scheme (Ref: 2012/2895/P) data collated over 8 years ago) and geographical extent (e.g. WEP proposal (CENV/2014/20) not including Museum Street and Grape Street) meant that the data was not suitable to be used to sufficiently assess the impact of the proposed development traffic on local air quality.

The proposed development is likely to have beneficial impact on local traffic flows, on account of the scheme replacing a 228 space Multi Storey Car Park with a car-free development generating a limited number of daily vehicular servicing trips (68 deliveries a day). The unavailability of a suitable data source to indicate local traffic flows post WEP, and the minor impact anticipated to be made by the scheme means that it would be suitable to scope out a detailed AQ modelling assessment of traffic emissions. The daily delivery vehicle movements are below the EPUK/IAQM screening criteria set out in Table 3.

7 Air Quality Neutral Assessment

The Air Quality Neutral London Plan Guidance is currently under consultation[11]. As the updated document is still currently in the format of consultation draft, the published guidance from SPG has been followed in this assessment.

The major changes between the 2014 and the 2021 guidance relate to land use categories and changes to the benchmarks. Given how far below the benchmarks the emissions are, it is not predicted that the outcome of the assessment would change substantially if the consultation draft methodology was used. Under the new guidance, as this development is car-free (apart from the servicing trips and disabled parking), an assessment of transport emissions would not be required. Using the existing SPG AQN methodology provides a conservative 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. Normally, emissions from back-up generators are not included in an air quality neutral assessment and the air quality neutral planning support update[47] does not explicitly state that back-up generators should be included in the assessment or whether they have been considered in the benchmark emissions for each land-use. However, these emissions have been included in this assessment as a conservative case.

The GLA SPG[11] provides emission rates of NOx and PM_{10} for each land-use. The emission rates have been combined with the gross internal area (GIA) in Table 16 to determine the Building Emission Benchmark (BEB), as shown in Table 17. To calculate the BEB the gross internal area (GIA) has been used in place of GFA, which is the parameter used in the SPG. The BEB is independent of whether the proposed development is in the CAZ, inner or outer London.

Table 18 compares the BEB with the TBE and shows that NOx and PM_{10} for the proposed development are below the benchmark.

Table 16: BEB rates for land-uses (g/m^2/annum) and proposed GIA (m^2)

Land-use	NOx (g/m^2/annum)	PM_{10} (g/m^2/annum)	Proposed GIA (m^2)
Class A1	22.6	1.29	733
Class A3-A5	75.2	4.3	733
Class A2 and B1	30.8	1.77	23,359
Class C3	26.2	2.28	2,906

Table 17: Calculation of the BEB (kg/annum)

Land-use	NOx (kg/annum)	PM_{10} (kg/annum)

[47] GLA (2014) Air Quality Neutral Planning Support Update: GLA 80371.

Class A1	16.6	0.9
Class A3-A5	55.1	3.2
Class A2 and B1	719.5	41.3
Class C3	76.1	6.6
BEB (kg/annum)	**867.3**	**52.1**

Table 18: Comparison of the TBE and the BEB (kg/annum)

Pollutant	**TBE (kg/annum)**	**BEB (kg/annum)**	**Difference (TBE – BEB) (kg/annum)**	**Outcome**
NOx	57.6	867.3	-809.7	Within benchmark
PM10	0.4	52.1	-51.7	Within benchmark

7.2 Transport Emissions

In order to assess the proposals against the 'air quality neutral' policy, the Total Transport Emissions (TTEs) and the transport emission benchmarks (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.

The development trip rates, are calculated using the equation below and are shown in Table 19.

Equation 1: Formula used to calculate development trip rates

$$Development\ trip\ rates = \frac{Trips\ in\ AADT\ \times 365}{GFA}$$

The total transport NOx and PM_{10} emissions have been calculated using the estimated development trip rates (trips/m^2/annum), for the various areas included in the proposed development, an average distance travelled by car per trip (km) as provided in the SPG and average pollutant emission factors (g/vehicle/km) from the SPG.

The NOx and PM_{10} TEB have been calculated using the GIA and the relevant benchmarks from the guidance. Table 20 shows the comparison of the TTE and

TEB for the proposed development per pollutant. The transport emissions are below the relevant benchmarks.

Table 19: GIA and development trip rates for the proposed development

Land-use	GIA (m^2)	Units	Development trip rates (trips/m^2/annum)
Retail (Classes A1-A5)	1,676	n/a	22
Commercial (Class B1)	25,824	n/a	41
Residential (Classes C2-C4)	n/a	48	5

The guidance provides a set of benchmark trip rates and TEB dependent on location. The site is located in central London and therefore falls under the Central Activity Zone (CAZ).

