Air Quality Assessment:

The Network Building, 95-100 Tottenham Court Road, Camden

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Experts in air quality management & assessment

Document Control

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Executive Summary

The air quality impacts associated with the redevelopment of the Network Building at 95-100 Tottenham Court Road in Camden have been assessed. The proposals involve the demolition of the existing six-storey building and the construction of a nine-storey building, consisting of ground floor retail units and office space above.

The proposed development will lead to a reduction in car parking on the site and will not lead to a significant increase in traffic on the local road network, with any additional traffic associated with servicing and deliveries. This small number of additional trips will have an insignificant effect on existing receptors.

The proposed development will include two diesel generators and a diesel-fired sprinkler pump for use in emergencies only. The assessment has demonstrated that the impacts arising from the proposed testing and maintenance regime at existing sensitive receptors will be negligible, and thus the plant will have an insignificant effect on local air quality.

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.

The proposed development has also been shown to meet the London Plan's requirement that new developments are at least 'air quality neutral'.

Overall, the construction and operational air quality effects of the proposed development are judged to be 'not significant'.

Contents

Tables

Figures

1 Introduction

1.1 This report describes the potential air quality impacts associated with the redevelopment of the Network Building at 95-100 Tottenham Court Road, Camden. The proposed development, in consideration for an outline planning application, is described as:

"Demolition of the existing building and construction of a new building to provide for a maximum of 17,275 sqm (GIA) of E class use floorspace along with details of access, scale and landscaping and other works incidental to the application (layout and appearance reserved)"

1.2 This report covers the outline planning application, as described above, and addresses the proposals for the Reserved Matters Application 1, which involve the demolition of the existing six-storey building, and the construction of a nine-storey building comprising retail units at ground and lower-ground floor and office space above.

1.3 The proposed development 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 particulate matter (PM_{10}) objectives. The location and setting of the proposed development is shown in Figure 1, along with the relevant nearby Focus Areas and monitoring sites.

1.4 The proposed development will generate additional traffic on local roads, which may impact on air quality at existing residential properties along the affected road network. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.5 The proposed development will be provided with heat and hot water via heat recovery from 4-pipe chillers, supplemented by electric Air Source Heat Pumps (ASHPs); there are no significant emissions to air associated with either of these technologies. The proposals for the development do, however, include the installation of two diesel generators for emergency purposes; a 1,253 kW input generator, herein referred to as the "Tenants' generator", and a 552 kW input generator, herein referred to as the "Landlord's generator". The emissions from these generators could impact upon air quality at existing properties. The proposals also include a diesel-fired sprinkler pump. The main air pollutants of concern related to diesel-fired plant are nitrogen dioxide PM_{10} and $PM_{2.5}$.

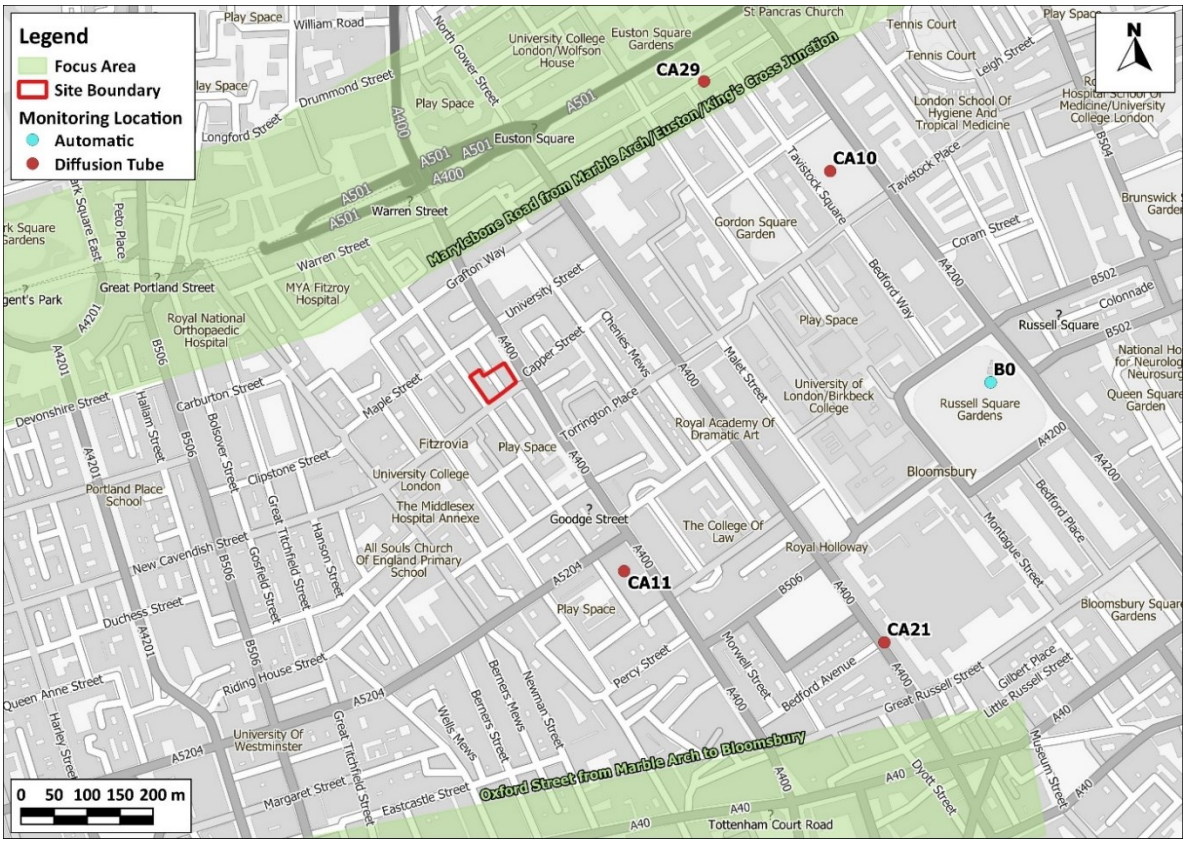

Figure 1: Proposed Development Setting in the Context of Air Quality

1.6 The Greater London Authority's (GLA's) London Plan (GLA, 2016) 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 GLA's Supplementary Planning Guidance (SPG) on Sustainable Design and Construction (GLA, 2014a).

1.7 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.

1.8 This report describes existing local air quality conditions in 2019, utilising the Council's available air quality monitoring data and information published by Defra. The assessment of construction dust impacts focuses on the anticipated duration of the works.

1.9 This report has been prepared taking into account all relevant local and national guidance and regulations.

2 Policy Context

2.1 The United Kingdom formally left the European Union (EU) on 31st January 2020; until the end of 2020 there will be a transition period while the UK and EU negotiate additional arrangements. During this period EU rules and regulations will continue to apply to the UK. All European legislation referred to in this report is written into UK law and will remain in place beyond 2020, unless amended, although there is uncertainty at this point in time as to who will enforce the requirements of some of this legislation.

Air Quality Strategy

2.2 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.

The Environmental Permitting (England and Wales) (Amendment) Regulations 2018

2.3 The Medium Combustion Plant Directive (MCPD) (The European Parliament and the Council of the European Union, 2015) regulates pollutant emissions from combustion plant with a rated input between 1 and 50 megawatts (MW_{th}) and was transposed into UK law in January 2018 through an amendment to the Environmental Permitting Regulations (2018). The legislation sets emission limits to be applied from December 2018 for new plant and from 2025 or 2030 for existing plant (depending on the rated input). In addition to addressing emissions from plant with a rated input of 1 to 50 MW_{th}, as required by the MCPD.

2.4 The amendment also introduces emission limits on generator plant, regardless of their rated input. Generators whose sole purpose is maintaining power supply at a site during an on-site emergency, that are operated for the purpose of testing/maintenance for no more than 50 hours per year, will be exempt from the emission limits, but will be required to apply for an exemption with the regulating authority.

2.5 Since the emergency plant will be tested for fewer than 50 hours per year they are exempt from requiring a MCP permit to operate.

Clean Air Act 1993 & Environmental Protection Act

2.6 Small combustion plant of less than 20 MW net rated thermal input are controlled under the Clean Air Act 1993 (1993). This requires the local authority to approve the chimney height. Plant which are smaller than 366 kW have no such requirement. The local authority's approval will, therefore, be required for the plant to be installed in the proposed development.

2.7 Measures to ensure adequate dispersion of emissions from discharging stacks and vents are included in Technical Guidance Note D1 (Dispersion) (1993), issued in support of the Environmental Protection Act (1990).

Clean Air Strategy 2019

2.8 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

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

2.10 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. The Government has since announced *"plans to bring forward an end to the sale of new petrol and diesel cars and vans to 2035, or earlier if a faster transition is feasible, subject to consultation, as well as including hybrids for the first time"*. If these ambitions are realised then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades.

Planning Policy

National Policies

2.11 The National Planning Policy Framework (NPPF) (2019a) 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 (Paragraph 8c) 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".

2.12 To prevent unacceptable risks from air pollution, Paragraph 170 of 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".

2.13 Paragraph 180 states:

"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".

2.14 More specifically on air quality, Paragraph 180 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".

2.15 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019b), 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 Limit Values. 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, or where the need for emissions reductions has been identified".

2.16 Regarding plan-making, the PPG states:

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

2.17 The role of the local authorities through the LAQM regime is covered, with the PPG stating that a local authority Air Quality Action Plan "*identifies measures that will be introduced in pursuit of the objectives and can have implications for planning*". In addition, the PPG makes clear that *"dust can also be a planning concern, for example, because of the effect on local amenity"*.

2.18 Regarding the need for an air quality assessment, the PPG states that:

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

2.19 The PPG sets out the information that may be required in an air quality assessment, making clear that:

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

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

London-Specific Policies

2.21 The key London-specific policies are summarised below, with more detail provided, where required, in Appendix A1.

The London Plan

2.22 The London Plan (GLA, 2016) 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.

2.23 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.

2.24 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.

2.25 The 'Intend to Publish' version of the new London Plan was published in December 2019 (GLA, 2019a), incorporating consolidated changes to previous versions suggested by the Mayor of London, as well as addressing the Inspectors' recommendations following the 2019 Examination in Public. Despite not yet being adopted, the 'Intend to Publish' London Plan is a material consideration in planning decisions and is afforded considerable weight. Policy SI1 on 'Improving Air Quality' states that:

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

2.26 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*
- *create unacceptable risk of high levels of exposure to poor air quality".*

2.27 It also states that:

"Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating a) how proposals have considered ways to maximise benefits to local air quality, and b) what measures or design features will be put in place to reduce exposure to pollution, and how they will achieve this."

London Environment Strategy

2.28 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

2.29 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".*

GLA SPG: Sustainable Design and Construction

2.30 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 2.24, above) should be implemented.

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

2.31 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) guidance (IAQM, 2016), and it states that "*the latest version of the IAQM Guidance should be used*".

Air Quality Focus Areas

2.32 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 are 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 located in close proximity to two air quality Focus Areas, one covering Marylebone Road from Marble Arch to King's Cross junction and another covering Oxford Street from Marble Arch to Bloomsbury.

Local Transport Plan

2.33 The LBC's Transport Strategy (London Borough of Camden, 2019a) sets out the Council's vision and objectives for transport in the borough, in order to respond to changing challenges, opportunities and policy contexts, and identifies measures by which the Council will meet its transport goals. The Strategy contains one relevant objective on air quality; Objective 5 '*To reduce and mitigate the impact of transport-based emissions…*'. The Objective is supported by the following policies:

"Policy 5b: Work towards the World Health Organisation (WHO) limits for Particulate Matter and Nitrogen Dioxide by 2030.

Policy 5c: Use air quality indicators (PM_{10} and NOx emissions levels) as key factors in prioritising locations for LIP-funding through our Area-wide Healthy Streets Projects.

