Air Quality Assessment:
160-161 Drury Lane, London Borough of Camden

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Experts in air quality management & assessment

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Executive Summary

The air quality impacts associated with the proposed mixed-use development at 160-161 Drury Lane in Camden have been assessed. The building currently consists of office (B1) and retail/reception (A1) and restaurant (A3) space. The proposed development will comprise a small rear extension, two additional storeys to the building, changes of use at ground and basement level, and changes to the internal layout. The new ground floor layout will include office space, retail/reception (A1) and restaurant (A3) space, and the upper floors of the building will remain as offices (B1).

Drury Lane is a busy road, but the assessment has demonstrated that future users of the proposed flexible retail units will experience acceptable air quality, with pollutant concentrations judged to be below the relevant air quality objective.

There is no existing or proposed parking at the site. The proposed development will generate minimal additional traffic on the local road network, which will lead to insignificant impacts on existing sensitive receptors.

During the construction works, a range of best practice mitigation measures will be implemented to reduce dust emissions and the overall effect will be 'not significant'; appropriate measures have been set out in this report, to be included in the Dust Management Plan for the works.

Overall, the construction and operational air quality effects of the proposed development are judged to be 'not significant'. The proposed development has also been shown to meet the London Plan's requirement that new developments are at least 'air quality neutral'.

Contents

1 Introduction

1.1 This report describes the potential air quality impacts associated with the proposed refurbishment and development of 160-161 Drury Lane, Camden (the Site). The assessment has been carried out by Air Quality Consultants Ltd on behalf of Palmyra Property Investments Ltd.

1.2 The proposed works will consist of demolition of existing fourth floor, replacement of fourth floor and erection of additional two storeys to the site, full re-skinning of the facades. Ground floor alterations will include new entrances, single storey extension to existing rear closet wing, reconfiguration of existing external fire escape stair to the rear. Refurbishment will also include reconfiguration of existing external roof plant and introduction of additional plant contained within the volume of the proposed sixth storey extension and all other enabling works in connection with the use of the building as offices (Class B1) at part ground floor and first to seventh floor levels and flexible B1/A1/A3 floor space at basement and part ground floor level. The Site currently consists of offices with two food retail units on the ground floor. The proposed works will provide approximately 410 m^2 additional Gross Internal Area (GIA).

1.3 The Site lies within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Camden (LBC) for exceedances of the annual mean nitrogen dioxide (NO_2) and 24-hour mean PM_{10} objectives. The Site does not currently provide any parking, and the proposed changes will not introduce any car parking spaces. Users of the existing and proposed flexible retail units will be subject to the impacts of road traffic emissions from the adjacent road network. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.4 The building will be provided with heat and hot water by air source heat pumps; there will be no on-site combustion plant and thus no significant sources of emissions within the Site.

1.5 The Greater London Authority's (GLA's) London Plan (GLA, 2016a) requires new developments to be air quality neutral. The air quality neutrality of the proposed development has, therefore, been assessed following the methodology provided in the Greater London Authority's (GLA's) Supplementary Planning Guidance (SPG) on Sustainable Design and Construction (GLA, 2014a).

1.6 The GLA has also released Supplementary Planning Guidance on the Control of Dust and Emissions from Construction and Demolition (GLA, 2014b). The SPG outlines a risk assessment approach for construction dust assessment and helps determine the mitigation measures that will need to be applied. A construction dust assessment has been undertaken and the appropriate mitigation has been set out.

1.7 This report describes existing local air quality conditions, and the predicted air quality in the anticipated year of completion of the works (2021). The assessment of construction dust impacts focuses on the anticipated duration of the works.

1.8 This report has been prepared taking into account all relevant local and national guidance and regulations, and follows a methodology set out by the LBC.

2 Policy Context and Assessment Criteria

Air Quality Strategy

2.1 The Air Quality Strategy (Defra, 2007) published by the Department for Environment, Food, and Rural Affairs (Defra) and Devolved Administrations, provides the policy framework for air quality management and assessment in the UK. It provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the air quality objectives. Local authorities are seen to play a particularly important role. The strategy describes the Local Air Quality Management (LAQM) regime that has been established, whereby every authority has to carry out regular reviews and assessments of air quality in its area to identify whether the objectives have been, or will be, achieved at relevant locations, by the applicable date. If this is not the case, the authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which identifies appropriate measures that will be introduced in pursuit of the objectives.

Clean Air Strategy 2019

2.2 The Clean Air Strategy (Defra, 2019) sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. At this stage, there is no straightforward way to take account of the expected future benefits to air quality within this assessment.

Reducing Emissions from Road Transport: Road to Zero Strategy

2.3 The Office for Low Emission Vehicles (OLEV) and Department for Transport (DfT) published a Policy Paper (DfT, 2018) in July 2018 outlining how the government will support the transition to zero tailpipe emission road transport and reduce tailpipe emissions from conventional vehicles during the transition. This paper affirms the Government's pledge to end the sale of new conventional petrol and diesel cars and vans by 2040, and states that the Government expects the majority of new cars and vans sold to be 100% zero tailpipe emission and all new cars and vans to have significant zero tailpipe emission capability by this year, and that by 2050 almost every car and van should have zero tailpipe emissions. It states that the Government wants to see at least 50%, and as many as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

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

the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Planning Policy

National Policies

2.5 The National Planning Policy Framework (NPPF) (2018) sets out planning policy for England. It states that the purpose of the planning system is to contribute to the achievement of sustainable development, and that the planning system has three overarching objectives, one of which is an environmental objective:

"to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy".

2.6 To prevent unacceptable risks from air pollution, the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air quality".

and

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

2.7 More specifically on air quality, the NPPF makes clear 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".

2.8 The NPPF is supported by Planning Practice Guidance (PPG) (DCLG, 2018), which includes guiding principles on how planning can take account of the impacts of new development on air quality. The PPG states that *"Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values"* and *"It is important that the potential impact of new development on air quality is taken into account … where the national assessment indicates that relevant limits have been exceeded or are near the limit".* The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans "*identify measures that will be introduced in pursuit of the objectives*".

2.9 The PPG states that:

"Whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to generate air quality impact in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation.

2.10 The PPG sets out the information that may be required in an air quality assessment, making clear that *"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality"*. It also provides guidance on options for mitigating air quality impacts, as well as examples of the types of measures to be considered. It makes clear that *"Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact".*

London-Specific Policies

The London Plan

2.11 The London Plan (GLA, 2016a) sets out the spatial development strategy for London consolidated with alterations made to the original plan since 2011. It brings together all relevant strategies, including those relating to air quality.

2.12 Policy 7.14, 'Improving Air Quality', addresses the spatial implications of the Mayor's Air Quality Strategy and how development and land use can help achieve its objectives. It recognises that Boroughs should have policies in place to reduce pollutant concentrations, having regard to the Mayor's Air Quality Strategy.

2.13 Policy 7.14B(c), requires that development proposals should be "*at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as designated Air Quality Management Areas (AQMAs))*". Further details of the London Plan in relation to planning decisions are provided in Appendix A1.

2.14 Consultation on a draft new London Plan (GLA, 2017a) closed on 2 March 2018, with an examination in public to follow. The current timescale is that the new London Plan will be adopted in Autumn 2019. However, the draft London Plan is a material consideration in planning decisions, which will gain more weight as it moves through the process to adoption. Policy SI1 on 'Improving Air Quality' states that "*London's air quality should be significantly improved and exposure to poor air quality, especially for vulnerable people, should be reduced*". It goes on to detail that development proposals should not:

- *"lead to further deterioration of existing poor air quality*
- *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*
- *reduce air quality benefits that result from the Mayor's or boroughs' activities to improve air quality*
- *create unacceptable risk of high levels of exposure to poor air quality".*

2.15 It also states that "*the development of large-scale redevelopment areas, such as Opportunity Areas and those subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development. All other developments should be at least Air Quality Neutral*".

London Environment Strategy

2.16 The London Environment Strategy was published in May 2018 (GLA, 2018a). The strategy considers air quality in Chapter 4; the Mayor's main objective is to create a *"zero emission London by 2050".* Policy 4.2.1 aims to *"reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport".* An implementation plan for the strategy has also been published which sets out what the Mayor will do between 2018 and 2023 to help achieve the ambitions in the strategy.

Mayor's Transport Strategy

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

The Mayor's Air Quality Strategy

2.18 The revised Mayor's Air Quality Strategy (MAQS) was published in December 2010 (GLA, 2010). The overarching aim of the Strategy is to reduce pollution concentrations in London to achieve compliance with the EU limit values as soon as possible. The Strategy commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures. These additional measures and the role of Low Emission Zones (LEZs) are described in Appendix A1.

GLA SPG: Sustainable Design and Construction

2.19 The GLA's SPG on Sustainable Design and Construction (GLA, 2014a) provides details on delivering some of the priorities in the London Plan. Section 4.3 covers Air Pollution. It defines when developers will be required to submit an air quality assessment, explains how location and transport measures can minimise emissions to air, and provides emission standards for gas-fired boilers, Combined Heat and Power (CHP) and biomass plant. It also sets out, for the first time, guidance on how Policy 7.14B(c) of the London Plan relating to 'air quality neutral' (see Paragraph 2.13, above) should be implemented.

GLA SPG: The Control of Dust and Emissions During Construction and Demolition

2.20 The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) outlines a risk assessment based approach to considering the potential for dust generation from a construction site, and sets out what mitigation measures should be implemented to minimise the risk of construction dust impacts, dependent on the outcomes of the risk assessment. This guidance is largely based on the Institute of Air Quality Management's (IAQM's)[1] guidance (IAQM, 2016), and it states that "*the latest version of the IAQM Guidance should be used*".

Air Quality Focus Areas

2.21 The GLA has identified 187 air quality Focus Areas in London. These are locations that not only exceed the EU annual mean limit value for nitrogen dioxide, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and Transport for London (TfL) will focus actions to improve air quality. The proposed development is not located within any of the air quality Focus Areas. The closest Focus Area is the "Oxford Street from Marble Arch to Bloomsbury", some 200 m to the northwest of the Site.

[1] The IAQM is the professional body for air quality practitioners in the UK.

Local Transport Plan

2.22 One of the main objectives of the Camden Transport Strategy (LBC, 2011a) is to "*reduce motor traffic and vehicle emissions to improve air quality, mitigate climate change and contribute to making Camden a 'low carbon and low waste borough".* To support this objective there are a number of policies related to air quality including:

"Policy 1.4 Camden will continue to promote low emission vehicles and support the staged introduction of the Low Emission Zone in London. The Council would also like to see further development of national policy to support local level efforts to improve air quality and tackle climate change;

Policy 1.5 For essential car journeys, Camden will encourage more residents and businesses to change to electric vehicles…to help reduce air and noise pollution…"

Local Policies

2.23 The LBC's new Local Plan was adopted by the Council in July 2017 (LBC, 2017a). Included within this is Policy CC4 on Air Quality which states that:

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

The Council will 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."

2.24 The new Local Plan also includes Policy T2 which requires "*all new developments in the borough to be car-free*".

2.25 The LBC has updated the Supplementary Planning Document 'Camden Planning Guidance 6 Amenity' (LBC, 2018a), which provides further guidance on air quality and outlines the requirements for an air quality assessment. The Planning Guidance states that:

"The Council's overarching aim is for new development is [sic] *to be 'air quality neutral' and not lead to further deterioration of existing poor air quality.*

You will be required to include mitigation and offsetting measures to deal with any negative air quality impacts associated with your development proposals. At the same time your development should be designed to minimise exposure of occupants to existing poor air quality.