The total transport emissions for the proposed development have been calculated using the GIA and development trip rate information, along with average distances and emission factors for the CAZ. These have been calculated for the retail, commercial and residential land-use classes. Table 20 provides the TTE for the proposed development and the comparison against the TEB.

Table 20: Comparison of Site TTE and TEB

Land-use	NOx (kg/annum)		PM_{10} (kg/annum)	
	TTE	TEB	TTE	TEB
Retail (Classes A1-A5)	32	248	5	43
Commercial (Class B1)	19	30	3	5
Residential (Classes C2-C4)	3	7	1	1
Total	**54**	**284**	**9**	**49**
Difference (TTE-TBE)	**-231**		**-40**	

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. Under normal conditions, the only emissions are expected from the testing of these back-up generators. The predicted annual emissions from the generators are below the benchmark emissions for both NOx and PM_{10}.

The annual emissions calculated from the predicted traffic movements are below the benchmark emissions for both NOx and PM_{10}.

Therefore, the proposed development is considered to be ‘air quality neutral’.

According to the London Plan[9] 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 228 space NCP Multi Storey Car Park) and promotes active travel through the inclusion of cycle parking provision (in accordance with the London Plan Cycle Parking Standards[9]) 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.

As the emissions calculated for the proposed development are well below the benchmark, it is not considered that the outcome of the assessment would change if the consultation draft methodology was used.

8 Air Quality Positive Statement

The draft Air Quality Planning (AQP) statement has been prepared following the structure below, in line with the Air Quality Positive Draft Guidance[16]:

- Introduction
- Constraints and opportunities
- Measures adopted
- Implementation and monitoring

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 project manager and 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 21.

Table 21: Constraints and opportunities for the Proposed Development.

Constraints and opportunities	Documents as part of the planning application
Statutory designations (AQMA, focus area)	Air Quality Assessment
Major off-site sources of air pollution	
A general overview of off-site sensitive receptors	Design Access Statement (DAS)
Improvements to pedestrian access and improved cycle parking facilities	DAS

8.3 Measures Adopted

The AQP measures are outlined below in Table 22.

8.4 Implementation and Monitoring

The means of implementing the above measures are outlined below in Table 23, in addition to any requirements for monitoring.

Table 22: 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**	
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.
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	Reduced emissions from the operational phase.	Design and Access Statement	No	Yes	Secured through agreed plans.

		modes of transport.					
Visitor, office, and resident cycle parking spaces	Provision of 500 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.	Design and Access Statement	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.

Table 23: 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.
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.
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.

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[30]. 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
- If required, 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

- Only use cutting, grinding or sawing 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;
- 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;

- 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 10 m from receptors where possible.

9.2 Operational Phase

The local authority air quality monitoring presented within 1km of the site boundary was measured at a range of heights (1.7 to 4m) at urban background, roadside and kerbside locations. As the site boundary abuts the road, the site can be classed as kerbside with heights 1.7 to 4m representative of human exposure from street to first floor level. 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.

It has therefore been recommended that no operable panels (natural ventilation) are located on the ground, first or second floors of the building. Pollutant concentrations are likely to reduce with height and therefore operable panels may be appropriate for higher floors.

In addition, it has been advised that air inlets/outlets 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 exceed 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 LBC 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 LBC 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 it could be defined as 'kerbside' therefore, 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 LBC 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 228 space multi-storey car park currently occupying the site location. Current estimates on vehicle fleet composition for 2024 show that there would be less than 2% of electric vehicles (cars and light goods vehicles) (NAEI estimates). This is a conservative estimate and it is likely that the proportion of electric vehicles in the fleet will be higher in future years to account for the Government's net zero carbon targets.

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 emissions associated with the additional traffic are expected to the negligible. Therefore, no significant effects would be likely from the additional traffic during operation of the proposed development.

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.

10.1 LBC Air Quality Planning Checklist

All major developments in LBC require the completion of the checklist[48] 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.

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[9].

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[49]?

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?)

[48] London Borough of Camden (2019), Air Quality Planning Checklist.
[49] Greater London Authority (2014), Sustainable Design and Construction Supplementary Planning Guidance.

Answer: Building air intakes have been located away from main roads and generators exhausts. Natural ventilation is not recommended on the ground, first or second floors.

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.