Policy 5h: Where feasible and appropriate, we will monitor the impact of our highways/streetscape schemes using air quality monitoring, including (for example) the use of diffusion tubes to monitor Nitrogen Dioxide levels pre- and post-implementation."

2.34 Other actions within the supporting policies include:

- Continuing to develop a comprehensive network of electric vehicle charging points;
- Incentivising the update of electric vehicles; and
- Establishing the highest standards for the Council's own vehicle fleet.

Local Policies

2.35 The Camden Council Local Plan (London Borough of Camden, 2017) was adopted in 2017. Policy A1 on managing the impact of development states that *"The Council will seek to protect the quality of life of occupiers and neighbours"* and will *"seek to ensure that the amenity of communities, occupiers and neighbours is protected […] and require mitigation measures where necessary".* Factors that will be considered include odour, fumes and dust.

2.36 Policy CC4 on Air Quality 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 (AQA) 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 permissions 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 emission impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan."

2.37 The LBC published a 'Camden Planning Guidance' Supplementary Planning Document (SPD) (London Borough of Camden, 2019b) in March 2019, specifically pertaining to air quality. It provides information on air quality in the borough and supports Local Plan Policy CC4 Air Quality. It also contains advice on air quality modelling methodology, including assuming no improvement in air quality in future year scenarios, and recommending the use of 38 µg/m^3 as the assessment level for annual mean nitrogen dioxide concentrations.

2.38 The draft 'Camden Planning Guidance' document on Air Quality is currently published for consultation purposes (London Borough of Camden, 2020a). If approved, it will replace the adopted Camden Planning Guidance on Air Quality.

Air Quality Action Plans

National Air Quality Plan

2.39 Defra has produced an Air Quality Plan to tackle roadside nitrogen dioxide concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018a) was published in October 2018 and sets out the steps Government is taking in relation to a further 33 local authorities where shorter-term exceedances of the limit value were identified. Alongside a package of national measures, the 2017 Plan and the 2018 Supplement require those identified English Local Authorities (or the GLA in the case of London Authorities) to produce local action plans and/or feasibility studies. These plans and feasibility studies must have regard to measures to achieve the statutory limit values within the shortest possible time, which may include the implementation of a CAZ. There is currently no straightforward way to take account of the effects of the 2017 Plan or 2018 Supplement 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

2.40 The LBC's Air Quality Action Plan (London Borough of Camden, 2019c) sets out a series of measures by which the Council will seek to achieve the air quality objectives in its AQMA. The Plan sets out seven themes, around which a number of actions have been developed in order to improve local air quality:

- *"Building emissions;*
- *construction emissions;*
- *transport emissions;*
- *communities and schools;*
- *delivery servicing and freight;*
- *public health and awareness raising; and*
- *lobbying."*

2.41 The plan also sets out the following roles for the LBC to fulfil:

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

3 Assessment Criteria

3.1 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).

3.2 The UK-wide 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. 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). Measurements have also shown that the 24-hour mean PM_{10} objective could be exceeded at roadside locations where the annual mean concentration is above 32 $\mu g/m^3$ (Defra, 2018b).

3.3 The 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 hotels. 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. 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.

3.4 EU Directive 2008/50/EC (The European Parliament and the Council of the European Union, 2008) sets limit values for nitrogen dioxide, PM_{10} and $PM_{2.5}$, and is implemented in UK law through the Air Quality Standards Regulations (2010). 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 normally recognise local authority monitoring or local modelling studies when determining the likelihood of the limit values being exceeded, unless such studies have been audited and approved by Defra and DfT's Joint Air Quality Unit (JAQU).

3.5 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
Fine Particles ($PM_{2.5}$) [a]	Annual Mean	25 µg/m^3

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

Construction Dust Criteria

3.6 There are no formal assessment criteria for dust. In the absence of formal criteria, the approach developed by the Institute of Air Quality Management (IAQM)[1] (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

Road Traffic Assessments

3.7 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.

3.8 The second stage then compares the changes in vehicle flows on local roads that a development will lead to against specified screening criteria. The screening thresholds (described in full in Appendix A3) inside an AQMA are a change in flows of more than 25 heavy duty vehicles or 100 light duty vehicles per day; outside of an AQMA the thresholds are 100 heavy duty vehicles or 500 light duty vehicles. Where these criteria are exceeded, a detailed assessment is likely to be 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"*.

3.9 While these screening criteria are specifically intended to act as a trigger for a detailed assessment, they can also sometimes be used to identify the extent of the road network that requires assessment. Where the change in traffic on a given road link is less than the relevant screening threshold, it is

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

unlikely that a significant impact would occur, and these links can be disregarded unless there are additional development-related emissions affecting receptors along the link.

Point Source Assessments

3.10 EPUK and the IAQM have developed an approach (Moorcroft and Barrowcliffe et al, 2017) to determine whether emissions from point sources, such as energy plant, have the potential for significant air quality impacts. The first step of the approach, as described in Appendix A3, is to screen the emissions and the emissions parameters to determine whether an assessment is necessary:

"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.

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".

3.11 This screening approach requires professional judgement, and the experience of the consultants preparing the assessment is set out in Appendix A4.

3.12 If it is determined that an assessment of the point source emissions is required, then there is a further stage of screening that can be applied to the model outputs. The approach is that any change in concentrations smaller than 0.5% of the long-term environmental standard will be *negligible*, regardless of the existing air quality conditions. Any change smaller than 1.5% of the long-term environmental standard will be *negligible* so long as the total concentration is less than 94% of the standard and any change smaller than 5.5% of the long-term environmental standard will be *negligible* so long as the total concentration is less than 75% of the standard. The guidance also explains that:

"Where peak short term concentrations (those averaged over periods of an hour or less) from an elevated source are in the range 11-20% of the relevant Air Quality Assessment Level (AQAL), then their magnitude can be described as small, those in the range 21-50% medium and those above 51% as large. These are the maximum concentrations experienced in any year and the severity of this impact can be described as slight, moderate and substantial respectively, without the need to reference background or baseline concentrations. In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts.

The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other local sources".

3.13 As a first step, the assessment of the emissions from the generators within the proposed development has considered the predicted process contributions using the following criteria:

- is the long-term (annual mean) process contribution less than 0.5% of the long-term environmental standard?; and
- is the short-term (24-hour mean or shorter) process contribution less than 10% of the short-term environmental standard?

3.14 Where both of these criteria are met, then the impacts are *negligible* and thus 'not significant'. Where these criteria are breached then a more detailed assessment, considering total concentrations (incorporating local baseline conditions), has been provided.

4 Assessment Approach

Consultation

4.1 The assessment follows a methodology outlined to the LBC via email correspondence between Tom Parkes (Senior Air Quality Officer at LBC) and George Chousos (Air Quality Consultants) on 13th October 2020. Specifically, the following key points were raised:

- the proposed development will result in a reduction to the number of car parking spaces, compared to the current use of the site; however, it will generate an additional 40 vehicles, of which eight will be Heavy Duty Vehicles (HDVs). These additional flows are below the IAQM/EPUK screening criteria for within an AQMA (25 HDVs / 100 LDVs) and therefore there is no requirement to complete a detailed assessment of road traffic impacts;
- the proposed development will include two emergency diesel generators, which will be tested monthly. The flues will exhaust vertically. An assessment will identify the impacts of the testing regime on local air quality;
- a construction dust risk assessment will be undertaken, in line with the IAQM and GLA guidance; and
- as assessment of the air quality neutrality of the proposed development will be undertaken, in line with Policy 7.14 of the London Plan.

Study Area

4.2 Impacts as a result of the testing of the generators have been considered across a 800 m x 800 m model domain, with the generators at the centre. This area is considered to cover a sufficient extent so as to capture the impacts of the plant emissions, and significant effects are not anticipated outside of the modelling domain.

4.3 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 within 500m of the site. The specific areas considered are detailed in Section 6.

Receptors

4.4 Concentrations have been predicted across the study area using nested Cartesian grids (see Figure 2), with a spacing of 5 m x 5 m within 200m and 25 m x 25 m within 400 m. The receptor grid has been modelled at two different heights to represent heights of potentially sensitive and relevant exposure in the vicinity of the proposed development:

- 1.5 m above ground level; and
- 20.0 m above ground level.

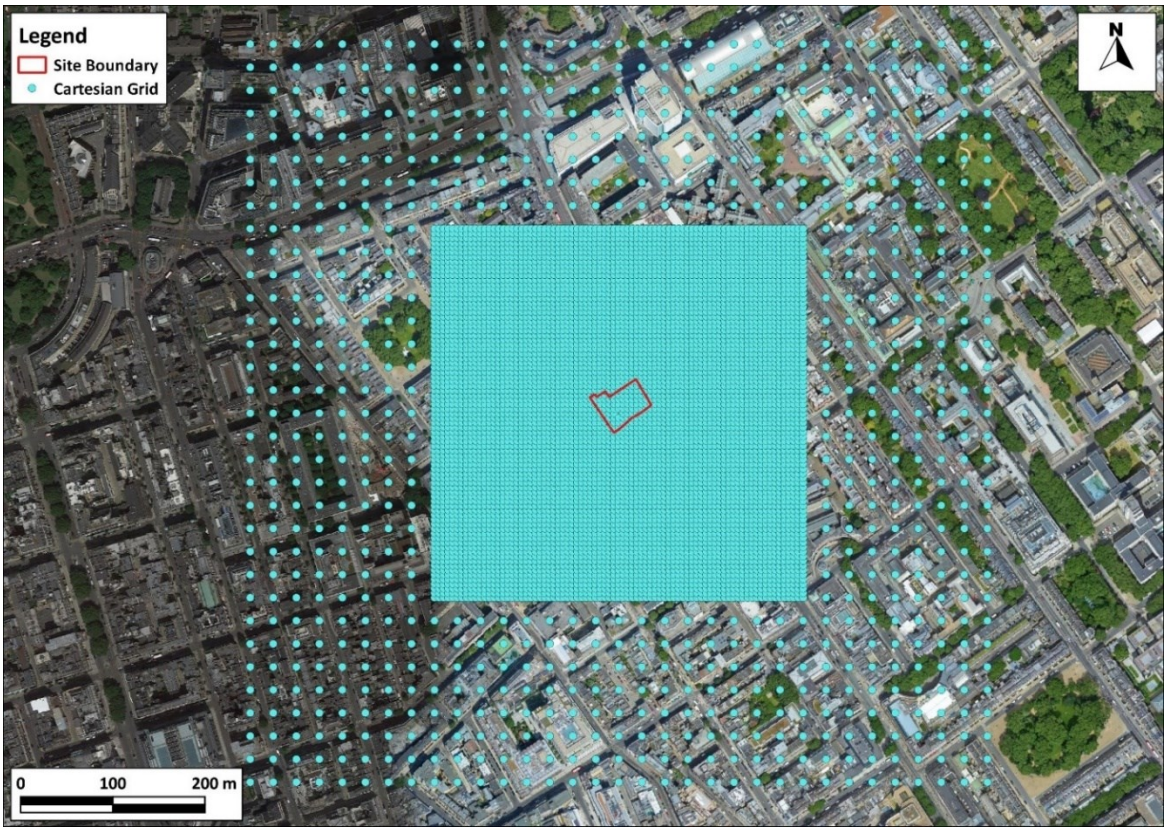

Figure 2: Grid of Receptors

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4.5 The construction dust risk assessment approach does not require specific receptors to be identified; instead, the numbers of different types of receptors within given distance bands are counted. These receptor counts are provided in Section 6.