To manage and prevent further deterioration of air quality in Camden, we will require an air quality assessment with planning applications for development that could have a significant negative impact in [sic] *air quality. This impact can arise during both the construction and operational stages of a development as a result of increased NO_x and PM_{10} emissions".*

2.26 The LBC has also produced Camden's Environmental Sustainability Plan (LBC, 2011b), which states the Council is "*committed to improving air quality, reducing, reusing and recycling waste, and enhancing our local biodiversity and green spaces".*

Air Quality Action Plans

National Air Quality Plan

2.27 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017a). Alongside a package of national measures, the Plan requires those English Local Authorities (or the GLA in the case of London Authorities) that are predicted to have exceedances of the limit values beyond 2020 to produce local action plans by December 2018. These plans are undertaken in stages (the initial Stage of which was to be completed by the end of March 2018) and must have measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a Clean Air Zone (CAZ). There is currently no practical way to take account of the effects of the national Plan in this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the proposed development. This assessment has principally been carried out in relation to the air quality objectives, rather than the EU limit values that are the focus of the Air Quality Plan.

Local Air Quality Action Plan

2.28 The LBC has declared an AQMA for exceedances of the annual mean nitrogen dioxide and 24-hour mean PM_{10} objectives that covers the whole Borough, and has developed an Air Quality Action Plan (LBC, 2016). This identifies actions and mitigation measures necessary to improve air quality in the borough. The overarching aims of the Plan are to:

1. *"Continue to meet the EU objectives for Carbon Monoxide, Benzene, 1,3-Butadiene, Lead and PM_{10}.*

2. *Continue to reduce concentrations of PM_{10} and $PM_{2.5}$, and to meet the EU Objective for NO_2."*

2.29 In addition, the key objectives of the Plan are to:

- *"Encourage reduction in fossil fuel use, the adoption of clean fuels and low emission technology and promote energy efficiency.*
- *Raise awareness about air quality in Camden and promote lifestyle changes which can help reduce levels of air pollution and minimise exposure to air pollution.*
- *Improve the health and well-being of the local population, including those that work and visit Camden.*
- *Work in partnership with national and regional bodies, and with local public and private organisations, to foster and drive improvements in air quality.*
- *Lead by example and reduce NO_2 and PM_{10} emissions associated with the Council's own buildings and transport services.*
- *Ensure actions which serve to reduce NO_2 and PM_{10} emissions complement actions to mitigate CO_2 emissions."*

Assessment Criteria

2.30 The Government has established a set of air quality standards and objectives to protect human health. The 'standards' are set as concentrations below which effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of an individual pollutant. The 'objectives' set out the extent to which the Government expects the standards to be achieved by a certain date. They take account of economic efficiency, practicability, technical feasibility and timescale. The objectives for use by local authorities are prescribed within the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations (2002).

2.31 The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004 respectively, and continue to apply in all future years thereafter. The $PM_{2.5}$ objective is to be achieved by 2020.

2.32 The European Union has also set limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$ (The European Parliament and the Council of the European Union, 2008). The limit values for nitrogen dioxide are the same numerical concentrations as the UK objectives, but achievement of these values is a national obligation rather than a local one. In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the limit

values. Central Government does not recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded.

2.33 The relevant air quality criteria for this assessment are provided in Table 1.

Table 1: Air Quality Criteria for Nitrogen Dioxide, PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particles (PM_{10})	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
Fine Particles ($PM_{2.5}$) [b]	Annual Mean	25 µg/m^3

[a] A proxy value of 32 µg/m^3 as an annual mean is used in this assessment to assess the likelihood of the 24-hour mean PM_{10} objective being exceeded. Measurements have shown that, above this concentration, exceedances of the 24-hour mean PM_{10} objective are possible (Defra, 2018b).

[b] The $PM_{2.5}$ objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Construction Dust Criteria

2.34 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the IAQM (2016) has been used (the GLA's SPG (GLA, 2014b) recommends that the assessment be based on the latest version of the IAQM guidance). Full details of this approach are provided in Appendix A2.

Screening Criteria for Road Traffic Assessments

2.35 Environmental Protection UK (EPUK) and the IAQM recommend a two-stage screening approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from road traffic generated by a development have the potential for significant air quality impacts. The approach, as described in Appendix A3, first considers the size and parking provision of a development; if the development is residential and is for fewer than ten homes or covers less than 0.5 ha, or is non-residential and will provide less than 1,000 m^2 of floor space or cover a site area of less than 1 ha, and will provide ten or fewer parking spaces, then there is no need to progress to a detailed assessment. The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. Where these criteria are exceeded, a detailed assessment is required, although the guidance advises that *"the criteria provided are precautionary and should be treated as indicative"*, and *"it may be appropriate to amend them on the basis of professional judgement"*.

Descriptors for Air Quality Impacts and Assessment of Significance

Construction Dust Significance

2.36 Guidance from IAQM (2016) is that, with appropriate mitigation in place, the effects of construction dust will be 'not significant'. This is the latest version of the guidance upon which the assessment methodology set out in the GLA guidance (GLA, 2014b) is based (the GLA guidance advises that the latest version of the IAQM guidance should always be used). The assessment thus focuses on determining the appropriate level of mitigation so as to ensure that effects will normally be 'not significant'.

Operational Significance

2.37 There is no official guidance in the UK in relation to development control on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by EPUK and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix A3. The approach includes elements of professional judgement, and the experience of the consultants preparing the report is set out in Appendix A4.

3 Assessment Approach

Existing Conditions

3.1 Industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2018c). Local sources have also been identified through examination of the Council's Air Quality Review and Assessment reports.

3.2 Information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority. Background concentrations have been defined using the national pollution maps published by Defra (2018d). These cover the whole of the UK on a 1x1 km grid.

3.3 Exceedances of the annual mean EU limit value for nitrogen dioxide in the study area have been identified using the maps of roadside concentrations published by Defra (2017b) as part of its 2017 Air Quality Plan for the baseline year 2015 and for the future years 2017 to 2030, as well as from any nearby Automatic Urban and Rural Network (AURN) monitoring sites (which operate to EU data quality standards). These maps are used by the UK Government, together with the AURN results, to report exceedances of the limit value to the EU. The national maps of roadside PM_{10} and $PM_{2.5}$ concentrations (Defra, 2018e), which are available for the years 2009 to 2015, show no exceedances of the limit values anywhere in the UK in 2015.

Construction Impacts

3.4 The construction dust assessment considers the potential for impacts within 350 m of the site boundary; or within 50 m of roads used by construction vehicles. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014b), which is based on that provided by IAQM (2016). This follows a sequence of steps. Step 1 is a basic screening stage, to determine whether the more detailed assessment provided in Step 2 is required. Step 2a determines the potential for dust to be raised from on-site works and by vehicles leaving the site. Step 2b defines the sensitivity of the area to any dust that may be raised. Step 2c combines the information from Steps 2a and 2b to determine the risk of dust impacts without appropriate mitigation. Step 3 uses this information to determine the appropriate level of mitigation required to ensure that there should be no significant impacts. Appendix A2 explains the approach in more detail.

Road Traffic Impacts

Screening

3.5 The first step in considering the road traffic impacts of the proposed development has been to screen the development and its traffic generation against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraph 2.35 and detailed

further in Appendix A3. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Air Quality Conditions On-site

3.6 Air quality conditions at the site have been considered by referring to the map of predicted concentrations produced by the GLA as part of the London Atmospheric Emissions Inventory (LAEI). These include maps of predicted annual mean nitrogen dioxide concentrations for a number of years projected forward from a 2013 base year (GLA, 2017b).

3.7 Of concern to the current assessment is whether the 1-hour mean nitrogen dioxide objective is exceeded. Measurements across the UK have shown that the 1-hour nitrogen dioxide objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 $\mu g/m^3$ (Defra, 2018b). Defra (2018b) thus recommends that Local Authorities only need to consider the possibility of exceedances of the 1-hour objective where annual mean concentrations are greater than 60 $\mu g/m^3$. This does not mean that exceedances of the 1-hour objective are likely above this level.

Changes to the LEZ and ULEZ

3.8 The Mayor of London confirmed in June 2018 that changes will be made to the existing LEZ in 2020, and that the forthcoming Ultra Low Emission Zone (ULEZ), to be implemented in 2019, will be expanded in 2021. The changes are described in detail in Appendix A1, and can be expected to significantly reduce NOx emissions in London from 2020 onwards; however, they are not reflected in the model predictions considered in this assessment. The assessment presented in this report is, therefore, worst-case, and it is expected that background concentrations, baseline concentrations, and the impacts of the proposed development, will be lower than described in Section 6 of this report. Appendix A5 discusses uncertainties regarding the future fleet mix in London and the scale of the reduction in NOx emissions that can be expected with the adoption of these changes.

'Air Quality Neutral'

3.9 The guidance relating to air quality neutral follows a tiered approach, such that all developments are expected to comply with minimum standards for gas and biomass boilers and for CHP plant (GLA, 2014a). Compliance with 'air quality neutral' is then founded on emissions benchmarks that have been derived for both building (energy) use and road transport in different areas of London. Developments that exceed the benchmarks are required to implement on-site or off-site mitigation to offset the excess emissions (GLA, 2014a).

3.10 Appendix A6 sets out the emissions benchmarks. The approach has been to calculate the emissions from the proposed development and to compare them with these benchmarks.

4 Site Description and Baseline Conditions

4.1 The Site is located at 160-161 Drury Lane in Camden. It is in a busy commercial area, with some residential dwellings nearby on Drury Lane, Parker Street and Great Queen Street. It is bounded by Parker Street to the northwest, Drury Lane to the southwest and commercial (including the Gillian Lynne Theatre opposite) and office buildings to the northeast and southeast. The Site currently consists of retail and office units.

Industrial sources

4.2 A search of the UK Pollutant Release and Transfer Register (Defra, 2018c) has not identified any significant industrial or waste management sources that are likely to affect the proposed development, in terms of air quality.

Air Quality Management Areas

4.3 The LBC has investigated air quality within its area as part of its responsibilities under the LAQM regime. In September 2002 an AQMA was declared for the whole borough for exceedances of the annual mean nitrogen dioxide and 24-hour mean PM_{10} objectives.

4.4 In terms of PM_{10}, the LBC concluded that there have been no exceedances of the objectives since 1998 (LBC, 2009; 2014; 2017b). It is, therefore, reasonable to assume that existing PM_{10} levels will not exceed the objectives within the study area.

Local Air Quality Monitoring

4.5 The LBC operates four automatic monitoring stations within its area, two of which are located within 1 km of the Site. The London Bloomsbury AURN monitor is located at Russell Square approximately 820 m to the north of the Site. Site CD3 is located 350 m to the west of the Site on Shaftesbury Avenue. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International Ltd (using the 50% TEA in acetone method). These include one deployed on Bloomsbury Street, approximately 570 m to the northwest of the Site, and another on Tottenham Court Road, approximately 960 m to the northwest of the Site. The neighbouring authority, City of London Corporation, also operates a number of monitors, one of which is located on Fleet Street, some 850 m east of the Site. Results for the years 2012 to 2017 have been taken from the LBC's 2016 and 2017 Annual Status Reports (ASRs) (LBC, 2017b; 2018b) and the City of London Corporation's 2016 ASR report (City of London Corporation, 2017). They are summarised in Table 2 and the monitoring locations are shown in Figure 1.

Table 2: Summary of Nitrogen Dioxide (NO_2) Monitoring (2012-2017) [a]

Site No.	Local Authority	Site Type	Location	2012	2013	2014	2015	2016	2017
Automatic Monitors - Annual Mean (µg/m^3)									
LB AURN	LBC	Urban background	London Bloomsbury	**55**	**44**	**45**	**48**	**42**	38
CD3	LBC	Roadside	Shaftesbury Avenue	**71**	**74**	**69**	**83**	**84**	- [b]
Objective				**40**					
Automatic Monitors - No. of Hours > 200 µg/m^3									
LB AURN	LBC	Urban background	London Bloomsbury	1	0	0	0	0	0
CD3	LBC	Roadside	Shaftesbury Avenue	12	6	1	- [c]	- [c]	- [b]
Objective				**18 (200)**					
Diffusion Tubes - Annual Mean (µg/m^3) [d]									
CA11	LBC	Kerbside	Tottenham Court Road	**83**	**88**	**87**	**86**	**84**	- [d]
CA21	LBC	Roadside	Bloomsbury Street	**72**	**76**	**81**	**71**	**72**	**81** [d]
CL39	City of London Corp.	Roadside	St. Dunstan's Church, Fleet Street	**93**	**87**	**80**	**87**	**81**	-
Objective				**40**					

[a] Exceedances of the objectives are shown in bold. Underlined are locations where the 1-hour objective may be exceeded.