Appendix A

Regional and Local Policy and Guidance

A1 Regional Policy and Guidance

A1.1 The London Plan

The London Plan[9] 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:*

   1) *Development proposals should not:*

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

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

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

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

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

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

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

C. *Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air*

quality positive approach. To achieve this a statement should be submitted demonstrating:

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

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

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

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

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:*

1) *reduce the amount of heat entering a building through orientation, shading, high albedo materials, fenestration, insulation and the provision of green infrastructure*

2) *minimise internal heat generation through energy efficient design*

3) *manage the heat within the building through exposed internal thermal mass and high ceilings*

4) *provide passive ventilation*

5) *provide mechanical ventilation*

6) *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.

A1.2 The London Environment Strategy

The London Environment Strategy (LES)[10] 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.

A1.3 Sustainable Design and Construction Supplementary Planning Guidance

The GLA published the Supplementary Planning Guidance (SPG) for Sustainable Design and Construction[11] in April 2014. Section 4.3 of the SPG focuses on air pollution and provides guidance on when assessments should be undertaken and how intelligent design can help to minimise the effect of a development on local air quality. The primary way in which the guidance aims to minimise air quality impacts is by setting an "air quality neutral" policy for developments. The policy sets benchmarks against which the annual emissions of NOx and PM_{10} from the buildings' operation and transport are assessed.

Emissions benchmarks for transport are outlined in the SPG for Central London Activity Area (CAZ), Inner and Outer London. For transport emissions the GLA SPG guidance states that:

> *"Developments should be designed to encourage and facilitate walking and cycling and the use of public transport. This will enable air pollutants deriving from a particular development to be minimised. To further support this policy, boroughs should also ensure developments do not exceed local car parking standards."*

A1.4 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[12] 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 NOx from construction and

demolition machinery by means of a new non-road mobile machinery (NRMM) ultra-low emissions zone (ULEZ).

A1.5 London Local Air Quality Management Technical Guidance

The Defra Local Air Quality Management Technical Guidance (TG16)[13] 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))[14] 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 (LAQM.TG(16)), 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.

A2 Local Policy and Guidance

A2.1 London Borough of Camden

Camden Local Plan

The Camden Local Plan[19] 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."*

LBC provide 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[48]. 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[19], in 2021 the Council prepared an air quality Camden Planning Guidance (CPG)[20]. 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*[21]".

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[21] 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*."

A3 Odour Regulation and Guidance

A3.1 Regulation

Generally, kitchen vents are not regulated under environmental legislation. At the planning stage the arrangements for ventilation will be examined to ensure compliance with building regulations. In addition, at planning, it is likely that the local environmental health officer would wish to be satisfied that a new vent would not give rise to a statutory nuisance under the Environmental Protection Act.

Kitchen ventilation systems are regulated under Health and Safety and Food Hygiene legislation and generally require that kitchens are provided with sufficient air to maintain a safe working environment. As a result, many kitchens have automatic systems that shut down the cooking appliances if the ventilation system fails.

10.1.1 Guidance on the Control of Odour and Noise from Commercial Kitchen Exhaust Systems

Defra has published various guidance on odours but withdrew all these documents in September 2017. However, it has not replaced any of these with new guidance and there is no indication if any of the guidance will be replaced. Some of this guidance remains useful to making an assessment and is discussed below.

Defra produced guidance on the Control on Odour and Noise from Commercial Kitchen Exhaust Systems in January 2005[33]. This guidance notes that odour is the response of our brains to chemicals in the atmosphere that we breathe. The human nose is very sensitive to odour and can detect the presence of some chemicals at very low concentrations that would be difficult for instruments to measure. The environment is rarely “odour free” even in places that are perceived to be clean such as rural areas or by the sea. Our response to odours depends on four interlinked (sensory) characteristics:

- Hedonic tone: this is a judgement of the relative pleasantness or unpleasantness of an odour made by assessors in an odour panel;
- Quality/Characteristics: this is a qualitative attribute which is expressed in terms of “descriptors”, e.g. “fruity”, “almond”, “fishy”. This can be of use when establishing an odour source from complainants’ descriptions;
- Concentration: the “amount” of odour present in a sample of air. It can be expressed in terms of parts per million, parts per billion or in mg/m^3 of air for a single odorous compound. More usually a mixture of compounds is present and the concentration of the mixture can be expressed in odour units per cubic metre (ou_E/m^3) (see definition below); and
- Intensity: is the magnitude (strength) of perception of an odour (from faint to strong). Intensity increases as concentration increases but the relationship is logarithmic. Increases or decreases in concentration of an odour do not always

produce a corresponding proportional change in the odour strength as perceived by the human nose.