Existing Conditions

4.6 Existing sources of emissions and baseline air quality conditions within the study area have been defined using a number of approaches:

- industrial and waste management sources that may affect the area have been identified using Defra's Pollutant Release and Transfer Register (Defra, 2020a);
- local sources have been identified through examination of the Council's Air Quality Review and Assessment reports;
- information on existing air quality has been obtained by collating the results of monitoring carried out by the local authority; and
- whether or not there are any exceedances of the annual mean EU limit value for nitrogen dioxide in the study area has been identified using the maps of roadside concentrations

published by Defra (2020b) 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, 2020c), which are available for the years 2009 to 2018, show no exceedances of the limit values anywhere in the UK in 2018.

Construction Impacts

4.7 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

4.8 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 3.7 and detailed further in Appendix A3. Where impacts can be screened out there is no need to progress to a more detailed assessment.

Impacts of the Proposed Diesel Generators

4.9 The energy demand will mainly be derived from ASHPs and chiller pumps. There will, however, be two back-up emergency diesel generators installed at Level 8 of the building which will be subject to regular testing. The assumed specifications for these plant, upon which the assessment is based, are set out in Appendices A5 and A7.

Screening

4.10 The first step in considering the generator impacts has been to screen the pollutant emissions against the criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017), as described in Paragraphs 3.10 and 3.11. Where plant impacts cannot be screened out against these criteria, a further stage of screening is required, whereby the modelled contributions of the plant are

compared to further screening criteria, as described in Paragraphs 3.12 to 3.14. Where impacts can be screened out there is no need to progress to a more detailed assessment. The following sections describe the approach to dispersion modelling of the plant emissions, which has been required for this project.

Modelling Methodology

4.11 The impacts of emissions from the proposed emergency plant have been modelled using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer. The model input parameters are set out in Appendix A5. The air quality modelling has been carried out based on a number of necessary assumptions, detailed further in Paragraph 4.20 and in Appendices A5 and A7. Where possible a realistic worst-case approach has been adopted.

Emissions Data

4.12 The emissions data input into the model for the diesel generators have been determined from the technical datasheets provided by Norman Disney & Young, who are the mechanical and engineering consultants for the proposed development, based upon the fuel consumption, fuel composition, typical operating conditions and combustion chemistry. Further details of the emissions data used in this assessment are provided in Appendix A5.

4.13 For consideration of concentrations in relation to the annual mean objectives, a realistic utilisation of the emergency plant, based on the proposed testing regime, has been assumed as follows:

- Monthly - one hour; and
- Annually - a full load bank test lasting approximately four hours.

4.14 Modelled annual mean outputs based on continuous operation have been scaled to reflect this anticipated level of utilisation, equivalent to 16 hours per year.

4.15 For the assessment of the short-term impacts, the model has been run with the emergency plant operating continuously throughout the year and at full load to ensure the potential impacts under all meteorological conditions are considered. This has resulted in the prediction of worst-case impacts on short term pollutant concentrations, and the assessment can thus be considered conservative. The model has been run once assuming that the generators are tested in the same hour (i.e. simultaneously) and once assuming that each generator is tested separately.

Assessment Scenarios

Buildings

4.16 Entrainment of the plume into the wake of buildings has been simulated within the model. ADMS-5 takes a relatively simplistic approach to modelling building downwash effects, thus additional

uncertainty is introduced when using the buildings module. In order to ensure a worst-case assessment, sensitivity tests have been carried out whereby the model has been run with:

- no buildings;
- with the main development building and the existing building adjacent to the proposed development; and
- using the urban canopy module[2] (CERC, 2016).

Meteorology

4.17 In order to allow for uncertainties in local and future-year meteorological conditions, the dispersion model has been run three times, with each run using a different full year of hour-by-hour meteorological data from an appropriate meteorological station. The maximum predicted concentration from any of the building scenarios and any meteorological year has been determined. It is these maxima that are used throughout this assessment.

Uncertainty

4.18 The point source dispersion model used in the assessment is dependent upon emission rates, flow rates, exhaust temperatures and other parameters for each source, all of which in reality are variable as the plant will operate at different loads at different times. The actual plant to be installed within the development will also not be confirmed until the proposed development is definitely going ahead, and thus could be different to that assumed for this assessment. The assessment has, however, addressed this by applying worst-case assumptions where necessary, and provided that the actual plant installed adheres to the restrictions set out in Appendix A7, the conclusions of this assessment will remain valid.

4.19 There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms. These uncertainties cannot be easily quantified and it is not possible to verify the point-source model outputs. Sensitivity tests have been applied to address specific uncertainties and to ensure a worst-case assessment.

Assumptions

4.20 For the purposes of the assessment it has been assumed that the generators will operate at full load. In reality, the hourly tests will be undertaken off-load, with only the annual load bank test taking place with the engines at full load.

4.21 For consideration of concentrations relating to the short-term objective, the generator emissions have been modelled for every hour of each of the three years of meteorological data. The

[2] The urban canopy module accounts for the average effects of buildings in the wider area on local air flow. The input data file used in the module covers the whole of Greater London.

assessment therefore assumes the worst-case combination of meteorological parameters coincide with the testing regime.

Impacts of the Proposed Sprinkler Pump

4.22 The proposed sprinkler pumps would be diesel-fired and only used in the event of an emergency. The potential impacts of the pump have been considered qualitatively, taking into account the likely use and scale of emissions compared with the diesel generators.

Assessment of Significance

Construction Dust Significance

4.23 Guidance from the 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

4.24 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 developed jointly by EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement; the experience of the consultants preparing the report is set out in Appendix A4. Full details of the EPUK/IAQM approach are provided in Appendix A3.

'Air Quality Neutral'

4.25 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).

4.26 Appendix A8 sets out the emissions benchmarks. The approach has been to calculate the emissions from the development and to compare them with these benchmarks. It should be noted that the current air quality neutral benchmarks are based around the planning use classes that existed prior to September 2020, having not yet been updated to reflect the amended use classes.

5 Baseline Conditions

Relevant Features

5.1 The Network Building is located on Tottenham Court Road, and is bounded by Maple Street to the north, Tottenham Court Road to the east, Howland Street to the south and Whitfield Street to the west. It currently consists of retail space and offices.

5.2 The application site is located within the LBC borough-wide AQMA and is approximately 160 m from the Marylebone Road air quality Focus Area and 600 m from the Oxford Street air quality Focus Area, as highlighted in Figure 1.

Industrial sources

5.3 No significant industrial or waste management sources have been identified that are likely to affect the proposed development, in terms of air quality.

Local Air Quality Monitoring

5.4 The LBC operates four automatic monitoring stations within its area, the nearest of which (London Bloomsbury, B0) is located approximately 710 m to the southeast of the proposed development. The Council also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko International (using the 50% TEA in acetone method); four diffusion tube monitoring sites within 700 m of the proposed development. Annual mean results for the years 2013 to 2019 are summarised in Table 2, while results relating to the 1-hour mean objective are summarised in Table 3. Exceedances of the objectives are shown in bold. The monitoring locations are shown in Figure 3. The monitoring data have been taken from the Council's 2020 Annual Status Report (London Borough of Camden, 2020b).

Table 2: Summary of Annual Mean NO_2 Monitoring (2013-2019) (µg/m³) [a, b]

Site ID	Site Type	Location	2013	2014	2015	2016	2017	2018	2019
B0	Urban Background	London Bloomsbury	**44.0**	**45.0**	**48.0**	**42.0**	38.0	36.0	32.0
CA10	Urban Background	Tavistock Gardens	**49.4**	**46.5**	**44.6**	39.7	**46.2**	35.4	33.1
CA11	Kerbside	Tottenham Court Road	**88.1**	**86.8**	**85.6**	**83.6**	**74.0**	**65.8**	**61.2**
CA21	Kerbside	Bloomsbury Street	**76.1**	**80.8**	**71.4**	**72.2**	**71.2**	**59.4**	**48.5**
CA29	Roadside	Endsleigh Gardens	-	-	-	-	-	-	**48.3**
Objective			**40**						

[a] Exceedances of the objectives are shown in bold.

[b] Annual mean NO_2 annual means in excess of 60 µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective, are shown in bold and underlined.

Table 3: Number of Hours with NO_2 Concentrations Above 200 µg/m^3

Site ID	Site Type	Location	2013	2014	2015	2016	2017	2018	2019
B0	Urban Background	London Bloomsbury	0	0	0	0	0	0	0
Objective			**18**						

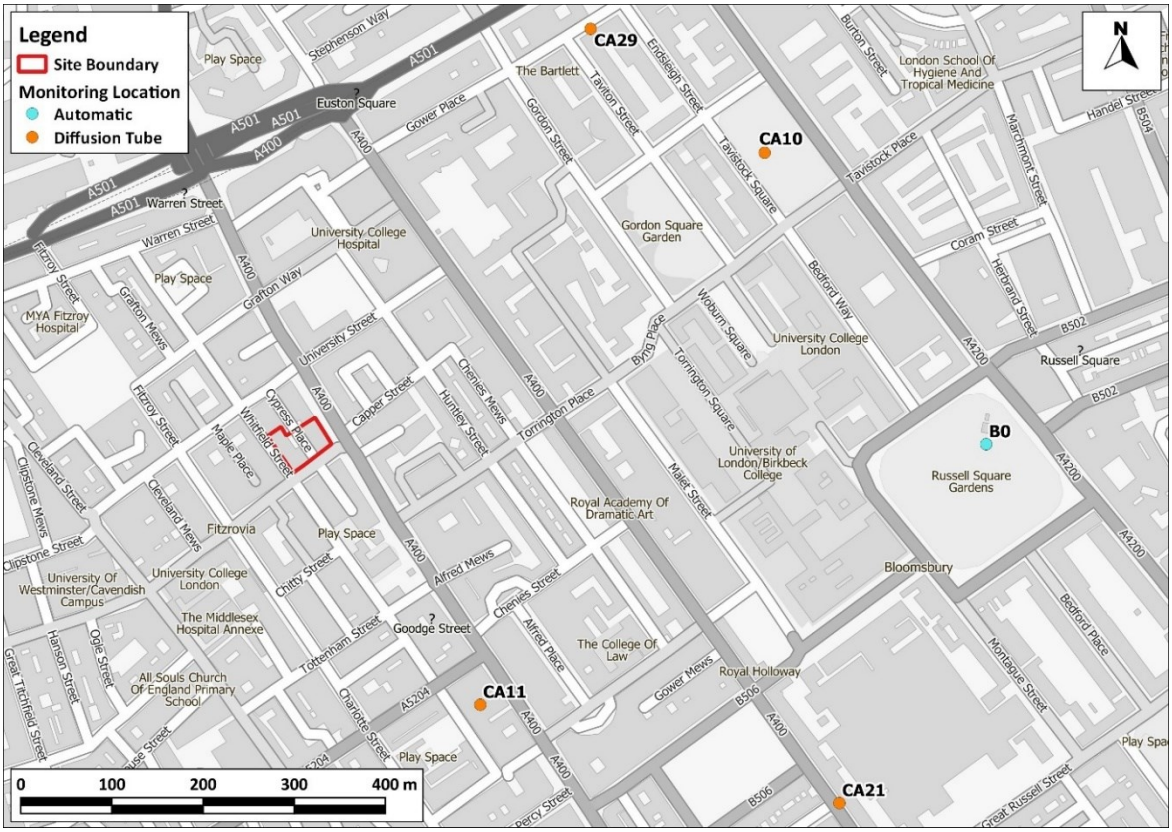

Figure 3: Monitoring Locations and the Application Site Boundary

5.5 The roadside and kerbside monitoring sites have consistently exceeded the annual mean nitrogen dioxide objective in all years presented. Concentrations measured at sites CA11 and CA21 have also exceeded 60 µg/m^3, indicating that there is potential for exceedances of the 1-hour mean nitrogen dioxide objective at kerbside locations. Measured concentrations at both urban background monitoring sites were below the objective in 2018 and 2019.