[b] Site closed in November 2016.

[c] Data capture issues.

[d] Low data capture (33% for CA11 and 50% for CA21).

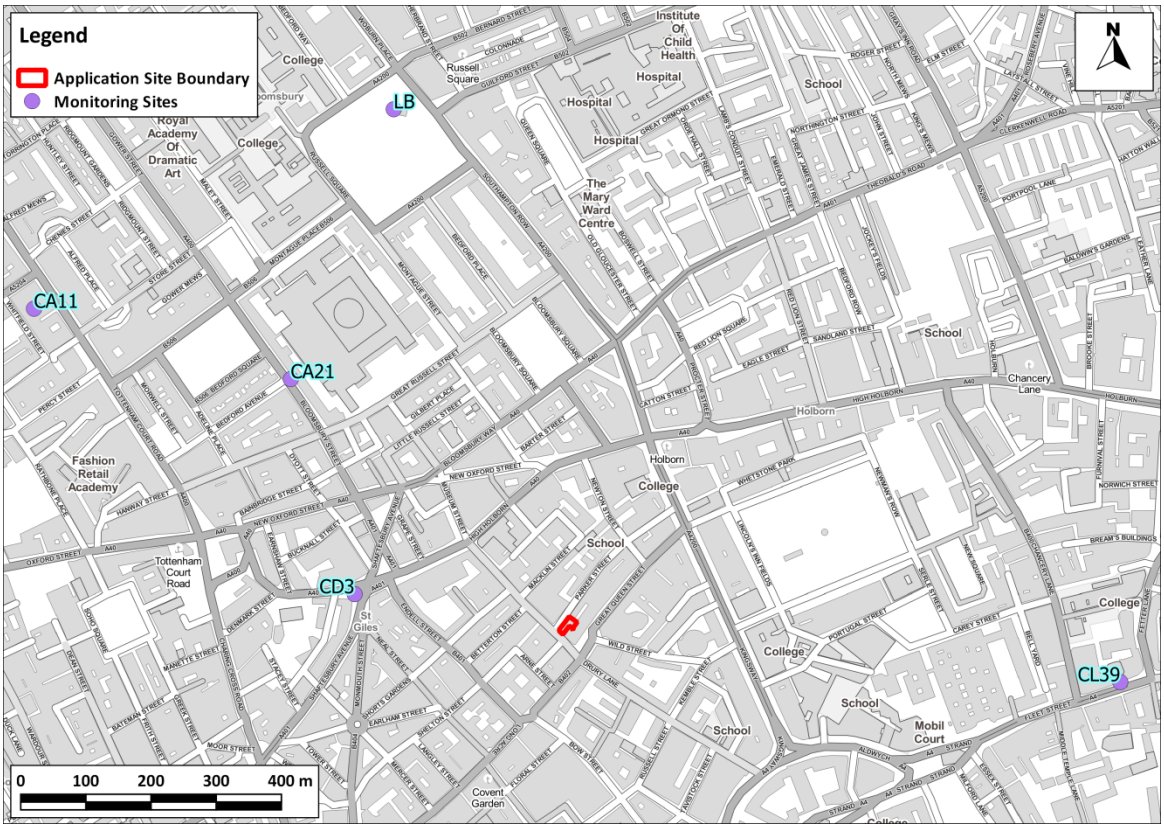

Figure 1: Monitoring Locations

4.6 The annual mean nitrogen dioxide objective has been exceeded at all monitors for all years shown in Table 2, except at London Bloomsbury in 2017. The 1-hour mean objective has not been exceeded at the automatic monitoring sites despite measured annual mean concentrations greater than 60 µg/m^3; the value used as a proxy, below which exceedances of the 1-hour mean objective are unlikely. The monitoring data are also plotted in Figure 2. There is a slight downward trend observed in the data at CL39 and at the London Bloomsbury monitor. At automatic monitor CD3, there is an upward trend in concentrations, and no discernible trend at CA21 or CA11.

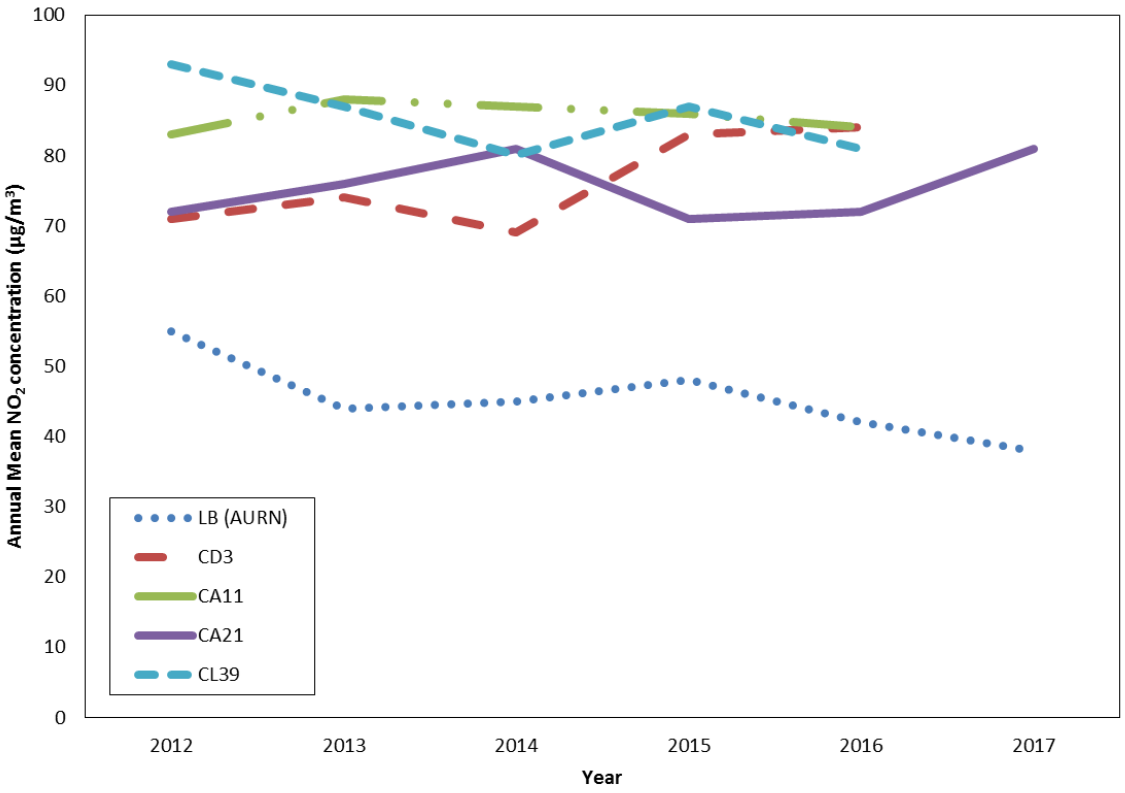

Figure 2: Annual mean NO_2 concentrations ($\mu g/m^3$) 2012-2017 (LB London Bloomsbury)

4.7 Sites CA11 and CA21 are likely to be the most representative of the Site, as they are located on busy streets with reduced dispersion due to tall buildings. However, they are both less than 1 m from the kerb, and thus pollutant concentrations are likely to be higher than those experienced at the Site, which is located 2 m from the roadside at the closest point. Site CD3 is situated on a busy complex junction, and CL39 is located on a much busier road than Drury Lane, and therefore concentrations at these locations are likely to be higher than those at the Site. Pollutant concentrations at the Site are likely to be higher than those at the London Bloomsbury background monitor.

4.8 The London Bloomsbury and CD3 automatic monitoring stations measure PM_{10} concentrations, and the London Bloomsbury monitor also measures $PM_{2.5}$ concentrations. Results for the years 2012 to 2017 are summarised in Table 3. There is no clear trend in PM_{10} concentrations at the London Bloomsbury monitor, but a downward trend in annual and 24-hour mean concentrations at CD3. There is insufficient data to determine a trend in $PM_{2.5}$ concentrations.

Table 3: Summary of PM_{10} and $PM_{2.5}$ Automatic Monitoring (2012-2017)

Site No.	Site Type	Location	2012	2013	2014	2015	2016	2017
PM_{10} Annual Mean (µg/m^3)								
LB (AURN)	Urban background	London Bloomsbury	19	18	20	22	20	19
CD3	Roadside	Shaftesbury Avenue	29	29	25	22	18	-
Objective			**40**					
PM_{10} No. Days >50 µg/m^3								
LB (AURN)	Urban background	London Bloomsbury	10	4	11	6	9	6
CD3	Roadside	Shaftesbury Avenue	18	17	16	4	-	-
Objective			**35 (50)**					
$PM_{2.5}$ Annual Mean (µg/m^3)								
LB (AURN)	Urban background	London Bloomsbury	-	-	-	11	12	13
Objective			**25** [a]					

[a] The $PM_{2.5}$ objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

Exceedances of EU Limit Value

4.9 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedances of the annual mean nitrogen dioxide limit value. Furthermore, Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2017b), which are used to report exceedances of the limit value to the EU, and which have been updated to support the 2017 Air Quality Plan, identify exceedances of this limit value in 2015 along many roads in London, including the High Holborn, Shaftesbury Avenue and Kingsway close to the Site. The Greater London Urban Area has thus been reported to the EU as exceeding the limit value for annual mean nitrogen dioxide concentrations. Defra's predicted concentrations for 2021, presented for three scenarios ('baseline', 'with CAZs' and 'with CAZs and additional actions' – the latter two taking account of the measures contained in its 2017 Air Quality Plan (Defra, 2017a)), identify continued exceedances of the limit value along part of High Holborn, Aldwych, Strand, Waterloo Road and Victoria Embankment. However, these exceedances are located at least 380 m from the Site. As such, there is considered to be a small risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

4.10 Defra's Air Quality Plan requires the GLA to prepare an action plan that will *"deliver compliance in the shortest time possible"*, and the 2015 Plan assumed that a CAZ was required. The GLA has already implemented an LEZ and an emissions surcharge, and a ULEZ comes into force in April 2019, thus the authority will have effectively implemented the required CAZ in 2019. These have been implemented as part of a package of measures including 12 Low Emission Bus Zones, Low

Emission Neighbourhoods, the phasing out of diesel buses and taxis and other measures within the Mayors Transport Strategy.

Background Concentrations

4.11 Estimated background concentrations at the Site have been determined for 2017 and the opening year (2021) using Defra's background maps (Defra, 2018d). The background concentrations are set out in Table 4, and are below the objectives in 2021.

Table 4: Estimated Annual Mean Background Pollutant Concentrations in 2017 and 2021 (µg/m^3)

Year	NO_2	PM_{10}	$PM_{2.5}$
2017	48.0	21.0	13.3
2021 [a]	32.2	20.0	12.4
Objectives	**40**	**40**	**25** [a]

[a] The $PM_{2.5}$ objective, which is to be met by 2020, is not in Regulations and there is no requirement for local authorities to meet it.

5 Construction Phase Impact Assessment

5.1 The proposed development principally involves the refurbishment of the building and involves construction activities limited to the small rear and two storey extension. Construction works have the potential to cause dust impacts during demolition, earthworks and construction, as well as from trackout of dust and dirt by vehicles onto the public highway. Step 1 of the assessment procedure is to screen the need for a detailed assessment. There are receptors within the distances set out in the guidance (see Appendix A2), thus a detailed assessment is required. The following section sets out Step 2 of the assessment procedure.

Potential Dust Emission Magnitude

Demolition

5.2 The top floor of the building, with an approximate total volume of 750 m^3, is to be demolished. The construction materials are mainly brick, stone and aluminium. Works are anticipated to start in March 2020 and are expected to last for up to two months. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for demolition is considered to be *small.*

Earthworks

5.3 There is no requirement for earthworks on site.

Construction

5.4 Construction will involve the refurbishment of the building, a small one storey rear extension and two additional floors, with a total volume of around 2,100 m^3. The materials used will mainly be brick, concrete, aluminium and zinc cladding. Dust may arise from the handling of dusty materials and from the cutting of concrete. The construction is anticipated to take place over a period of one year and to be complete by April 2021. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for construction is considered to be *small*.