The most commonly used attribute is the concentration of odours; this is measured in European odour units (ou_E/m^3). This is measured by olfactometry which involves using a device known as an olfactometer which presents a sample of odour at different dilutions to a trained panel. The panel is asked whether they are able to detect odour at various concentrations. Once only 50% of the panel can detect the odour it is considered to be at its "Detection Threshold". The odour concentration at the Detection Threshold is defined to be 1 ou_E/m^3. For instance, if an odour sample has been diluted in an olfactometer by a factor of 10,000 to reach the detection threshold, then the concentration of the original sample is 10,000 ou_E/m^3.

Defra notes in recent general guidance[18] that 5 ou_E/m^3 would be a 'faint' odour whilst 10 ou_E/m^3 would be considered a 'distinct' odour. Generally, an average person would be able to recognise the source of an odour at about 3 ou_E/m^3 although this can depend on the relative offensiveness of the odour. Background odour levels can be some 5-60 ou_E/m^3 or more.

This guidance notes that the main issue with odour is its ability to result in an effect that is "objectionable". The guidance notes that an offensive odour can occur at concentrations of compounds that are far below the level that would result in an effect on the physical health of humans.

The Defra kitchen guidance notes that there are three factors that influence the production of odour from a commercial kitchen:

- Size of the facility – This influences the volume of ventilation air handled and the intensity of the odour.
- Type of food prepared – This affects the chemical constituents in the ventilation air.
- Type of cooking appliances used – This dictates the level of fat, water and the temperature of the ventilation air.

In general, the amount of odour released depends on the amount of oil/grease in the vented air and the quantities of spices used in the cooking. Hence deep fat frying and open grills and the cooking of more highly spiced food result in the highest odour releases.

The guidance notes that existing premises should have systems designed to comply with the principles of Best Practical Means and these should be achieved with an adequate level of odour control and stack dispersion. It notes that the discharge stack should ideally be located at least 1m above the roof ridge or not less than 1m above the roof eaves (in the latter case, additional odour control measures may be required). Where this cannot be achieved, then odours need to be reduced by control equipment and the guidance details how different levels of mitigation can be achieved to allow a low level ventilation system to work successfully.

The general guidance on odour issued by Defra also contains information on odour assessment but, whilst this contains useful background information and guidance, it refers back to the Kitchen Ventilation guidance[33] in the case of restaurant odour.

A3.2 IAQM Odour Guidance

The Institute of Air Quality Management (IAQM) produced guidance in 2014[17] with the specific intention to provide advice for "assessing odour impacts for planning purposes". It recommends various assessment techniques including the use of a Source, Pathway, Receptor (SPR) model.

Appendix B

Construction Dust Methodology

B1 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
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 <10,000 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 C

Local Monitoring Data

C1 Local Monitoring Data

Table C1.1: Local authority NO_2 ($\mu g/m^3$) 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										
London Bloomsbury	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')	530430	182430	Camden	Passive	Urban background	1.8	35.8	31.3	34.8*	26.7	24.7	n/a
Tavistock Gardens	529880	182334	Camden	Passive	Urban background	2.5	**44.6**	**39.7**	**46.2***	35.4	33.1	n/a
Tottenham Court Road	529568	181728	Camden	Passive	Kerbside	3.5	**85.6**	**83.6**	**74.0***	**65.8**	**61.2**	n/a
Bloomsbury Street	529962	181620	Camden	Passive	Kerbside	2.2	**71.4**	**72.2**	**71.2***	**59.4**	**48.5**	n/a
Strand	530785	180911	Westminster	Continuous	Roadside	1.8	**122.0**	**101.0**	**92.0**	**88.0**	**76.0**	n/a
Covent Garden	530444	180903	Westminster	Continuous	Urban background	2	n/a	n/a	37	**39**	**39**	n/a
Oxford Street East (94 Oxford Street)	529493	181331	Westminster	Continuous	Roadside	1.7	n/a	n/a	n/a	**76.0***	**51.0**	n/a
London Bloomsbury (Defra)	530119	182039	Defra	Continuous	Urban background	4.0	**48.2**	**40.9**	37.7	36.4	31.5	27.5

Site name	OS grid square		Local authority	Continuous /Passive	Site type	Height (m)	2015	2016	2017	2018	2019	2020
	X	Y										
Camden - Holborn (Bee Midtown)	530528	181505	LondonAir	Continuous	Kerbside	2	**83.0**	**84.0**	**74.0**	**67.0**	**55.0**	34.0

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

n/a denoted 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

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 denoted no available data for year of monitoring