5.6 Based on the data in Table 2, there is a clear reduction in measured concentrations at all types of monitoring site, as shown in Figure 4; although the reductions are more pronounced over the last three years at the kerbside sites.

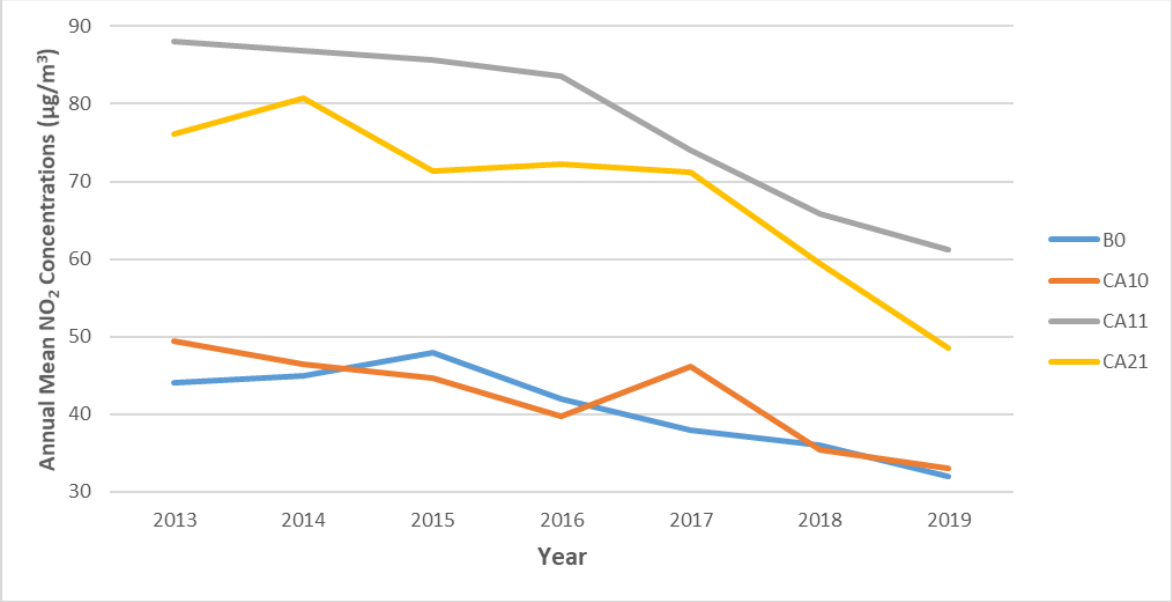

Figure 4: Annual Mean NO_2 concentrations Between 2013 and 2019

5.7 The London Bloomsbury urban background automatic monitoring station also measures concentrations of PM_{10} and $PM_{2.5}$. Annual mean results for the years 2013 to 2019 are summarised in Table 4, while results relating to the daily mean PM_{10} objective are summarised in Table 5. Concentrations of both PM_{10} and $PM_{2.5}$ are well below the relevant objectives in all years presented.

Table 4: Summary of Annual Mean PM_{10} and $PM_{2.5}$ Monitoring (2013-2019) (µg/m³)

Site ID	Site Type	Location	2013	2014	2015	2016	2017	2018	2019
PM_{10}									
B0	Urban Background	London Bloomsbury	18	20	22	20	19	17	18
Objective			**40**						
$PM_{2.5}$									
B0	Urban Background	London Bloomsbury	-	-	11	12	13	10	11
Objective			**25 [a]**						

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

Table 5: Number of Days with PM_{10} Concentrations Above 50 µg/m^3

Site No.	Site Type	Location	2013	2014	2015	2016	2017	2018	2019
B0	Urban Background	London Bloomsbury	4	11	6	9	6	1	9
Objective			**35**						

Exceedances of EU Limit Value

5.8 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedances of the annual mean nitrogen dioxide limit value (Defra, 2020d). Furthermore, Defra's roadside annual mean nitrogen dioxide concentrations (Defra, 2020c), which are used to report exceedances of the limit value to the EU, identify exceedances of this limit value in 2018 along many roads in London, including Tottenham Court Road (A400) adjacent to the proposed development. 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 2024 (Defra, 2020b) do not identify any exceedances adjacent to the site. As such, there is considered to be no risk of a limit value exceedance in the vicinity of the proposed development by the time that it is operational.

5.9 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 a ULEZ, thus the authority has effectively already implemented the required CAZ. 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 Mayor's Transport Strategy.

6 Construction Phase Impact Assessment

Construction Traffic

6.1 During the construction phase, it is anticipated that no more than 32 Heavy Duty Vehicles (HDVs) will access the site on any given day; this is the maximum number of heavy vehicles accessing the site. In reality, taking into consideration the size of the site, for the majority of the construction phase, the daily number of vehicles is expected to be lower. Since the peak period will not last for a prolonged period of time, it is not considered necessary to assess the impacts of traffic emissions during the construction phase, since when averaged across the year, the annual average daily flows are likely to be below 25 HDVs (equivalent to 9,125 HDVs per year).

On-Site Exhaust Emissions

6.2 The IAQM guidance (IAQM, 2016) states:

"Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur".

6.3 The proposed siting and numbers of any NRMM is not currently known, however, where possible the distance between any areas where NRMM and site traffic will typically operate and sensitive receptors will be maximised, and plant and machinery will be turned off when not in use.

Construction Dust and Particulate Matter Emissions

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

6.5 The existing building, which is 24 m high and has an approximate total volume of 13,000 m^3, will be demolished. A mobile crusher will be used on site before removal of the material; such crushing plant may require a valid Environmental Permitting Regulations permit. The demolition works are expected to last approximately 30 weeks, commencing in June 2022. 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

6.6 The characteristics of the soil at the site have been defined using the British Geological Survey's UK Soil Observatory website (British Geological Survey, 2020), as set out in Table 6. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 6: Summary of Soil Characteristics

Category	Record
Soil Layer Thickness	Deep
Soil Parent Material Grain Size	Mixed (Arenaceous [a] – Rudaceous [b])
European Soil Bureau Description	River Terrace Sand/Gravel
Soil Group	Light (Sandy) to Medium (Sandy)
Soil Texture	Sand to Sandy Loam [c]

[a] grain size 0.06 – 2.0 mm.

[b] grain size > 2.0 mm.

[c] a loam is composed mostly of sand and silt.

6.7 The site covers some 2,000 m^2 and most of this will be subject to earthworks, involving removal of the foundations of the demolished buildings, excavation, and haulage. The earthworks will take place in July 2022, and last around one month. Dust will arise mainly from vehicles travelling over unpaved ground and from the handling of dusty materials (such as dry soil). Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for earthworks is considered to be *small*.

Construction

6.8 Construction will involve the erection of a nine-storey building, with a total building volume of around 20,000 m^3. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials and from piling. The construction will take place over a two-year period, commencing in August 2022. 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

6.9 It is expected that no more than 40 heavy duty vehicles, which may track out dust and dirt, will depart from the site. Given the size and location of the site, it is unlikely however, that they will travel significant distances on unpaved roads. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for trackout is considered to be *medium*.

6.10 Table 7 summarises the dust emission magnitude for the proposed development.

Table 7: Summary of Dust Emission Magnitude

Source	Dust Emission Magnitude
Demolition	Small
Earthworks	Small
Construction	Small
Trackout	Medium

Sensitivity of the Area

6.11 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.

6.12 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling, while places of work are of a 'medium' sensitivity (Table A2.2 in Appendix A2). 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. There are approximately five residential apartments, all located within the same building complex, within 20 m of the site, and three places of work (see Figure 5).

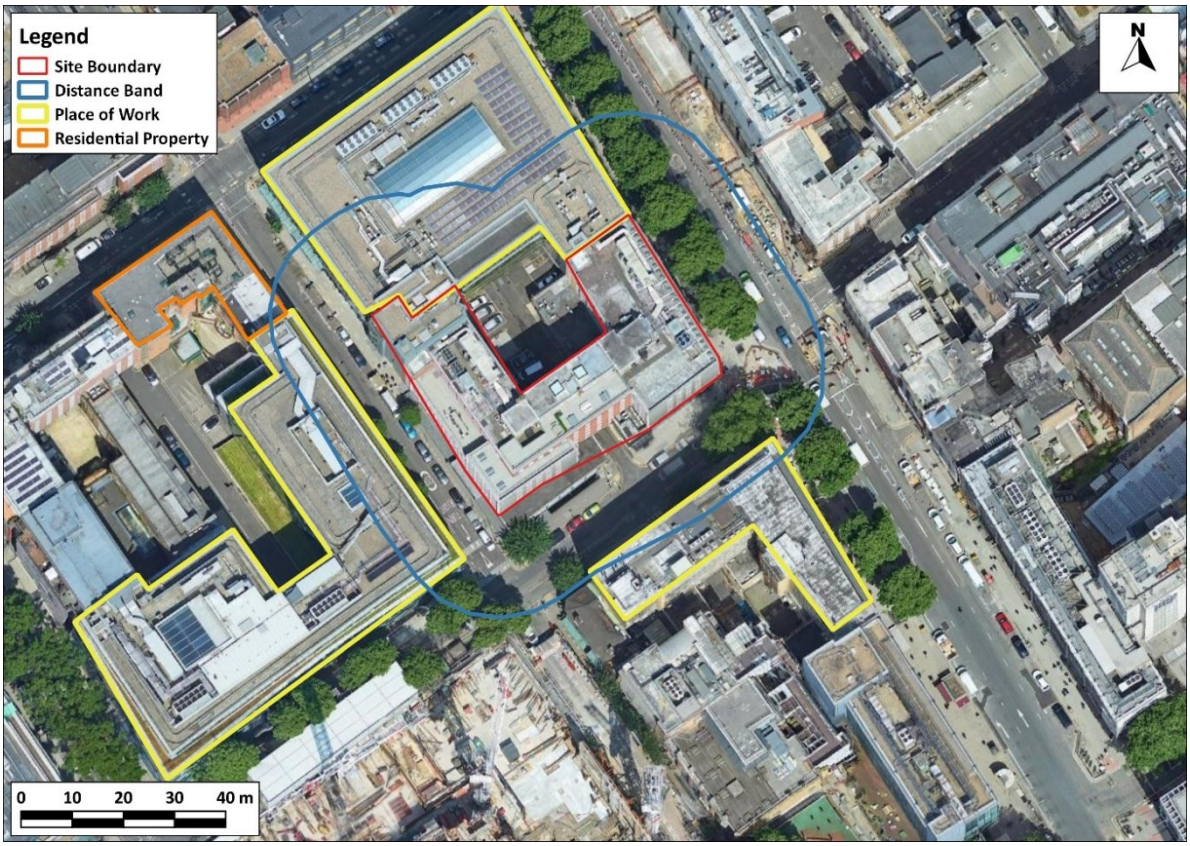

Figure 5: 20 m Distance Band around Site Boundary

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6.13 Table 7 shows that the dust emission magnitude for trackout is *medium* and Table A2.3 in Appendix A2 thus explains that there is a risk of material being tracked 200 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 approximately 160 residential properties within 20 m of the roads along which material could be tracked (see Figure 6).