Trackout

5.5 The site will not be driven over by vehicles; all deliveries and removals will occur from the road (the majority are likely to be from Parker Street). As such, the potential for trackout of dust and dirt from the Site is low. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for trackout is considered to be *small*.

5.6 Table 5 summarises the dust emission magnitude for the proposed development.

Table 5: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Small
Earthworks	N/A
Construction	Small
Trackout	Small

Sensitivity of the Area

5.7 This assessment step combines the sensitivity of individual receptors to dust effects with the number of receptors in the area and their proximity to the site. It also considers additional site-specific factors such as topography and screening, and in the case of sensitivity to human health effects, baseline PM_{10} concentrations.

Sensitivity of the Area to Effects from Dust Soiling

5.8 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling (Table A2.2 in Appendix A2). There are between 10 and 100 residential properties in the area within 20 m which is shown in Figure 3. Using the matrix set out in Table A2.3 in Appendix A2, the area surrounding the onsite works is of 'high' sensitivity to dust soiling.

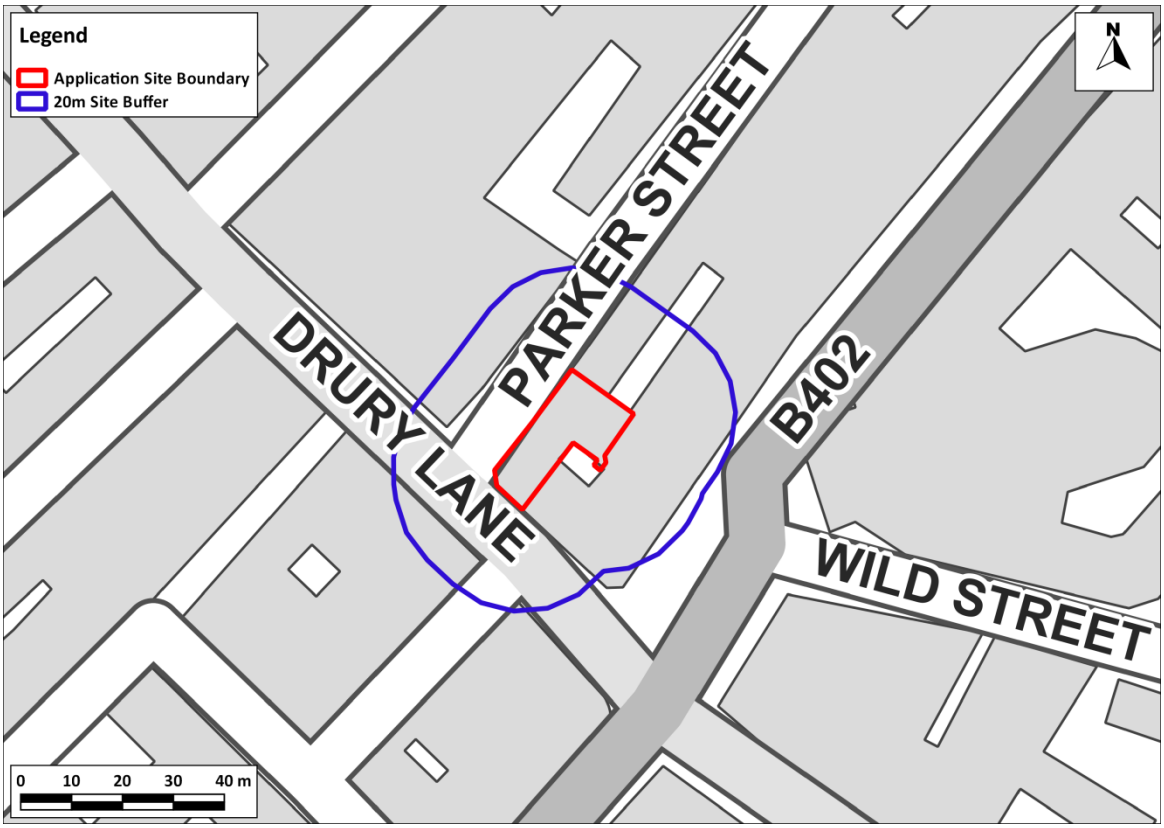

Figure 3: 20 m Distance Band around Site Boundary

5.9 Table 5 shows that the dust emission magnitude for trackout is *small* and Table A2.3 in Appendix A2 thus explains that there is a risk of material being tracked 50 m from the site exit. Since it is not known which roads construction vehicles will use, it has been assumed that all possible routes could be affected. There are between 10 and 100 residential properties in the area within 20 m of the roads along which material could be tracked which is shown in Figure 4, and Table A2.3 in Appendix A2 thus indicates that the area is of 'high' sensitivity to dust soiling due to trackout.

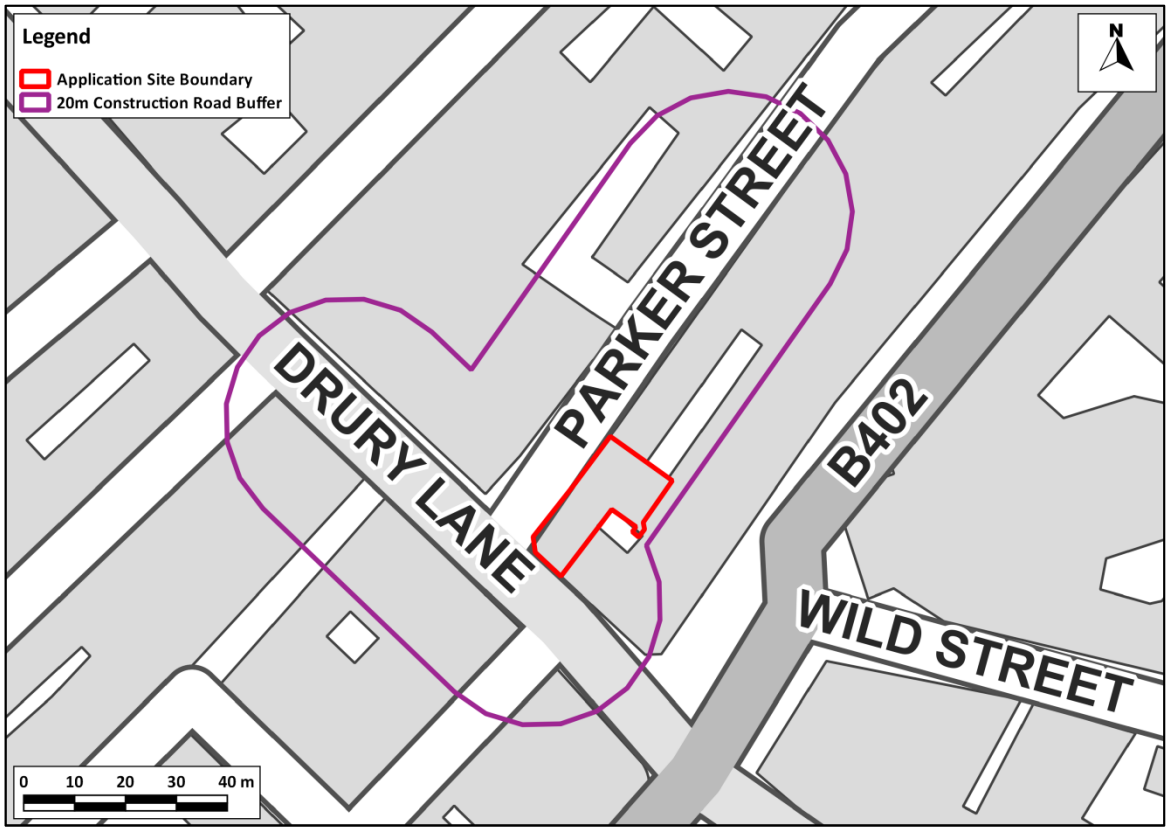

Figure 4: 20 m Distance Band around Roads Used by Construction Traffic Within 50m of the Site

Sensitivity of the Area to any Human Health Effects

5.10 Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. The matrix in Table A2.4 in Appendix A2 requires information on the baseline annual mean PM_{10} concentration in the area. The properties nearest the Site are located on the first floor or above on Drury Lane and Great Queen Street, and from ground floor on the Parker Street. The existing annual mean PM_{10} concentration is likely to lie between those measured at the London Bloomsbury urban background site and the CD3 roadside site shown in Table 3, with measured concentrations below 24 µg/m^3 at both sites since 2015. Using the matrix in Table A2.4 in Appendix A2, it is considered that the area surrounding the onsite works and the area surrounding roads along which material may be tracked from the site are of 'medium' sensitivity to human health effects.

Sensitivity of the Area to any Ecological Effects

5.11 The guidance only considers designated ecological sites within 50 m to have the potential to be impacted by the construction works. There are no designated ecological sites within 50 m of the site boundary or those roads along which material may be tracked, thus ecological impacts will not be considered further.

Summary of the Area Sensitivity

5.12 Table 6 summarises the sensitivity of the area around the proposed construction works.

Table 6: Summary of the Area Sensitivity

Effects Associated With:	Sensitivity of the Surrounding Area	
	On-site Works	Trackout
Dust Soiling	High Sensitivity	High Sensitivity
Human Health	Medium Sensitivity	Medium Sensitivity

Risk and Significance

5.13 The dust emission magnitudes in Table 5 have been combined with the sensitivities of the area in Table 6 using the matrix in Table A2.6 in Appendix A2, in order to assign a risk category to each activity. The resulting risk categories for the four construction activities, without mitigation, are set out in Table 7. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 8 (step 3 of the assessment procedure).

5.14 It should be noted that the risk of demolition impacts will always be at least medium when the sensitivity of the area is high regardless of the scale of the works to be undertaken. As the demolition involved at the Site will be very small scale and over a short time period, on balance it is judged that the risk of impacts for the proposed development is considered to be low.

Table 7: Summary of Risk of Impacts Without Mitigation

Source	Dust Soiling	Human Health
Demolition	Low Risk	Low Risk
Construction	Low Risk	Low Risk
Trackout	Low Risk	Negligible

The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant' (IAQM, 2016).

6 Operational Phase Impact Assessment

Impacts at Existing Receptors

Screening Assessment of Development-Generated Road Traffic Emissions

6.1 The proposed development does not include any on-site parking, and Curtins, who are the transport consultants for the development, expect the total number of vehicle trips during AM and PM peak periods to increase from two to three per day. The increase in annual average daily flows is therefore unlikely to exceed 100 vehicles (the screening threshold for inside of an AQMA) along any road, thus, there is no requirement for a detailed assessment of road traffic impacts at existing receptors.

Impacts on Future Users of the Development

Consideration of Exposure

6.2 The UK air quality objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed over the averaging period of the objective. Defra explains where these objectives will apply in its Local Air Quality Management Technical Guidance (Defra, 2018b). The annual mean objectives for nitrogen dioxide and PM_{10} are considered to apply at the façades of residential properties, schools, hospitals etc.; they do not apply at shops or restaurants. The 24-hour mean objective for PM_{10} is considered to apply at the same locations as the annual mean objective, as well as in gardens of residential properties and at hotels but not at shops or restaurants. The 1-hour mean objective for nitrogen dioxide applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets. This is the only objective that will apply at the façades of the proposed flexible retail units within the Site.

6.3 The air quality objectives also do not apply at places of work (AQC, 2016), and will thus not be considered at the office locations.

6.4 The site currently comprises office space (where the objectives do not apply) and food retail units (where only the 1-hour mean nitrogen dioxide objective applies). The proposed development will also comprise office space (where the objectives do not apply) and areas where the 1-hour mean objective applies (the proposed flexible retail space). The annual mean and 24-hour objectives will continue to not apply at the site.

Initial Screening Assessment of Traffic Emissions

6.5 The proposed development is located adjacent to the busy Drury Lane and is within an AQMA, thus further assessment of the air quality conditions at the site is required.

Assessment of Existing Emissions Sources

6.6 The flexible retail space on the ground floor of the proposed development provides relevant receptor locations in relation to the 1-hour mean nitrogen dioxide air quality objective (see paragraph 6.4). Table 2 shows that annual mean nitrogen dioxide concentrations have exceeded the 60 µg/m^3 proxy value (the concentration below which exceedances of the one hour objective are unlikely) at automatic monitoring site CD3. However, the measured 1-hour mean objective has not been exceeded at the automatic monitor CD3, which measures similar annual mean concentrations to the diffusion tube monitors[2]. The CD3 monitor is located on a complex junction with higher levels of traffic than Drury Lane, and therefore, based on measured concentrations, it can reasonably be assumed that the 1-hour mean nitrogen dioxide objective is unlikely to be exceeded at the Site.

6.7 Figure 5 shows the modelled annual mean nitrogen dioxide concentrations for 2013 in proximity to the Site based on the LAEI modelling. It shows that the majority of the area will experience concentrations between 50 and 60 µg/m^3, with concentrations between 60 and 80 µg/m^3 predicted along Drury Lane and Great Queen Street. The concentrations are predicted at a coarse resolution of 20 m, and the predicted concentration on Drury Road adjacent to the southern façade of the Site, is 78.6 µg/m^3 suggesting exceedances of the 1-hour mean objective are possible. However, this nearest cell is unlikely to accurately reflect concentrations at the façade of the Site, due to the poor resolution and the fact that the centre of that cell is in the centre of the road where concentrations are expected to be highest.

6.8 The proposed development is due to be completed in 2021. Figure 6 shows the LAEI modelled annual mean nitrogen dioxide concentrations for 2020 in proximity to the Site. It shows that the majority of the area is predicted to experience concentrations between 35 and 40 µg/m^3, with concentrations between 40 and 50 µg/m^3 on Drury Lane and Great Queen Street. The highest predicted concentration adjacent to the site is 50.4 µg/m^3. These concentrations are well below 60 µg/m^3 and therefore, based on these data, an exceedance of the 1-hour mean nitrogen dioxide objective is unlikely.

6.9 On balance it is judged exceedances of the 1-hour mean objective at the ground floor units on Drury Lane is unlikely taking into account:

- that no exceedances of the 1-hour mean objective have been measured at the automatic monitoring site within 1 km of the application site, which is located at a busy junction and where traffic flows are higher;

[2] This is unsurprising given that annual mean concentrations above 60µg/m^3 do not mean an exceedance of the 1-hour mean objective is likely, only that at concentrations below this value an exceedance of the objective is unlikely.

- the proposed development opening year is 2021, and the 2013 and 2020 LAEI modelled nitrogen dioxide concentrations suggest exceedances of the 1-hour mean objective are unlikely, except at the south-eastern corner of the Site in 2013. However, this peak value is located in the centre of Drury Lane and is unlikely to represent pollutant concentrations at the façade of the building by the time that the proposed development works are completed; and
- future changes to the London LEZ and ULEZ described in Paragraphs A1.4 and A1.6 will result in significant reductions in NOx emissions across London, thus the predicted nitrogen dioxide concentrations set out in this assessment are likely to be higher than those experienced at the Site in 2021.

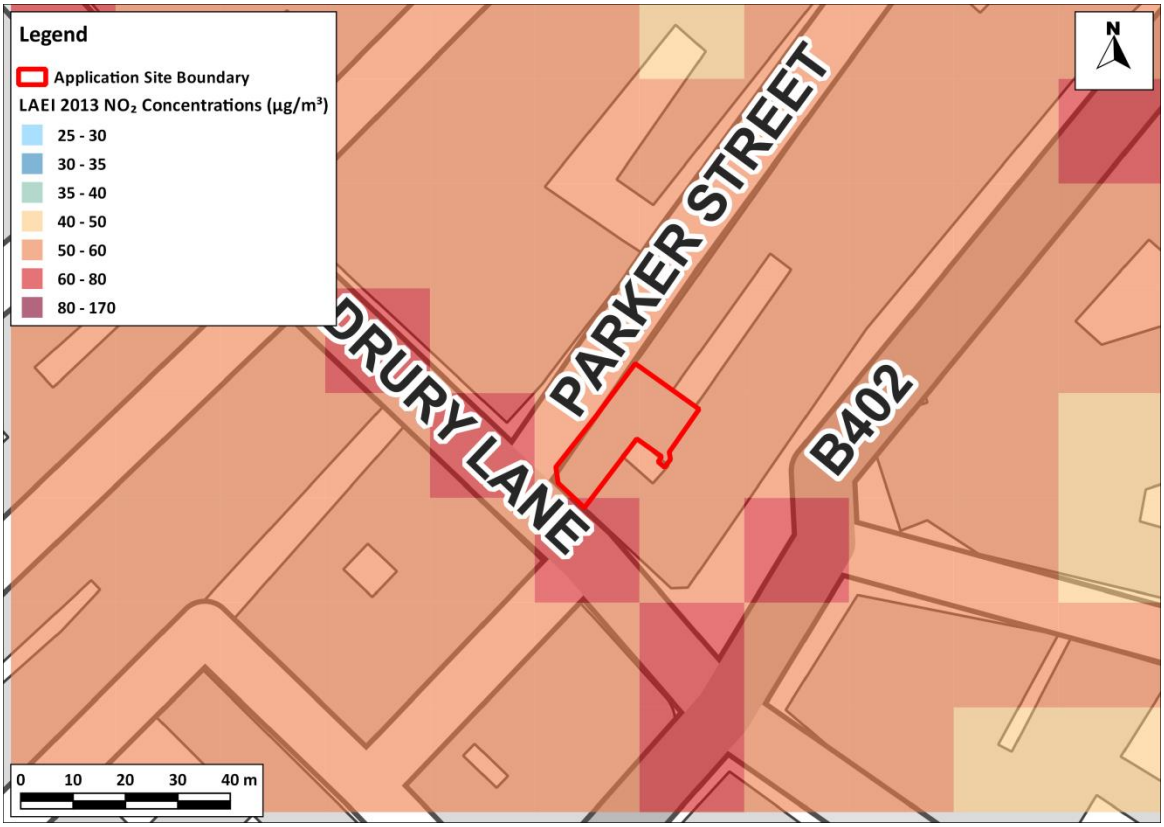

Figure 5: LAEI 2013 modelled annual mean nitrogen dioxide concentrations (µg/m^3)

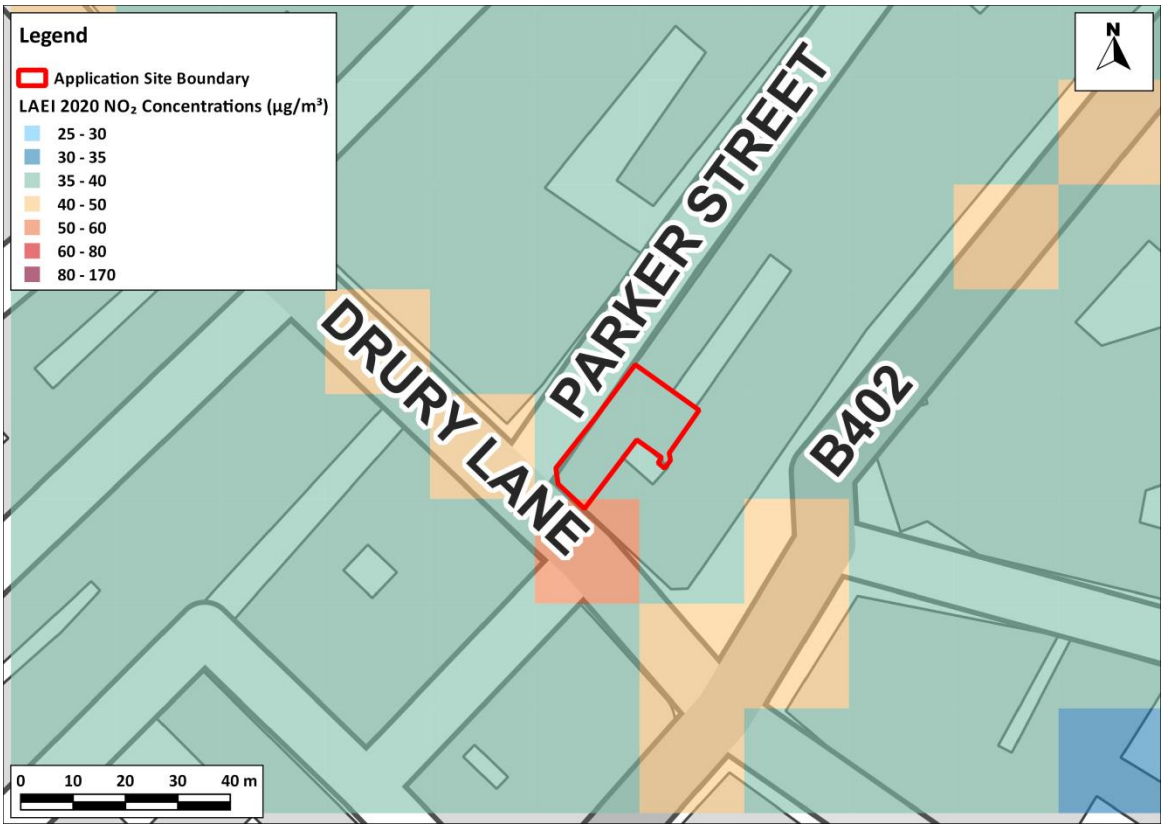

Figure 6: LAEI 2020 modelled annual mean nitrogen dioxide concentrations (µg/m^3)

Significance of Operational Air Quality Effects

6.10 The operational air quality effects without mitigation are judged to be 'not significant'. This professional judgement is made in accordance with the methodology set out in Appendix A3, and takes account of the assessment that:

- the increase in vehicle movements as a result of the proposed development are minimal;
- the air quality exposure within the site is not changing when comparing the existing and proposed uses only relevant exposure to the nitrogen dioxide 1-hour mean objective, thus the proposed development will not introduce new exposure;
- retail and restaurant land uses (A1/A3) are relevant receptors in relation to the 1-hour mean nitrogen dioxide objective, and no exceedances of this objective have been measured at automatic monitors within 1 km of the Site in the previous six years; and
- the 2013 and 2020 LAEI modelled nitrogen dioxide concentrations are lower than 60 µg/m^3, except at the south eastern corner of the Site in 2013. However, this peak value is

located in the centre of Drury Lane and is unlikely to represent pollutant concentrations at the façade of the building by the time that the proposed development works are completed.

7 'Air Quality Neutral'

7.1 The purpose of the London Plan's requirement that development proposals be 'air quality neutral' is to prevent the gradual deterioration of air quality throughout Greater London.

Building Emissions

7.2 KUT LLP has advised that the Site will be provided heat and hot water by air source heat pumps. As such, there will be no combustion sources and the Site will be better than air quality neutral in terms of building emissions.

Road Transport Emissions

7.3 The Transport Emissions Benchmarks (TEBs) are based on the number of car trips generated by different land-use classes, together with the associated trip lengths and vehicle emission rates. However, the guidance (AQC, 2014) only provides trip lengths and emission rates for A1, B1 and C3 uses, thus a TEB cannot be calculated for the restaurant (A3) element of the proposed development. The guidance does provide an alternative methodology, based on trip rates only, and this has been followed in considering the air quality neutrality of the proposed development in terms of transport emissions.

7.4 Table A6.6 in Appendix A6 provides default trip rates for different development categories. This information has been used to calculate a benchmark trip rate for the proposed development in Table 8.