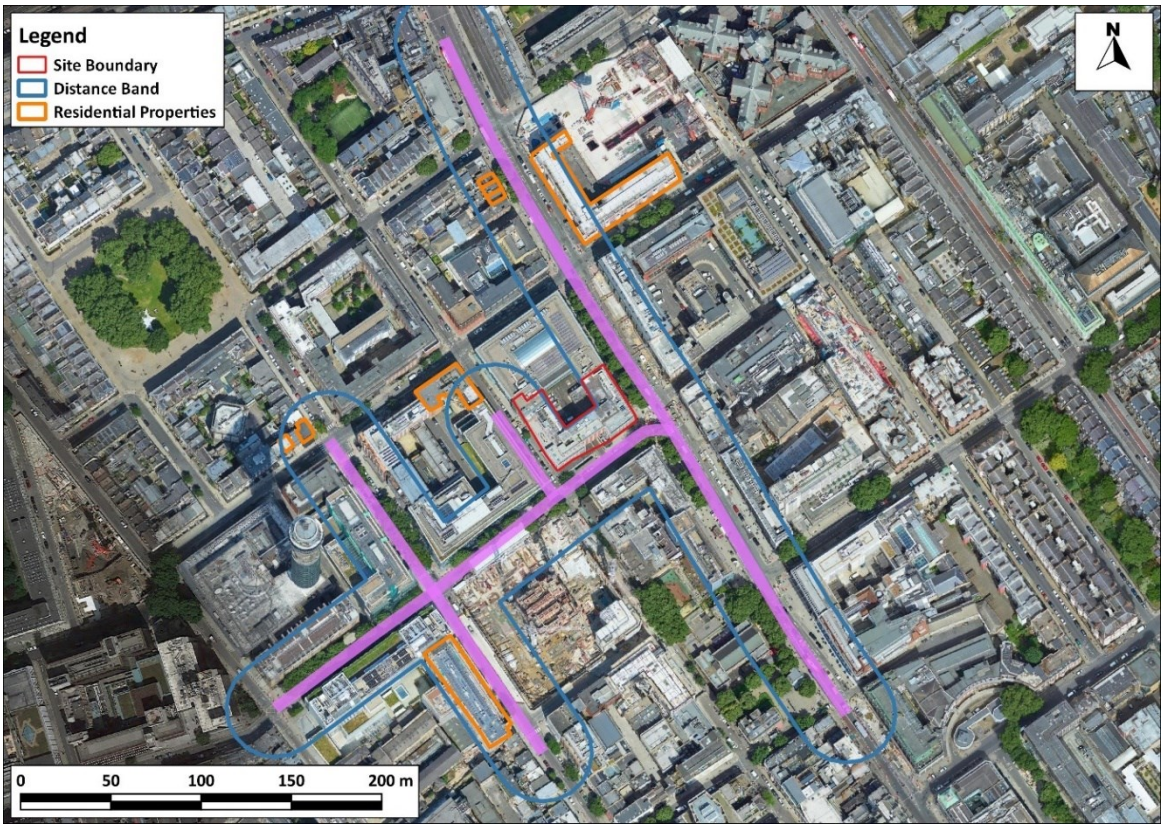

Figure 6: 20 m Distance Band around Roads Used by Construction Traffic Within 200 m of the Site Exits

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Sensitivity of the Area to Effects from Dust Soiling

6.14 Using the information set out in Paragraph 6.12 and Figure 5 alongside the matrix set out in Table A2.3 in Appendix A2, the area surrounding the onsite works is of 'medium' sensitivity to dust soiling.

6.15 Using the information set out in Paragraph 6.13 and Figure 6 alongside the same matrix, the area is of 'high' sensitivity to dust soiling due to trackout.

Sensitivity of the Area to any Human Health Effects

6.16 The matrix in Table A2.4 in Appendix A2 requires information on the baseline annual mean PM_{10} concentration in the area. The kerbside automatic monitoring site CD1 located on Finchley Road, approximately 3.6 km to the northwest of the proposed development, is considered to be representative of existing conditions at the site; both Finchley Road and Tottenham Court Road experience approximately 20,000 vehicles daily (GLA, 2019b). For a conservative approach, the highest measured concentration, from the past seven years, at the monitor has been used (22 µg/m^3) has been used (London Borough of Camden, 2020b).

6.17 Using the information set out in Paragraphs 6.12 and Figure 5 alongside the matrix in Table A2.4 in Appendix A2, the area surrounding the onsite works is of 'low' sensitivity to human health effects. Using the information set out in Paragraph 6.13 and Figure 6 alongside the same matrix, the area surrounding roads along which material may be tracked from the site is of 'medium' sensitivity.

Sensitivity of the Area to any Ecological Effects

6.18 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

6.19 Table 8 summarises the sensitivity of the area around the proposed construction works.

Table 8: Summary of the Area Sensitivity

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

Risk and Significance

6.20 The dust emission magnitudes in Table 7 have been combined with the sensitivities of the area in Table 8 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 9. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 9 (Step 3 of the assessment procedure).

Table 9: Summary of Risk of Impacts Without Mitigation

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

6.21 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).

7 Operational Phase Impact Assessment

Assessment of Development-Generated Road Traffic Emissions

7.1 The proposed development is expected to generate an additional 40 vehicle trips daily on the local road network, of which eight will be HDVs; these trips are mainly associated with servicing and waste collection.

7.2 It is, therefore, judged that the relevant IAQM/EPUK screening thresholds for within an AQMA (25 HDVs / 100 LDVs, as described in Appendix A3) will not be exceeded and there is no requirement for a detailed assessment of road traffic impacts at existing receptors.

7.3 It can thus be concluded that the proposed development will not have a significant impact on local roadside air quality.

Assessment of Generator Emissions

Initial Screening of Generator Emissions

7.4 The maximum predicted nitrogen dioxide, PM_{10} and $PM_{2.5}$ process contributions associated with emissions from the two generators are shown in Table 10; results are presented for each modelled receptor grid height. The maximum predicted concentrations are provided for any location on the modelled grid area, from any of the three meteorological years considered and any of the building scenarios.

Table 10: Predicted Maximum Pollutant Concentrations Associated with Generator Emissions (µg/m³)

Pollutant/Averaging Period	Maximum Process Contribution (1.5 m)		Maximum Process Contribution (20.0 m)		Objective / Assessment Level
	µg/m³	% of Objective	µg/m³	% of Objective	
Annual Mean NO_2 (Both)	0.02	0.06	0.02	0.06	**40**
Maximum of 1-hour NO_2 (Both)	53.8	26.9	42.1	21.0	**200** [a]
Maximum of 1-hour NO_2 (Landlord's Generator)	19.8	9.9	22.6	11.3	**200** [a]
Maximum of 1-hour NO_2 (Tenants' Generator)	34.1	17.0	29.2	14.6	**200** [a]
Annual Mean PM_{10} (Both)	0.005	0.01	0.005	0.01	**40**
Maximum of 24-hour PM_{10} (Both)	1.6 [b]	3.2	3.5 [b]	6.9	**50** [c]
Annual Mean $PM_{2.5}$ (Both)	0.005	0.02	0.005	0.02	**25**

[a] The objective allows 18 exceedances of 200 µg/m³ per year; the process contributions presented are the highest concentration in a single hour.

[b] The 24-hour mean process contribution has been factored by 0.33 (equivalent to 8 / 24) to account for four hours of testing of each generator (which will happen once a year, for the load bank test) in any 24-hour period.

[c] The objective allows 35 exceedances of 50 µg/m³ per year; the process contributions are the highest concentration in a 24-hour period.

7.5 These predicted maximum concentrations can be compared with the EPUK/IAQM screening criteria, as previously described in Section 2, and the following conclusions can be drawn:

- the predicted maximum annual mean nitrogen dioxide concentrations (0.06% of the objective), for both modelled heights, are well below the screening criterion (0.5%);
- at 1.5 m and 20 m, the predicted maximum contribution to 1-hour mean nitrogen dioxide concentrations (26.9% and 21.0% of the objective respectively), assuming both generators are tested simultaneously, is above the screening criterion (10%);
- at 1.5 m, the predicted maximum concentration (9.9% of the objective), assuming only the landlord's generator is tested, is below the screening criterion (10%);
- at 20 m, the predicted maximum contribution to 1-hour mean nitrogen dioxide concentrations (11.3% of the objective), assuming only the landlord's generator is tested, is marginally above the screening criterion (10%);

- at 1.5 m, the predicted maximum contribution to 1-hour mean nitrogen dioxide concentrations (17.0% of the objective) assuming only the tenants' generator is tested, is above the screening criterion (10%);
- at 20 m, the predicted maximum contribution to 1-hour mean nitrogen dioxide concentrations (14.7% of the objective) assuming only the tenants' generator is tested, is above the screening criterion (10%);
- the predicted maximum annual mean PM_{10} and $PM_{2.5}$ concentrations (0.01% and 0.02% of the objective at both heights) are well below the screening criterion (0.5%); and
- the predicted maximum contribution of 24-hour mean PM_{10} concentrations, assuming both generators are tested within the same 24-hour period, (3.2% at 1.5 m and 6.9% at 20.0 m of the objective) are below the screening criterion (10%).

7.6 The predicted impacts exceed the screening criterion for 1-hour mean nitrogen dioxide concentrations (for all three testing scenarios and at both heights). No further assessment is required for annual mean nitrogen dioxide, PM_{10} or $PM_{2.5}$ concentrations, or for 24-hour mean PM_{10} concentrations.

Detailed Assessment of Generator Emissions

7.7 The maximum total 1-hour mean nitrogen dioxide concentrations from the generators, assuming they are tested both simultaneously and in separate hours are shown in Table 11. The total concentrations shown include the baseline concentrations; at 20 m above ground, baseline concentrations will be close to background levels as there will only be a small contribution from road traffic. However, for a conservative assessment, the measured annual mean 2019 concentration at the kerbside monitoring site CA11 on Tottenham Court Road (61.2 µg/m^3, see Table 2) has been used as the baseline concentration for both heights. Common practice when calculating total 1-hour mean concentration is to add the Process Contribution to twice the local annual mean baseline concentration (i.e. 122.4 µg/m^3).

Table 11: Predicted Maximum 1-hour Mean Concentrations (µg/m^3)

Testing Scenario	Concentrations at 1.5 m (µg/m^3)		Concentrations at 20 m (µg/m^3)		Assessment Level
	Process Contribution	Total Concentration	Process Contribution	Total Concentration	
Both Generators Together	53.8	176.2	42.1	164.5	**200** [a]
Landlord's Generator Separately	19.8	142.2	22.6	145.0	**200** [a]
Tenants' Generator Separately	34.1	156.5	29.2	151.6	**200** [a]

[a] The objective allows 18 exceedances of 200 µg/m^3 per year.

7.8 The maximum total concentration is less than 200 µg/m^3 at the worst-case location on the modelled grid at each modelled height, and for any testing scenario (together, or separately). In reality, the risk of generator testing periods coinciding with the worst-case meteorological conditions is low and thus impacts are likely to be much smaller than presented in Table 11.

7.9 It should be recognised that if the generators are tested together, they will only operate in 16 separate hours of the year, and therefore it is not possible for the 1-hour objective, which allows for 18 hours where the assessment level of 200 µg/m^3 is exceeded, to occur. If the generators are tested separately, and therefore they operate on 32 separate occasions (16 hours each), then the assessment level of 200 µg/m^3 will not be exceeded, and therefore the objective will also not be exceeded.

7.10 The assessment has not quantitatively assessed the impact of the proposed diesel-fired sprinkler pump that will also be installed for emergency purposes only. The assessed diesel generators have net fuel inputs of 552 kW and 1,253 kW, resulting in NOx emission rates of 0.22 g/s and 0.48 g/s, respectively. In contrast, the sprinkler pump will have a net fuel input of 128 kW. It is, therefore, reasonable to assume that the NOx emission rate of the fire sprinkler will be approximately ten times smaller than that of the largest assessed generator. As the worst-case maximum 1-hour concentration with the both generators tested together would be well below the objective, there is sufficient headroom before the 1-hour mean nitrogen dioxide objective level or annual mean screening criteria are exceeded.