Table 8: Calculation of Transport Benchmark Trip Rates for the Development

	Description	Value	Reference
A1 Retail / Reception			
A	**Gross Internal Floor Area (m^2)**	221	
B	**Benchmark Trip Rate (trips/m^2/annum)**	100	Table A6.6
C	**Benchmark Trip Rate (trips/annum)**	22,100	A x B
A3 Restaurant			
D	**Gross Internal Floor Area (m^2)**	88	
E	**Benchmark Trip Rate (trips/m^2/annum)**	137	Table A6.6
F	**Benchmark Trip Rate (trips/annum)**	12,056	D x E
B1 Office			
G	**Gross Internal Floor Area (m^2)**	1308	
H	**Benchmark Trip Rate (trips/m^2/annum)**	4	Table A6.6
I	**Benchmark Trip Rate (trips/annum)**	5,232	G x H
Entire Development			

Total Benchmark Trip Rate (trips/annum)	**17,288**	C + F + I

7.5 The proposed development would need to generate approximately 47 vehicle trips a day (17,288 trips per year) to exceed this benchmark. Based on the Transport Statement provided by Curtins, the proposed development will generate three vehicle movements within the peak periods. The Total Trip Rate will therefore be less than the Total Trip Rate Benchmarks, and the proposed development is thus better than air quality neutral in terms of transport emissions.

8 Mitigation

Mitigation Included by Design

8.1 The EPUK/IAQM guidance advises that good design and best practice measures should be considered, whether or not more specific mitigation is required. The proposed development incorporates the following good design and best practice measures:

- no car parking spaces will be provided;
- provision of pedestrian and cycle access to the development, including short and long stay cycle parking with wash rooms and shower facilities; and
- use of air-source heating to avoid the need for on-site combustion.

Recommended Mitigation

Construction Impacts

8.2 Measures to mitigate dust emissions will be required during the construction phase of the proposed development in order to minimise effects upon nearby sensitive receptors.

8.3 The Site has been identified as Low Risk, as set out in Table 7. The GLA's SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014b) describes measures that should be employed, as appropriate, to reduce the impacts, along with guidance on what monitoring should be undertaken during the construction phase. This reflects best practice experience and has been used, together with the professional experience of the consultant who has undertaken the dust impact assessment and the findings of the assessment, to draw up a set of measures that should be incorporated into the specification for the works. These measures are described in Appendix A7.

8.4 Where mitigation measures rely on water, it is expected that only sufficient water will be applied to damp down the material. There should not be any excess to potentially contaminate local watercourses.

Road Traffic Impacts

8.5 The assessment has demonstrated that overall effect of traffic emissions on future users of the proposed development will be 'not significant'. In addition, the increase in vehicle flows as a result of the proposed development will be minimal, and will therefore have a negligible impact on existing receptors. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

8.6 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The local air quality plan that the LBC is required to produce in order to address limit value exceedances in its area will also help to improve air quality; the proposed implementation of the ULEZ can reasonably be expected to lead to significant improvements. The Council's Air Quality Action Plan will also be helping to deliver improved air quality.

Air Quality Neutral

8.7 The proposed development will be better than air quality neutral in terms of transport and buildings emissions. Thus, no mitigation is recommended.

9 Conclusions

9.1 The construction works necessary to deliver the proposed development at the site have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. With these measures in place, it is expected that any residual effects will be 'not significant'.

9.2 The operational impacts of increased traffic emissions arising from additional traffic on local roads, due to the proposed development, have been screened out as insignificant.

9.3 The proposed development will swap an area where only the 1-hour mean nitrogen dioxide objective applies for another area where only the 1-hour mean nitrogen dioxide objective applies. Air quality conditions within this area have, nevertheless, been considered. It is judged that 1-hour mean nitrogen dioxide objective will not be exceeded at the Site. Thus, the effects of local traffic on the air quality for future users of the Site have been shown to be acceptable.

9.4 The changes to the LEZ and ULEZ described in Paragraphs A1.4 and A1.6, which the Mayor of London has confirmed are to be implemented, will result in significant reductions in NOx emissions across London. Consequentially, the predicted nitrogen dioxide concentrations set out in this assessment are likely to be higher than those experienced at the Site in 2021 (see Appendix A5).

9.5 The building and transport related emissions associated with the proposed development are both below the relevant benchmarks. The proposed development therefore complies with the requirement that all new developments in London should be at least air quality neutral and no mitigation measures have been recommended.

9.6 The overall operational air quality effects of the proposed development are judged to be 'not significant'. This conclusion is based on the impacts at existing receptors being negligible, the proposed development not introducing new exposure, and the nitrogen dioxide concentrations being below the relevant objectives.

9.7 The proposed development is consistent with the NPPF, which states that 'Planning policies and decisions should contribute to and enhance the natural and local environment by…preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution…'. Furthermore, the proposed development does not conflict with the requirements of Policy T2 of the new Local Plan, nor does it conflict with, or render unworkable, any elements of the LBC's Air Quality Action Plan or Supplementary Planning Document 'Planning Guidance 6 Amenity'. The proposed development is better than air quality neutral, and is thus compliant with Policy 7.14 of the London Plan.

10 References

AQC (2014) *Air Quality Neutral Planning Support Update: GLA 80371*, Available: http://www.aqconsultants.co.uk/getattachment/Resources/Download-Reports/GLA-AQ-Neutral-Policy-Final-Report-April-2014.pdf.aspx.

AQC (2016) *Relationship between the UK Air Quality Objectives and Occupational Air Quality Standards*, [Online], Available: http://www.aqconsultants.co.uk/AQC/media/Reports/Relationship-between-the-UK-Air-Quality-Objectives-and-Occupational-Air-Quality-Standards.pdf.

City of London Corporation (2017) *Air Quality Annual Status Report for 2016*.

DCLG (2018) *Planning Practice Guidance*, [Online], Available: http://planningguidance.planningportal.gov.uk/blog/guidance/.

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

Defra (2017a) *Air quality plan for nitrogen dioxide (NO2) in the UK*, Available: https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017.

Defra (2017b) *2017 NO2 projections data (2015 reference year)*, Available: https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data.

Defra (2018b) *Review & Assessment: Technical Guidance LAQM.TG16 February 2018 Version*, Defra, Available: https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf.

Defra (2018c) *UK Pollutant Release and Transfer Register*, [Online], Available: http://prtr.defra.gov.uk/map-search.

Defra (2018d) *Local Air Quality Management (LAQM) Support Website*, [Online], Available: http://laqm.defra.gov.uk/.

Defra (2018e) *UK Ambient Air Quality Interactive Map*, [Online], Available: https://uk-air.defra.gov.uk/data/gis-mapping.

Defra (2019) *Clean Air Strategy 2019*, Available: https://www.gov.uk/government/publications/clean-air-strategy-2019.

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

GLA (2010) *Mayor's Air Quality Strategy: Cleaning the Air*.

GLA (2014a) *Sustainable Design and Construction Supplementary Planning Guidance*, Available: https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/sustainable-design-and.

GLA (2014b) *The Control of Dust and Emissions from Construction and Demolition SPG*, Available: https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/control-dust-and.

GLA (2016a) *The London Plan: The Spatial Development Strategy for London Consolidated with Alterations Since 2011*, Available: https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan.

GLA (2016b) *London Atmospheric Emissions Inventory (LAEI) 2013*, Available: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013.

GLA (2017a) *Draft New London Plan*, [Online], Available: https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/draft-new-london-plan/.

GLA (2017b) *London Atmospheric Emissions Inventory (LAEI) 2013*, [Online], Available: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013.

GLA (2018a) *London Environment Strategy*, Available: https://www.london.gov.uk/what-we-do/environment/london-environment-strategy.

GLA (2018b) *Mayor's Transport Strategy*, [Online], Available: https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf.

IAQM (2016) *Guidance on the Assessment of Dust from Demolition and Construction v1.1*, Available: http://iaqm.co.uk/guidance/.

Jacobs (2017) *Integrated Impact Assessment, Ultra Low Emission Zone - Further Proposals*, Available: https://consultations.tfl.gov.uk/environment/air-quality-consultation-phase-3b/user_uploads/integrated-impact-assessment.pdf.

LBC (2009) *2009 Air Quality Updating and Screening Assessment for London Borough of Camden*.

LBC (2011a) *Camden's Transport Strategy: Camden's Local Implementation Plan*.

LBC (2011b) *Green Action for Change: Camden's Environmental Sustainability Plan (2011 - 2020)*.

LBC (2014) *2014 Air Quality Progress Report for London Borough of Camden*.

LBC (2016) *Camden's Clean Air Action Plan 2016 - 2018*.

LBC (2017a) *Camden Local Plan*.

LBC (2017b) *LB Camden Air Quality Annual Status Report for 2016*.

LBC (2018a) *Camden Planning Guidance 6 Amenity*.

LBC (2018b) *London Borough of Camden Air Quality Annual Status Report for 2017*.

Ministry of Housing, Communities and Local Government (2018) *National Planning Policy Framework*, Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/607721169 50.pdf.

Moorcroft and Barrowcliffe et al (2017) *Land-Use Planning & Development Control: Planning For Air Quality v1.2*, IAQM, London, Available: http://iaqm.co.uk/guidance/.

The Air Quality (England) (Amendment) Regulations 2002, Statutory Instrument 3043 (2002), HMSO, Available: https://www.legislation.gov.uk/uksi/2002/3043/contents/made.

The Air Quality (England) Regulations 2000 Statutory Instrument 928 (2000), HMSO, Available: http://www.legislation.gov.uk/uksi/2000/928/contents/made.

The European Parliament and the Council of the European Union (1997) *Directive 97/68/EC of the European Parliament and of the Council*, Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:31997L0068.

The European Parliament and the Council of the European Union (2008) *Directive 2008/50/EC of the European Parliament and of the Council*, Available: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0050.

11 Glossary

AADT	Annual Average Daily Traffic
AQC	Air Quality Consultants
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BEB	Building Emissions Benchmark
CAZ	Clean Air Zone
CHP	Combined Heat and Power
CURED	Calculator Using Realistic Emissions for Diesels
DCLG	Department for Communities and Local Government
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DMP	Dust Management Plan
EFT	Emission Factor Toolkit
EPUK	Environmental Protection UK
Exceedance	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
EU	European Union
EV	Electric Vehicle
Focus Area	Location that not only exceeds the EU annual mean limit value for NO_2 but also has a high level of human exposure
GIA	Gross Internal Floor Area
GLA	Greater London Authority
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
HMSO	Her Majesty's Stationery Office
HGV	Heavy Goods Vehicle
IAQM	Institute of Air Quality Management
kW	Kilowatt

LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LB	London Borough
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
µg/m^3	Microgrammes per cubic metre
MAQS	Mayor's Air Quality Strategy
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
NRMM	Non-road Mobile Machinery
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PHV	Private Hire Vehicle
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
RDE	Real Driving Emissions
SPG	Supplementary Planning Guidance
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
T-Charge	Toxicity Charge
TEA	Triethanolamine – used to absorb nitrogen dioxide
TEB	Transport Emissions Benchmark

TfL	Transport for London
TRAVL	Trip Rate Assessment Valid for London
ULEZ	Ultra Low Emission Zone
ZEC	Zero Emission Capable

12 Appendices

A1 London-Specific Policies and Measures

London Plan

A1.1 The London Plan sets out the following points in relation to planning decisions:

"Development proposals should:

a) minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within AQMAs or where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);

b) promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils "The control, of dust and emissions form construction and demolition";

c) be at least "air quality neutral" and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs));

d) ensure that where provision needs to made to reduce emissions from a development, these usually are made on site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches;

e) where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified."