Significance of Operational Air Quality Effects

7.11 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 proposed development will not lead to a significant increase in traffic on local roads;
- emissions from the proposed generators will lead to insignificant changes in annual mean concentrations at nearby existing receptors;
- changes in daily PM_{10} concentrations are well below the screening criterion at all existing receptor locations; and
- the testing regime of the generators will not lead to an exceedance of the short-term nitrogen dioxide objective at any location.

8 'Air Quality Neutral'

8.1 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. The 'air quality neutrality' of a proposed development, as assessed in this section, does not directly indicate the potential of the proposed development to have significant impacts on human health (this has been assessed separately in the previous section).

8.2 As of 1st September 2020, Use Classes A1/2/3, B1, D1(a-b) and 'indoor sport' from D2(e) have been revoked and covered by the broader Use Class E. For the purposes of the air quality neutral assessment, and in the absence of an updated set of benchmark values, the building and transport benchmarks determined for the previous Use Classes and presented within the air quality neutral guidance document ((AQC, 2014) and Appendix A8) were used.

8.3 The proposals considered in this assessment are for office (B1) and retail units (A1 / A3). As it is not clear which land use will occupy the retail units, for the purposes of the air quality neutral assessment, the land use with the lowest emission benchmark (A1) has been assumed, as a conservative approach. Where the building and transport emissions do not exceed the benchmarks, it can be assumed that there will be no restriction on the land use class selected, and the Proposed Development will be 'Air Quality Neutral' regardless of the final use.

Building Emissions

8.4 Norman Disney & Young has advised that the main source of heat and electricity will be derived from four-pipe chillers and ASHPs, which will not have any associated local emissions to air. Two diesel generators will, however, be installed for emergency purposes. Each generator will operate for approximately 16 hours per annum, comprising a monthly 1-hour test, and an annual 4-hour load bank test. The fire sprinkler has been assumed to meet the EU Stage IIIA emission limit for non-road diesel engines.

8.5 This operational profile has been calculated to generate:

- a total annual NOx emission of 12.6 kg/annum (based on a NOx emission rate of 3,570 mg/kWh) and a total annual PM_{10} emission of 2.1 kg/annum (based on a PM_{10} emission rate of 600 mg/kWh) for the landlord's generator;
- a total annual NOx emission of 27.6 kg/annum (based on a NOx emission rate of 3,590 mg/kWh) and a total annual PM_{10} emission of 3.8 kg/annum (based on a PM_{10} emission rate of 500 mg/kWh) for the tenants' generator; and
- a total annual NOx emission of 2.9 kg/annum (based on a NOx emission rate of 4,000 mg/kWh) and a total annual PM_{10} emission of 0.2 kg/annum (based on a PM_{10} emission rate of 300 mg/kWh) for the fire sprinkler.

8.6 The total annual NOx and PM_{10} emissions from the proposed development will, therefore, be 43.1 kg and 6.1 kg, respectively.

8.7 Appendix A8 shows the Building Emissions Benchmarks (BEBs) for each land use category. Table 12 shows the calculation of the BEBs for this development.

Table 12: Calculation of Building Emissions Benchmark for the Development

Description		Value	Reference
NOx			
A	**Gross Internal Floor Area of Retail (A1) (m^2)**	521	Piercy & Company
B	**NOx BEB for A1 Retail (g/m^2/annum)**	22.6	Table A8.1
C	**Gross Internal Floor of Offices (B1) (m^2)**	17,275	Piercy & Company
D	**NOx BEB for B1 (g/m^2/annum)**	30.8	Table A8.1
Total BEB NOx Emissions (kg/annum)		543.8	(A x B + C x D) / 1,000
PM_{10}			
G	**Gross Internal Floor Area of Retail (A1) (m^2)**	521	Piercy & Company
H	**NOx BEB for A1 Retail (g/m^2/annum)**	1.29	Table A8.1
I	**Gross Internal Floor of Offices (B1) (m^2)**	17,275	Piercy & Company
J	**NOx BEB for B1 (g/m^2/annum)**	1.77	Table A8.1
Total BEB PM_{10} Emissions (kg/annum)		31.2	(G x H + I x J) / 1,000

8.8 The Total Building Emissions are less than the Total Building Emissions Benchmarks for both NOx and PM_{10}. The proposed development is thus better than air quality neutral in terms of building emissions.

Road Transport Emissions

8.9 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.

8.10 Caneparo Associates has advised that the proposed development is expected to generate a total of 13,363 car trips per year from the B1 offices and a further 1,752 car trips per year from the A1 retail units[3]. Appendix A8 provides default values for the average trip length for B1 offices and A1 retail in Central London, as well as the average NOx and PM_{10} emissions per vehicle-kilometre. This information has been used to calculate the transport emissions generated by the development (Table 13). These have then been compared with the TEBs for the development set out in Table 14.

[3] These vehicle movements are classified as light duty vehicles, and are not, necessarily, all cars, as used within the air quality neutral calculation. This will have overestimated the transport emissions from the development.

Table 13: Calculation of Transport Emissions for the Development

Description	Value	
Retail (A1)		
Total Car Trips per Year [a]	1,752	
Average Distance per Trip (km)	9.3	
	NOx	**PM_{10}**
Emissions per Vehicle-km (g)	0.4224	0.0733
Retail Transport Emissions (kg/annum)	6.9	1.2
Office (B1)		
Total Car Trips per Year [a]	13,363	
Average Distance per Trip (km)	3.0	
	NOx	**PM_{10}**
Emissions per Vehicle-km (g)	0.4224	0.0733
Office Transport Emissions (kg/annum)	16.9	2.9
Entire Development		
Total Transport Emission (kg/annum)	**23.8**	**4.1**

[a] Each trip is 1-way (i.e. a return journey would be two trips).

Table 14: Calculation of Transport Emissions Benchmarks for the Development

Description	Value	
Retail (A1)		
Gross Internal Floor Area of Retail (m^2)	521	
	NOx	**PM_{10}**
Benchmark Emissions (g/m^2/annum)	169	29.3
Retail TEBs (kg/annum)	88.0	15.3
Office (B1)		
Gross Internal Floor Area of Office (m^2)	17,275	
	NOx	**PM_{10}**
Benchmark Emissions (g/m^2/annum)	1.27	0.22
Office TEBs (kg/annum)	21.9	3.8
Entire Development		
Total TEBs (kg/annum)	**109.9**	**19.1**

8.11 The total development transport emissions are less than the total transport emissions benchmarks for both NOx and PM_{10}. The proposed development is thus better than air quality neutral in terms of transport emissions.

Summary

8.12 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.

9 Mitigation

Good Design and Best Practice

9.1 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:

- reduction in on-site car parking spaces from current levels;
- provision of on-site cycle storage;
- provision of heat and how water via hear recovery from 4-pipe chillers, supplemented by electric ASHPs, to avoid the need for a centralised plant; and
- use of exhaust flues for the emergency generators that discharge from Level 8 with vertically upwards, unimpeded by any fixture on top of the stack (e.g. rain cowls).

Recommended Mitigation

Construction Impacts

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

9.3 The site has been identified as a *Medium* Risk site during trackout, and *Low* Risk during demolition, earthworks and construction, as set out in Table 9. 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 A9.

9.4 The mitigation measures should be written into a Dust Management Plan (DMP). The DMP may be integrated into a Code of Construction Practice or the Construction Environmental Management Plan, and may require monitoring. The GLA's guidance suggests that, for a Medium Risk site, automatic monitoring of particulate matter (as PM_{10}) will be required. It also states that, on certain sites, it may be appropriate to determine the existing (baseline) pollution levels before work begins. However, the guidance is clear that the Local Authority should advise as to the appropriate air quality monitoring procedure and timescale on a case-by-case basis.

9.5 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

9.6 The assessment has demonstrated that the proposed development will not cause any exceedances of the air quality objectives and that the overall effect of the proposed development will be 'not significant'. It is, therefore, not considered appropriate to propose further mitigation measures for this development.

9.7 Measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation (which is written into UK law). The local air quality plan that the GLA is required to produce in order to address limit value exceedances in its area will also help to improve air quality.

Generator Impacts

9.8 The assessment has demonstrated that the emissions from the emergency diesel generators within the proposed development will not lead to any exceedances of the short term objectives, and will have an insignificant impact on annual mean concentrations at existing nearby receptors.

9.9 As such, there is no requirement for mitigation beyond the best practice design measures highlighted above. The generators installed within the development should, however, meet the specifications set out in Appendix A7; if the installed generators do not conform to these specifications, additional assessment and/or mitigation may be required.

Air Quality Neutral

9.10 The air quality neutral policy is intended to minimise the cumulative impacts of many developments throughout London. The proposed development has been shown to be 'air quality neutral', and therefore no offsetting of emissions is required.

10 Conclusions

10.1 The assessment has considered the impacts of the proposed development on local air quality in terms of dust and particulate matter emissions during construction, emissions from road traffic generated by the completed and occupied development, and emissions from the emergency generators and diesel fire sprinkler pump. It has also identified whether or not the proposed development is air quality neutral (as required by the London Plan).

Construction Impacts

10.2 The construction works have the potential to create dust. During construction it will therefore be necessary to apply a package of mitigation measures to minimise dust emissions. Appropriate measures have been recommended and, with these measures in place, it is expected that any residual effects will be 'not significant'.

Operational Impacts

Impacts

10.3 The assessment has demonstrated that the incremental changes to traffic flows on the local road network will be below recognised screening thresholds, and that the effects of road traffic on existing sensitive receptors will be insignificant.

10.4 The assessment has also demonstrated that the operation of the generators will lead to insignificant changes to annual mean concentrations, both in terms of nitrogen dioxide and particulate matter. In terms of the short-term objectives, the testing of the generators will not result in an exceedance of either the 1-hour mean nitrogen dioxide, or the 24-hour mean PM_{10} objectives.

Mitigation

10.5 It is not considered necessary to propose mitigation at the development; instead the proposed development has implemented a series of good design and best practice measures to minimise its impact on the local area.

Significance

10.6 The overall operational air quality effects of the proposed development are judged to be 'not significant'. This conclusion is based on the proposals having an insignificant effect on local air quality.

Air Quality Neutral

10.7 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.

Policy Implications

10.8 Taking into account these conclusions, it is judged that the proposed development is consistent with Paragraph 180 of the NPPF, being appropriate for its location in terms of its effect on the local air quality environment.

10.9 It is also consistent with Paragraph 181, as it will not affect compliance with relevant limit values or national objectives.

10.10 The proposed development is also consistent with Policy CC4 of the Local Plan, as it will have an insignificant effect on air quality for existing sensitive receptors in the vicinity. The proposed development is better than air quality neutral and is thus compliant with Policy 7.14 of the London Plan.

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12 Glossary

AADT	Annual Average Daily Traffic
ADMS-5	Atmospheric Dispersion Modelling System model for point sources
AQC	Air Quality Consultants
AQAL	Air Quality Assessment Level
AQMA	Air Quality Management Area
AURN	Automatic Urban and Rural Network
BEB	Building Emissions Benchmark
CAFS	Cleaner Air for Scotland
CAZ	Clean Air Zone
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)
IAQM	Institute of Air Quality Management
JAQU	Joint Air Quality Unit
kW	Kilowatt
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management

LBC	London Borough of Camden
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
µg/m^3	Microgrammes per cubic metre
MW_{th}	Megawatts Thermal
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
PC	Process Contribution
PEC	Predicted Environmental Concentration
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
SCR	Selective Catalytic Reduction
SPG	Supplementary Planning Guidance
SPD	Supplementary Planning Document
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal
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

13 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 from 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 be 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."