The Mayor's Air Quality Strategy (MAQS)

A1.2 The 2010 MAQS commits to the continuation of measures identified in the 2002 MAQS, and sets out a series of additional measures, including:

Policy 1 – Encouraging smarter choices and sustainable travel;

- *Measures to reduce emissions from idling vehicles focusing on buses, taxis, coaches, taxis, PHVs and delivery vehicles;*
- *Using spatial planning powers to support a shift to public transport;*

- *Supporting car free developments.*

Policy 2 – Promoting technological change and cleaner vehicles:

- *Supporting the uptake of cleaner vehicles.*

Policy 4 – Reducing emissions from public transport:

- *Introducing age limits for taxis and PHVs.*

Policy 5 – Schemes that control emissions to air:

- *Implementing Phases 3 and 4 of the LEZ from January 2012*
- *Introducing a NOx emissions standard (Euro IV) into the LEZ for Heavy Goods Vehicles (HGVs), buses and coaches, from 2015.*

Policy 7 – Using the planning process to improve air quality:

- *Minimising increased exposure to poor air quality, particularly within AQMAs or where a development is likely to be used by a large number of people who are particularly vulnerable to air quality;*
- *Ensuring air quality benefits are realised through planning conditions and section 106 agreements and Community Infrastructure Levy.*

Policy 8 – Creating opportunities between low to zero carbon energy supply for London and air quality impacts:

- *Applying emissions limits for biomass boilers across London;*
- *Requiring an emissions assessment to be included at the planning application stage.*

Low Emission Zone (LEZ)

A1.3 A key measure to improve air quality in Greater London is the LEZ. This entails charges for vehicles entering Greater London not meeting certain emissions criteria, and affects older, diesel-engined lorries, buses, coaches, large vans, minibuses and other specialist vehicles derived from lorries and vans. The LEZ was introduced on 4 February 2008, and was phased in through to January 2012. From January 2012 a standard of Euro IV was implemented for lorries and other specialist diesel vehicles over 3.5 tonnes, and buses and coaches over 5 tonnes. Cars and lighter Light Goods Vehicles (LGVs) are excluded. The third phase of the LEZ, which applies to larger vans, minibuses and other specialist diesel vehicles, was also implemented in January 2012. As set out in the 2010 MAQS, a NOx emissions standard (Euro IV) is included in the LEZ for HGVs, buses and coaches, from 2015.

A1.4 The Mayor of London confirmed in June 2018 that the LEZ will be amended such that a Euro VI standard will apply for heavy vehicles from 26 October 2020. Requirements relating to larger vans, minibuses and other specialist diesel vehicles will not change.

Ultra Low Emission Zone (ULEZ)

A1.5 London's ULEZ is to be introduced on 8 April 2019. The ULEZ will operate 24 hours a day, 7 days a week in the same area as the current Congestion Charging zone. All cars, motorcycles, vans, minibuses and Heavy Goods Vehicles will need to meet exhaust emission standards (ULEZ standards) or pay an additional daily charge to travel within the zone. The ULEZ standards are Euro 3 for motorcycles; Euro 4 for petrol cars, vans and minibuses; Euro 6 for diesel cars, vans and minibuses; and Euro VI for HGVs, buses and coaches.

A1.6 The Mayor of London confirmed in June 2018 that, from 25 October 2021, the ULEZ will cover the entire area within the North and South Circular roads, applying the emissions standards set out in Paragraph A1.5 for light vehicles. The ULEZ will not include any requirements relating to heavy vehicle emissions beyond 26 October 2020, as these will be addressed by the amendments to the LEZ described in Paragraph A1.4.

Other Measures

A1.7 The Mayor introduced an Emissions Surcharge (also known as the Toxicity Charge, or T-Charge) in October 2017, which added an extra £10 charge for vehicles using the congestion charge zone that do not meet the Euro 4/IV emission standards. The Emissions Surcharge aims to discourage the use of older, more polluting vehicles driving into and within central London. It is the first step towards the introduction of the ULEZ.

A1.8 From 2018 all taxis presented for licencing for the first time must be zero emission capable (ZEC). This means they must be able to travel a certain distance in a mode which produces no air pollutants. From 2018 all private hire vehicles (PHVs) presented for licensing for the first time must meet Euro 6 emissions standards. From 1 January 2020, all newly manufactured PHVs presented for licensing for the first time must be ZEC (with a minimum zero emission range of 10 miles). The Mayor's aim is that the entire taxi and PHV fleet will be made up of ZEC vehicles by 2033.

A1.9 The Mayor has also proposed to make sure that TfL leads by example by cleaning up its bus fleet, implementing the following measures:

- TfL will procure only hybrid or zero emission double-decker buses from 2018;
- a commitment to providing 3,100 double decker hybrid buses by 2019 and 300 zero emission single-deck buses in central London by 2020;
- introducing 12 Low Emission Bus Zones by 2020;
- investing £50m in Bus Priority Schemes across London to reduce engine idling; and

- retrofitting older buses to reduce emissions (selective catalytic reduction (SCR) technology has already been fitted to 1,800 buses, cutting their NOx emissions by around 88%).

A2 Construction Dust Assessment Procedure

A2.1 The criteria developed by IAQM (2016), upon which the GLA's guidance is based, divide the activities on construction sites into four types to reflect their different potential impacts. These are:

- demolition;
- earthworks;
- construction; and
- trackout.

A2.2 The assessment procedure includes the four steps summarised below:

STEP 1: Screen the Need for a Detailed Assessment

A2.3 An assessment is required where there is a human receptor within 350 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the boundary of the site and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A2.4 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is *negligible* and that any effects will be 'not significant'. No mitigation measures beyond those required by legislation will be required.

STEP 2: Assess the Risk of Dust Impacts

A2.5 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude (Step 2A); and
- the sensitivity of the area to dust effects (Step 2B).

A2.6 These two factors are combined in Step 2C, which is to determine the risk of dust impacts with no mitigation applied. The risk categories assigned to the site may be different for each of the four potential sources of dust (demolition, earthworks, construction and trackout).

Step 2A – Define the Potential Dust Emission Magnitude

A2.7 Dust emission magnitude is defined as either 'Small', 'Medium', or 'Large'. The IAQM guidance explains that this classification should be based on professional judgement, but provides the examples in Table A2.1.

Table A2.1: Examples of How the Dust Emission Magnitude Class May be Defined

Class	Examples
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10,000 tonnes, earthworks during wetter months
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m

[a] These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B – Define the Sensitivity of the Area

A2.8 The sensitivity of the area is defined taking account of a number of factors:

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

A2.9 The first requirement is to determine the specific sensitivities of local receptors. The IAQM guidance recommends that this should be based on professional judgment, taking account of the principles in Table A2.2. These receptor sensitivities are then used in the matrices set out in Table A2.3, Table A2.4 and Table A2.5 to determine the sensitivity of the area. Finally, the sensitivity of the area is considered in relation to any other site-specific factors, such as the presence of natural shelters etc., and any required adjustments to the defined sensitivities are made.

Step 2C – Define the Risk of Impacts

A2.10 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the *risk* of impacts with no mitigation applied. The IAQM guidance provides the matrix in Table A2.6 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A2.11 The IAQM guidance provides a suite of recommended and desirable mitigation measures which are organised according to whether the outcome of Step 2 indicates a low, medium, or high risk. The list provided in the IAQM guidance has been used as the basis for the requirements set out in Appendix A7.

STEP 4: Determine Significant Effects

A2.12 The IAQM guidance does not provide a method for assessing the significance of effects before mitigation, and advises that pre-mitigation significance should not be determined. With appropriate mitigation in place, the IAQM guidance is clear that the residual effect will normally be 'not significant'.

A2.13 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

Table A2.2: Principles to be Used When Defining Receptor Sensitivities

Class	Principles	Examples
Sensitivities of People to Dust Soiling Effects		
High	users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land	dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms
Medium	users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land	parks and places of work
Low	the enjoyment of amenity would not reasonably be expected; or there is property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land	playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads
Sensitivities of People to the Health Effects of PM_{10}		
High	locations where members of the public may be exposed for eight hours or more in a day	residential properties, hospitals, schools and residential care homes
Medium	locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	may include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	locations where human exposure is transient	public footpaths, playing fields, parks and shopping streets
Sensitivities of Receptors to Ecological Effects		
High	locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species	Special Areas of Conservation with dust sensitive features
Medium	locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition	Sites of Special Scientific Interest with dust sensitive features
Low	locations with a local designation where the features may be affected by dust deposition	Local Nature Reserves with dust sensitive features

Table A2.3: Sensitivity of the Area to Dust Soiling Effects on People and Property [3]

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

[3] For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude, 200 m from sites with a *medium* dust emission magnitude and 50 m from sites with a *small* dust emission magnitude, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table A2.4: Sensitivity of the Area to Human Health Effects [3]

Receptor Sensitivity	Annual Mean PM_{10}	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	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A2.5: Sensitivity of the Area to Ecological Effects [3]

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

Table A2.6: Defining the Risk of Dust Impacts

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

A3 EPUK & IAQM Planning for Air Quality Guidance

A3.1 The guidance issued by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) is comprehensive in its explanation of the place of air quality in the planning regime. Key sections of the guidance not already mentioned above are set out below.

Air Quality as a Material Consideration

"Any air quality issue that relates to land use and its development is capable of being a material planning consideration. The weight, however, given to air quality in making a planning application decision, in addition to the policies in the local plan, will depend on such factors as:

- *the severity of the impacts on air quality;*
- *the air quality in the area surrounding the proposed development;*
- *the likely use of the development, i.e. the length of time people are likely to be exposed at that location; and*
- *the positive benefits provided through other material considerations".*

Recommended Best Practice

A3.2 The guidance goes into detail on how all development proposals can and should adopt good design principles that reduce emissions and contribute to better air quality management. It states:

"The basic concept is that good practice to reduce emissions and exposure is incorporated into all developments at the outset, at a scale commensurate with the emissions".

A3.3 The guidance sets out a number of good practice principles that should be applied to all developments that:

- include 10 or more dwellings;
- where the number of dwellings is not known, residential development is carried out on a site of more than 0.5 ha;
- provide more than 1,000 m^2 of commercial floorspace;
- are carried out on land of 1 ha or more.

A3.4 The good practice principles are that:

- New developments should not contravene the Council's Air Quality Action Plan, or render any of the measures unworkable;

- Wherever possible, new developments should not create a new “street canyon”, as this inhibits pollution dispersion;
- Delivering sustainable development should be the key theme of any application;
- New development should be designed to minimise public exposure to pollution sources, e.g. by locating habitable rooms away from busy roads;
- The provision of at least 1 Electric Vehicle (EV) “rapid charge” point per 10 residential dwellings and/or 1000 m^2 of commercial floorspace. Where on-site parking is provided for residential dwellings, EV charging points for each parking space should be made available;
- Where development generates significant additional traffic, provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety;
- All gas-fired boilers to meet a minimum standard of <40 mgNOx/kWh;
- Where emissions are likely to impact on an AQMA, all gas-fired CHP plant to meet a minimum emissions standard of:
    - Spark ignition engine: 250 mgNOx/Nm^3;
    - Compression ignition engine: 400 mgNOx/Nm^3;
    - Gas turbine: 50 mgNOx/Nm^3.
- A presumption should be to use natural gas-fired installations. Where biomass is proposed within an urban area it is to meet minimum emissions standards of 275 mgNOx/Nm^3 and 25 mgPM/Nm^3.

A3.5 The guidance also outlines that offsetting emissions might be used as a mitigation measure for a proposed development. However, it states that:

“It is important that obligations to include offsetting are proportional to the nature and scale of development proposed and the level of concern about air quality; such offsetting can be based on a quantification of the emissions associated with the development. These emissions can be assigned a value, based on the “damage cost approach” used by Defra, and then applied as an indicator of the level of offsetting required, or as a financial obligation on the developer. Unless some form of benchmarking is applied, it is impractical to include building emissions in this approach, but if the boiler and CHP emissions are consistent with the standards as described above then this is not essential”.

A3.6 The guidance offers a widely used approach for quantifying costs associated with pollutant emissions from transport. It also outlines the following typical measures that may be considered to

offset emissions, stating that measures to offset emissions may also be applied as post assessment mitigation:

- Support and promotion of car clubs;
- Contributions to low emission vehicle refuelling infrastructure;
- Provision of incentives for the uptake of low emission vehicles;
- Financial support to low emission public transport options; and
- Improvements to cycling and walking infrastructures.

Screening

Impacts of the Local Area on the Development

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

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

Impacts of the Development on the Local Area

A3.7 The guidance sets out two stages of screening criteria that can be used to identify whether a detailed air quality assessment is required, in terms of the impact of the development on the local area. The first stage is that you should proceed to the second stage if any of the following apply:

- 10 or more residential units or a site area of more than 0.5 ha residential use; and/or
- more than 1,000 m^2 of floor space for all other uses or a site area greater than 1 ha.