London Environment Strategy

A1.2 The air quality chapter of the London Environment Strategy sets out three main objectives, each of which is supported by sub-policies and proposals. The Objectives and their sub-policies are set out below:

"Objective 4.1: Support and empower London and its communities, particularly the most disadvantaged and those in priority locations, to reduce their exposure to poor air quality.

- *Policy 4.1.1 Make sure that London and its communities, particularly the most disadvantaged and those in priority locations, are empowered to reduce their exposure to poor air quality*
- *Policy 4.1.2 Improve the understanding of air quality health impacts to better target policies and action*

Objective 4.2: Achieve legal compliance with UK and EU limits as soon as possible, including by mobilising action from London Boroughs, government and other partners

- *Policy 4.2.1 Reduce emissions from London's road transport network by phasing out fossil fuelled vehicles, prioritising action on diesel, and enabling Londoners to switch to more sustainable forms of transport*
- *Policy 4.2.2 Reduce emissions from non-road transport sources, including by phasing out fossil fuels*
- *Policy 4.2.3 Reduce emissions from non-transport sources, including by phasing out fossil fuels*
- *Policy 4.2.4 The Mayor will work with the government, the London boroughs and other partners to accelerate the achievement of legal limits in Greater London and improve air quality*
- *Policy 4.2.5 The Mayor will work with other cities (here and internationally), global city and industry networks to share best practice, lead action and support evidence based steps to improve air quality*

Objective 4.3: Establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, meeting world health organization health-based guidelines for air quality

- *Policy 4.3.1 The Mayor will establish new targets for $PM_{2.5}$ and other pollutants where needed. The Mayor will seek to meet these targets as soon as possible, working with government and other partners*
- *Policy 4.3.2 The Mayor will encourage the take up of ultra low and zero emission technologies to make sure London's entire transport system is zero emission by 2050 to further reduce levels of pollution and achieve WHO air quality guidelines*
- *Policy 4.3.3 Phase out the use of fossil fuels to heat, cool and maintain London's buildings, homes and urban spaces, and reduce the impact of building emissions on air quality*
- *Policy 4.3.4 Work to reduce exposure to indoor air pollutants in the home, schools, workplace and other enclosed spaces"*

A1.3 While the policies targeting transport sources are significant, there are less obvious ones that will also require significant change. In particular, the aim to phase out fossil-fuels from building heating and cooling and from NRMM will demand a dramatic transition.

Low Emission Zone (LEZ)

A1.4 The LEZ was implemented as a key measure to improve air quality in Greater London. It 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. A NOx emissions standard (Euro IV) is included in the LEZ for HGVs, buses and coaches, from 2015.

A1.5 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, although this was delayed to 1 March 2021 to give affected businesses more time to meet the new standards in light of the unanticipated demands of the coronavirus pandemic. Requirements relating to larger vans, minibuses and other specialist diesel vehicles will not change.

Ultra Low Emission Zone (ULEZ)

A1.6 London's ULEZ was introduced on 8 April 2019. The ULEZ currently operates 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.

A1.7 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 A1.6 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 A1.5.

Other Measures

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 m^3 – 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 A9.

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 [4]

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

[4] 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 for trackout, 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 [4]

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

Table A2.5: Sensitivity of the Area to Ecological Effects [4]

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 describe the nature of air quality impacts, nor how to assess their significance. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. This approach involves a two stage process:

- a qualitative or quantitative description of the impacts on local air quality arising from the development; and
- a judgement on the overall significance of the effects of any impacts.

A3.16 The guidance recommends 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 and, 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.

A3.17 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. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.

A3.18 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

Penny Wilson, BSc (Hons) CSci MIEnvSc MIAQM

Ms Wilson is an Associate Director with AQC, with more than 20 years' relevant experience in the field of air quality. She has been responsible for numerous assessments for a range of infrastructure developments including power stations, road schemes, ports, airports and residential/commercial developments. The assessments have covered operational and construction impacts, including odours. She also provides services to local authorities in support of their LAQM duties, including the preparation of Review and Assessment and Action Plan reports, as well as audits of Air Quality Assessments submitted with planning applications. She has provided expert evidence to a number of Public Inquiries, and is a Member of the Institute of Air Quality Management and a Chartered Scientist.

Dr Frances Marshall, MSci PhD MIEnvSc MIAQM

Dr Marshall is a Senior Consultant with AQC with over eight years' relevant experience. Prior to joining AQC, she spent four years carrying out postgraduate research into atmospheric aerosols at the University of Bristol. Dr Marshall has experience preparing air quality assessments for a range of projects, including residential and commercial developments, road traffic schemes, energy centres, energy from waste schemes and numerous power generation schemes. She has experience in producing air quality assessments for EIA schemes, and has also assessed the impacts of Local Plans on designated ecological areas, prepared Annual Status Reports for Local Authorities, and undertaken diffusion tube monitoring studies. She is a Member of both the Institute of Air Quality Management and the Institution of Environmental Sciences.

George Chousos, BSc MSc AMIEnvSc AMIAQM

Mr Chousos is an Assistant Consultant with AQC, having joined in May 2019. Prior to joining AQC, he completed an MSc in Air Pollution Management and Control at the University of Birmingham, specialising in air pollution control technologies and management, and data processing using R. He also holds a degree in Environmental Geoscience from the University of Cardiff, where he undertook a year in industry working in the field of photo-catalytic technology. He is now gaining experience in undertaking air quality assessments, with the use of ADMS-Roads and ADMS-5 dispersion modelling software. Mr Chousos has also prepared construction dust risk assessments, Air Quality Neutral assessments, local authority Annual Status Reports (ASRs) and odour assessments.

A5 Modelling Methodology

Model Inputs

A5.1 The impacts of emissions from the proposed generators have been predicted using the ADMS-5 dispersion model. ADMS-5 is a new generation model that incorporates a state-of-the-art understanding of the dispersion processes within the atmospheric boundary layer.

A5.2 The model has been run to predict the contribution of the proposed emergency plant emissions to annual mean concentrations of nitrogen oxides, PM_{10} and $PM_{2.5}$, the maximum 1-hour mean nitrogen oxides concentrations and the maximum 24-hour mean PM_{10} concentrations. Model input selections are summarised in Table A5.1, and, where considered necessary, discussed further below. Input emission parameters are presented later in Table A5.3.

Table A5.1: Summary of Model Inputs

Model Parameter	Value Used
Terrain Effects Modelled?	No
Variable Surface Roughness File Used?	No
Urban Canopy Flow Used?	Yes
Building Downwash Effects Modelled?	Yes
Meteorological Monitoring Site	London City
Meteorological Data Years	2017, 2018, 2019
Dispersion Site Surface Roughness Length (m)	1.5
Dispersion Site Minimum MO Length (m)	75
Met Site Surface Roughness Length (m)	0.3
Met Site Surface Minimum MO Length (m)	75

A5.3 The backup landlord's diesel emergency generator will have an assumed net fuel input of 552 kW_{th} which is equivalent to a fuel consumption of 55.6 litres per hour of diesel oil. The generator will be capable of delivering 220 kW of electricity on demand.

A5.4 The backup tenants' diesel emergency generator will have an assumed net fuel input of 1,253 kW_{th} which is equivalent to a fuel consumption of 126.2 litres per hour of diesel oil. The generators will be capable of delivering 481 kW of electricity on demand.

A5.5 Emissions will rise to roof level in two flues. Norman Disney & Young has advised that the emergency generators will be tested for one hour per month, as well as for four hours as a load bank test once a year, in accordance with the maintenance schedule.

A5.6 The exhaust volume flow rates for the diesel generators have been calculated based on the complete combustion of the assumed diesel oil composition in Table A5.2.

A5.7 The emission parameters employed in the modelling are set out in Table A5.3.

Table A5.2: Typical Diesel Fuel Composition

Elemental Component	Diesel Oil
Carbon	86.5%
Hydrogen	13.2%
Oxygen	0.3%
Net Calorific Value (LHV) (MJ/kg)	42.82
Gross Calorific Value (HHV) (MJ/kg)	45.70
HHV/LHV	1.07
Liquid Density @ 15°C (kg/m^3)	835

Table A5.3: Plant Specifications and Modelled Emissions and Release Conditions

Parameter	Landlord's Generator (HSW-255)	Tenants' Generator (HSW-550)
Specified Net Fuel Input (kW)	552.0	1,253.0
Calculated Gross Fuel Input (kW)	589.1	1,337.3
Flue Internal Diameter (m)	0.20	0.26 [a]
Calculated Actual Exhaust Volume Flow (m^3/s) [b]	0.8	1.3
Calculated Exit Velocity (m/s)	24.3	25.0
Specified Exhaust O_2 Content (%)	9.9	4.6
Specified Exhaust H_2O Content (% v/v)	7.3	10.4
Specified Exhaust Temperature (°C)	428	542
Calculated Normalised Exhaust Volume Flow (Nm^3/s) [c]	0.2	0.4
Specified NOx Emission Rate (mg/Nm^3) [c]	3,570	3,590
Calculated NOx Emission Rate (g/s)	0.218	0.480
Specified PM_{10} and $PM_{2.5}$ Emission Rate (mg/Nm^3) [c]	600	500
Calculated PM_{10} and $PM_{2.5}$ Emission Rate (g/s)	0.037	0.067
Flue Location (x,y)	529389.5,182032.9	529377.4,182034.6
Modelled Flue Height Above Ground (m)	29.7	30.1

[a] Calculated diameter to derive an exhaust velocity of 25 m/s.

A5.8 Entrainment of the plume into the wake of the buildings (the so-called building downwash effect) has been taken into account in the model. The building dimensions and flue location have been obtained from drawings provided by Norman Disney & Young. The location of the flue is shown in Figure A5.1 along with the modelled buildings. The landlord's generator flue has been modelled at a height of 29.7 m above ground level (2.3 m above Level 8), whilst the tenants' generator flue has been modelled at a height of 30.1 m above ground level (2.7 m above the Level 8).

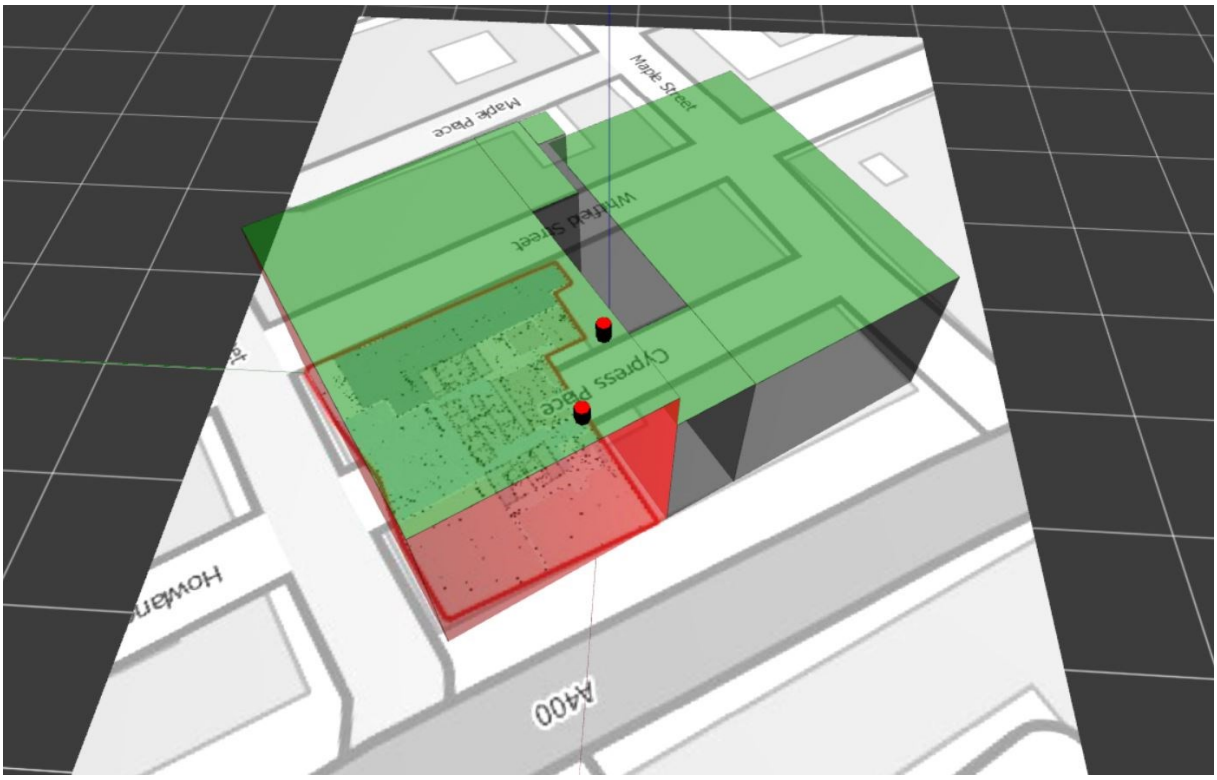

Figure A5.1: Flue Locations (red circles) & Modelled Buildings (green blocks)

A5.9 Hourly sequential meteorological data in sectors of 10 degrees from London City Airport for 2017 to 2019 inclusive have been used in the model. The London City Airport meteorological monitoring station is located approximately 15 km to the east of the proposed development. It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the proposed development; both are located in the Greater London area where they will be influenced by the effects of inland meteorology over urban topography.