A3.8 Coupled with any of the following:

- the development has more than 10 parking spaces; and/or

- the development will have a centralised energy facility or other centralised combustion process.

A3.9 If the above do not apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area. If they do apply then you proceed to stage 2, which sets out indicative criteria for requiring an air quality assessment. The stage 2 criteria relating to vehicle emissions are set out below:

- the development will lead to a change in LDV flows of more than 100 AADT within or adjacent to an AQMA or more than 500 AADT elsewhere;
- the development will lead to a change in HDV flows of more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere;
- the development will lead to a realigning of roads (i.e. changing the proximity of receptors to traffic lanes) where the change is 5m or more and the road is within an AQMA;
- the development will introduce a new junction or remove an existing junction near to relevant receptors, and the junction will cause traffic to significantly change vehicle acceleration/deceleration, e.g. traffic lights or roundabouts;
- the development will introduce or change a bus station where bus flows will change by more than 25 AADT within or adjacent to an AQMA or more than 100 AADT elsewhere; and
- the development will have an underground car park with more than 100 movements per day (total in and out) with an extraction system that exhausts within 20 m of a relevant receptor.

A3.10 The criteria are more stringent where the traffic impacts may arise on roads where concentrations are close to the objective. The presence of an AQMA is taken to indicate the possibility of being close to the objective, but where whole authority AQMAs are present and it is known that the affected roads have concentrations below 90% of the objective, the less stringent criteria are likely to be more appropriate.

A3.11 On combustion processes (including standby emergency generators and shipping) where there is a risk of impacts at relevant receptors, the guidance states that:

"Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.

In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates.

Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable".

A3.12 Should none of the above apply then the development can be screened out as not requiring a detailed air quality assessment of the impact of the development on the local area, provided that professional judgement is applied; the guidance importantly states the following:

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

A3.13 Even if a development cannot be screened out, the guidance is clear that a detailed assessment is not necessarily required:

"The use of a Simple Assessment may be appropriate, where it will clearly suffice for the purposes of reaching a conclusion on the significance of effects on local air quality. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence. Similarly, it may be possible to conduct a quantitative assessment that does not require the use of a dispersion model run on a computer".

A3.14 The guidance also outlines what the content of the air quality assessment should include, and this has been adhered to in the production of this report.

Assessment of Significance

A3.15 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. The guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;

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

A3.16 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

A3.17 A judgement of the significance should be made by a competent professional who is suitably qualified. A summary of the professional experience of the staff contributing to this assessment is provided in Appendix A4.

A4 Professional Experience

Dr Ben Marner, BSc (Hons) PhD CSci MIEnvSc MIAQM

Dr Marner is a Technical Director with AQC and has twenty years' experience in the field of air quality. He has been responsible for air quality and greenhouse gas assessments of road schemes, rail schemes, airports, power stations, waste incinerators, commercial developments and residential developments in the UK and abroad. He has been an expert witness at several public inquiries, where he has presented evidence on health-related air quality impacts, the impacts of air quality on sensitive ecosystems, and greenhouse gas impacts. He has extensive experience of using detailed dispersion models, as well as contributing to the development of modelling best practices. Dr Marner has arranged and overseen air quality monitoring surveys, as well as contributing to Defra guidance on harmonising monitoring methods. He has been responsible for air quality review and assessments on behalf of numerous local authorities. He has also developed methods to predict nitrogen deposition fluxes on behalf of the Environment Agency, provided support and advice to the UK Government's air quality review and assessment helpdesk, Transport Scotland, Transport for London, and numerous local authorities. He is a Member of the Institute of Air Quality Management and a Chartered Scientist. Dr Marner is a member of Defra's Network of Evidence Experts and a member of Defra's Air Quality Expert Group.

Lucy Hodgins, BSc (Hons) MIEnvSc MIAQM

Miss Hodgins is a Senior Consultant with AQC, with over eight years' experience in the field of air quality. She has been involved in the assessment of air quality impacts for a range of industrial, commercial and residential projects using qualitative and quantitative methods, including dispersion modelling, utilising a variety of models including ADMS Roads, Breeze Roads, ADMS-5 and Breeze Aermod. She has been responsible for the preparation of road traffic and point source emissions assessments for residential, mixed-use and industrial developments. She has undertaken numerous operational dust assessments for mineral and waste facilities, as well as assessments of construction dust emissions. She has also undertaken assessments for energy from waste, anaerobic digestion and waste biomass facilities for a range of air pollutants, along with nuisance dust and odour. Miss Hodgins has extensive experience in nuisance dust and ambient air quality monitoring and the interpretation of monitoring data. She is a Member of the Institute of Air Quality Management and the Institution of Environmental Sciences.

Dr Kate Wilkins BSc (Hons) MSc PhD

Dr Wilkins joined AQC in January 2018 as an Assistant Consultant. She is currently gaining experience of undertaking air quality assessments and contributing to projects. Prior to joining AQC, Kate completed a PhD at the University of Bristol, researching atmospheric dispersion

modelling and satellite remote sensing of volcanic ash. Prior to her PhD she gained a BSc in Environmental Science and an MSc in Environmental Dynamics and Climatic Change. She has also spent a year working at the Environment Agency in Flood Risk Management.

Full CVs are available at www.aqconsultants.co.uk.

A5 London Vehicle Fleet Projections

A5.1 TfL has published an Integrated Impact Assessment (Jacobs, 2017) setting out the impacts of the changes to the LEZ and ULEZ described in Paragraphs A1.4 and A1.6. The assessment predicts that the changes will reduce overall NOx emissions from vehicles in London by 28% in 2021 (32% in Inner London and 27% in Outer London) and by 21% in 2025 (24% in Inner London and 21% in Outer London). The percentage reduction reduces with time due to the natural turnover of the fleet that would have occurred regardless of the introduction of the proposed changes. The proposed changes will not significantly affect emissions in Central London, where the ULEZ will already be implemented, but concentrations here will still reduce due to the lower emissions in surrounding areas.

A5.2 The report projects that the changes will reduce exposure to exceedances of the annual mean nitrogen dioxide objective by 40% and 21% in Central London in 2021 and 2025, respectively; by 4% and 0% in Inner London in 2021 and 2025, respectively; and by 23% and 27% in Outer London in 2021 and 2025, respectively, when compared to the baseline scenario.

A5.3 The changes are not projected to have a significant effect on PM_{10} and $PM_{2.5}$ concentrations, although a small reduction is predicted.

A5.4 The changes to the LEZ and ULEZ announced by the Mayor of London in June 2018 have not been considered in this assessment. Paragraphs A5.1 and A5.2 highlight that the changes to the LEZ and ULEZ will result in significant reductions in vehicle nitrogen oxides emissions and resultant nitrogen dioxide concentrations. The changes might reasonably also be expected to expedite the uptake of cleaner vehicles well beyond that projected in the EFT's fleet projections for London.

A6 'Air Quality Neutral'

A6.1 The GLA's SPG on Sustainable Design and Construction (GLA, 2014a), and its accompanying Air Quality Neutral methodology report (AQC, 2014), provide an approach to assessing whether a development is air quality neutral. The approach is to compare the expected emissions from the building energy use and the car use associated with the proposed development against defined emissions benchmarks for buildings and transport in London.

A6.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A6.1, while the 'Transport Emissions Benchmarks' ('TEBs') are set out in Table A6.2. In order to assess against the TEBs, it is necessary to combine the expected trip generation from the development with estimates of average trip length and average emission per vehicle. So as to ensure a consistent methodology, the report which accompanies the SPG (AQC, 2014) recommends that the information in Table A6.3 and Table A6.4 (upon which the TEBs are based) is used. Similarly, the information in Table A6.5 may be used if site-specific information is not available (AQC, 2014). For use classes other than A1, B1 and B3, trip lengths and average emissions per vehicle are not provided, thus the trip rates in Table A6.6 alone may be used to consider the air quality neutrality of a development. These have been derived from the Trip Rate Assessment Valid for London (TRAVL) database.

Table A6.1: Building Emissions Benchmarks (g/m^2 of Gross Internal Floor Area)

Land Use Class	NOx	PM_{10}
Class A1	22.6	1.29
Class A3 - A5	75.2	4.32
Class A2 and Class B1	30.8	1.77
Class B2 - B7	36.6	2.95
Class B8	23.6	1.90
Class C1	70.9	4.07
Class C2	68.5	5.97
Class C3	26.2	2.28
D1 (a)	43.0	2.47
D1 (b)	75.0	4.30
Class D1 (c -h)	31.0	1.78
Class D2 (a-d)	90.3	5.18
Class D2 (e)	284	16.3

Table A6.2: Transport Emissions Benchmarks

Land use	CAZ [a]	Inner [b]	Outer [b]
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	1553
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,C4)	40.7	100	267

[a] Central Activity Zone.

[b] Inner London and Outer London as defined in the LAEI (GLA, 2016b).

Table A6.3: Average Distance Travelled by Car per Trip

Land use	Distance (km)		
	CAZ	Inner	Outer
Retail (A1)	9.3	5.9	5.4
Office (B1)	3.0	7.7	10.8
Residential (C3)	4.3	3.7	11.4

Table A6.4: Average Road Traffic Emission Factors in London in 2010

Pollutant	g/vehicle-km		
	CAZ	Inner	Outer
NOx	0.4224	0.370	0.353
PM_{10}	0.0733	0.0665	0.0606

Table A6.5: Average Emissions from Heating and Cooling Plant in Buildings in London in 2010

	Gas (kg/kWh)		Oil (kg/kWh)	
	NOx	PM_{10}	NOx	PM_{10}
Domestic	0.0000785	0.00000181	0.000369	0.000080
Industrial/Commercial	0.000194	0.00000314	0.000369	0.000080

Table A6.6: Average Number of Trips per Annum for Different Development Categories

Land use	Number of Trips (trips/m^2/annum)		
	CAZ	Inner	Outer
A1	43	100	131
A3	153	137	170
A4	2.0	8.0	-
A5	-	32.4	590
B1	1	4	18
B2	-	15.6	18.3
B8	-	5.5	6.5
C1	1.9	5.0	6.9
C2	-	3.8	19.5
D1	0.07	65.1	46.1
D2	5.0	22.5	49.0
Number of Trips (trips/dwelling/annum)			
C3	129	407	386

A7 Construction Mitigation

A7.1 The following is a set of best-practice measures from the GLA guidance (GLA, 2014b) that should be incorporated into the specification for the works. These measures should be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Site Management

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- develop a Dust Management Plan (DMP);
- display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary;
- display the head or regional office contact information;
- record and respond to all dust and air quality pollutant emissions complaints;
- make a complaints log available to the local authority when asked;
- carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the Local Authority when asked;
- increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions are being carried out and during prolonged dry or windy conditions; and
- record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and ensure that the action taken to resolve the situation is recorded in the log book.

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;

- fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods; and
- remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.

Operating Vehicle/Machinery and Sustainable Travel

- Ensure all on-road vehicles comply with the requirements of the London LEZ (and ULEZ);
- ensure all Non-road Mobile Machinery (NRMM) comply with the standards set within the GLA's Control of Dust and Emissions During Construction and Demolition SPG. This outlines that, from 1 September 2015, all NRMM of net power 37 kW to 560 kW used on the site of a major development in Greater London must meet Stage IIIA of EU Directive 97/68/EC (The European Parliament and the Council of the European Union, 1997) and its subsequent amendments as a minimum. NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IIIB of the Directive as a minimum. From 1 September 2020 NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum, while NRMM used on any site within the Central Activity Zone or Canary Wharf will be required to meet Stage IV of the Directive as a minimum;
- 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; and
- implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;
- ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using recycled water where possible and appropriate;
- use enclosed chutes, conveyors and covered skips; and
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- avoid bonfires and burning of waste materials.

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 water suppression is used during demolition operations;
- avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces), if possible; and
- 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.

Measures Specific to Trackout

- Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site;
- avoid dry sweeping of large areas; and
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.