A5.10 Wind roses for London City Airport for the years 2017 to 2019 are provided in Figure A5.2 to Figure A5.4. The station is operated by the UK Met Office. Raw data were provided by the Met Office and processed by AQC for use in ADMS.

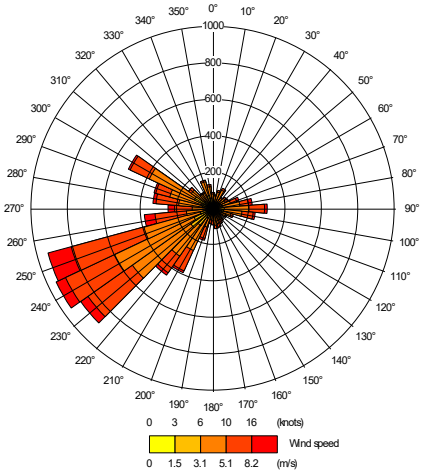

Figure A5.2: Wind Rose for 2017

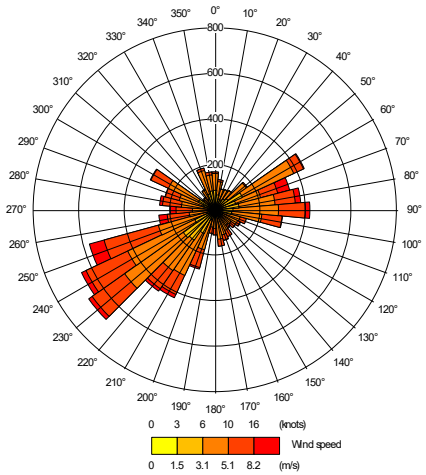

Figure A5.3: Wind Rose for 2018

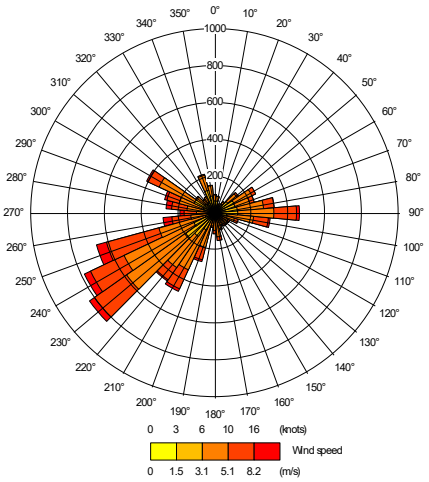

Figure A5.4: Wind Rose for 2019

Post-processing

A5.11 For the initial screening of the process contributions, the approach recommended by the Environment Agency (2005) has been used to predict nitrogen dioxide concentrations, assuming that:

- annual mean NO_2 concentration = annual mean NOx concentration multiplied by 0.7; and
- maximum 1-hour mean NO_2 concentrations = maximum 1-hour mean NOx concentrations multiplied by 0.35.

A6 London Vehicle Fleet Projections

A6.1 TfL has published an Integrated Impact Assessment (Jacobs, 2017) setting out the impacts of the changes to the LEZ and ULEZ described in Paragraphs A1.5 and A1.7. 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.

A6.2 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.

A6.3 The changes are not projected to have a significant effect on PM_{10} and $PM_{2.5}$ concentrations, although a small reduction is predicted.

A6.4 AQC's report on the performance of Defra's EFT (AQC, 2020b) also highlighted that the EFT's assumptions regarding future fleet composition in London and across the UK may be over-pessimistic in terms of NOx emissions (and no changes to the fleet mix within London were made between versions 9 and 10 of the EFT). The future fleet projection derived from the EFT for Outer London, for example, shows a very small reduction in the proportion of diesel cars between 2016 and 2030, and a very limited uptake of electric cars. The AQC report highlights that this contrasts with the expectations of many observers, as well as the most recent trends publicised by the media. When considered alongside the future requirements of the LEZ and ULEZ, these future fleet projections seem all the more unrealistic (i.e. worst-case in terms of emissions), as the changes to the LEZ and ULEZ would reasonably be expected to significantly increase the uptake of lower emissions vehicles in London.

A6.5 The changes to the LEZ and ULEZ announced by the Mayor of London in June 2018 are not reflected in Defra's latest EFT and thus have not been considered in this assessment. The potentially over-pessimistic fleet projections built in to the EFT have not been addressed in this report either. Paragraphs A6.1 and A6.2 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. As such, while the results presented in this report represent a reasonably conservative reflection of likely concentrations and impacts in the

absence of the changes to the LEZ and ULEZ, they almost certainly represent an unrealistically worst-case assessment of likely concentrations and impacts bearing in mind the implementation of these changes.

A7 Generator Specifications

A7.1 The proposed development will include two emergency diesel generators, as well as a diesel fire sprinkler pump. Specifications for these plant, upon which the assessment has been based, are shown in Table A7.1.

Table A7.1: Generator Specifications

Parameter	Value	Restriction
Landlord's Generator (HSW-255)		
Gross Peak Fuel Input (kW)	589.1	Max
Hours of Use per Annum	16	Max
Annual Fuel Input (kWh/annum)	9,426	Max
Exhaust Temperature (°C)	428	Min
Flue Internal Diameter (m)	0.20	Max
Efflux Velocity (m/s)	24.3	Min
NOx Emission Rate (mg/kWh)	3,570	Max
PM_{10} & $PM_{2.5}$ Emission Rate (mg/kWh)	600	Max
Condensing	No	-
Tenants' Generator (HSW-550)		
Gross Peak Fuel Input (kW)	1,337.3	Max
Hours of Use per Annum	16	Max
Annual Fuel Input (kWh/annum)	21,396	Max
Exhaust Temperature (°C)	542	Min
Flue Internal Diameter (m)	0.26	Max
Efflux Velocity (m/s)	25.0	Min
NOx Emission Rate (mg/kWh)	3,590	Max
PM_{10} & $PM_{2.5}$ Emission Rate (mg/kWh)	500	Max
Condensing	No	-
Diesel Fire Sprinkler Pump (KA4H)		
Gross Peak Fuel Input (kW)	136.6	Max

A7.2 The restrictions set out in Table A7.1 should be adhered in order to ensure that the final plant design does not lead to impacts greater than those modelled. In addition, the final design should ensure that all stacks discharge vertically upwards and are unimpeded by any fixture on top of the stack.

A7.3 If the design of the generators deviates significantly from the modelled specifications, additional future modelling may be required in order to ensure that there are no significant adverse air quality impacts.

A7.4 The GLA's Sustainable Design and Construction SPG (GLA, 2014a) also suggests that the following measures should be adhered to in order to ensure adequate dispersion of emissions from discharging stacks and vents. These include the following:

- discharges should be vertically upwards and unimpeded by cowls or any other fixtures on top of the stack. However, the use of coning or of flame traps at the tops of stacks is acceptable. In the case of discharge stacks (whether single or multiple stack) with shrouds or casings around the stack(s), the stack(s) alone should extend above the shroud or casing. This extension should be at least 50% of the shroud or casing's greatest lateral dimension;
- irrespective of the pollutant discharge, there are minimum discharge stack heights based on the heat release and the discharge momentum. These can be calculated following calculations set out in the guidance note, but the absolute minimum value is 1 m;
- no discharge stack should be less than 3 m above the ground or any adjacent area to which there is general access. For example, roof areas and elevated walkways;
- a discharge stack should never be less than the height of any building within a distance of 5 times the stack height; and
- a discharge stack should be at least 3 m above any opening windows or ventilation air inlets within a distance of 5 times the stack height.

A8 'Air Quality Neutral'

A8.1 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.

A8.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A8.1, while the 'Transport Emissions Benchmarks' ('TEBs') are set out in Table A8.2. 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 A8.3 and Table A8.4 (upon which the TEBs are based) is used. Similarly, the information in Table A8.5 may be used if site-specific information are not available (AQC, 2014). For use classes other than A1, B1 and C3, trip lengths and average emissions per vehicle are not provided, thus the trip rates in Table A8.6 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. As noted in Paragraph 4.26, the air quality neutral benchmarks are based around old planning use classes.

Table A8.1: 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 A8.2: Transport Emissions Benchmarks

Land use	CAZ [a]	Inner [b]	Outer [b]
NOx (g/m²/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/m²/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, 2019b).

Table A8.3: 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 A8.4: 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 A8.5: 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 A8.6: 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

A9 Construction Mitigation

A9.1 Table A9.1 presents 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.

Table A9.1: Best-Practice Mitigation Measures Recommended for the Works

Measure	Desirable	Highly Recommended
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		✓
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		✓
Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution	✓	
Avoid site runoff of water or mud		✓
Keep site fencing, barriers and scaffolding clean using wet methods		✓

Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below		✓
Cover, seed, or fence stockpiles to prevent wind whipping		✓
Carry out regular dust soiling checks of buildings within 100 m of site boundary and provide cleaning if necessary	✓	
Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly		✓
Agree monitoring locations with the Local Authority		✓
Where possible, commence baseline monitoring at least three months before work begins		✓
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 London's NRMM emission standards. Currently, NRMM used on any site within Greater London are required to 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, while NRMM used on any site within the Central Activity Zone, Canary Wharf or one of London's Opportunity Areas are required to meet Stage IIIB of the Directive as a minimum. The proposed development is within an area where this stricter requirement applies. From 1 March 2021, NRMM used in the Central Activity Zone, Canary Wharf or one of London's Opportunity Areas will be required to meet Stage IV of the Directive as a minimum, while machinery used anywhere else in London will be required to meet stage IIIB. From January 2025, NRMM used anywhere in London will be required to meet stage IV, while from January 2030 the stage V standard will apply. From January 2040 only zero emission machinery will be allowed.		✓
Ensure all vehicles switch off engines when stationary – no idling vehicles		✓
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable		✓
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)	✓	
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials		✓
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 non-potable water where possible and appropriate		✓

Use enclosed chutes, conveyors and covered skips		✓
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate		✓
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods		✓
Waste Management		
Reuse and recycle waste to reduce dust from waste materials		✓
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		✓
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	✓	
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		✓
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport		✓
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);		✓
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits; and		✓
Access gates should be located at least 10 m from receptors, where possible		✓
Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site	✓	