Air Quality Assessment:
Pope’s Road, Brixton

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Experts in air quality
management & assessment

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Client	AG Hondo Pope's Road BV	Principal Contact	Tsz Kan Woo (Trium Environmental Consulting LLP)

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Report Prepared By:	David Bailey, Lauren Armstrong and Guido Pellizzaro

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Air Quality Consultants Ltd
23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086
119 Marylebone Road, London NW1 5PU Tel: 020 3873 4780
aqc@aqconsultants.co.uk

Registered Office: 23 Coldharbour Road, Bristol BS6 7JT
Companies House Registration No: 2814570

Executive Summary

The air quality impacts associated with the proposed mixed-use development of land adjacent to Pope Road, Brixton, Lambeth have been assessed.

The Proposed Development will generate additional traffic on the local road network, but the assessment has shown that there will be no significant effects on any existing, sensitive receptor.

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

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

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

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1 Introduction

1.1 This air quality assessment has been carried out by Air Quality Consultants Ltd, for Trium Environmental Consulting LLP, (on behalf of AG Hondo Pope's Road BV) to accompany the planning application for a proposed mixed-use development in Brixton. The application site comprises a funnel shaped parcel of land situated between two large railway viaducts. The site is bound by Popes Road to the west, at its widest point, and Valentia Place to the east, at its narrowest points (hereafter referred to as the 'Site'). The Site comprises a single storey building currently in use as a retail store,

1.2 The proposals include the demolition of the existing building and erection of a part G + 19, part G + 8 storey building comprising flexible A1/A3/B1/D1/D2 uses at basement, ground and first floor, with restaurant (A3) use on floor 8 and B1 accommodation on floors 2 to 19, with plant enclosures at roof level, and associated cycle parking, servicing and all necessary enabling works (hereafter referred to as the 'Proposed Development').

1.3 The Proposed Development is located within a borough-wide Air Quality Management Area (AQMA) declared by the London Borough of Lambeth for exceedances of the annual and 1-hour mean nitrogen dioxide (NO_2) objectives and the annual and 24-hour mean PM_{10} objectives. The Proposed Development will lead to changes in vehicle flows on local roads, which may impact on air quality at existing residential properties. The main air pollutants of concern related to road traffic emissions are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

1.4 The Proposed Development will also include a diesel backup generator for emergency use only. At this stage the details of the emissions associated with the diesel backup generator are unavailable; however it is considered that with the granting of any planning permission, the London Borough of Lambeth will provide a suitably worded planning condition requesting that further details are provided to the Council on the impact of the diesel backup generator on local air quality, and an updated air quality neutral assessment will be provided to the Council, prior to the operation of the Proposed Development. As such, the impact of the backup generator on air quality has not been considered further in this assessment.

1.5 This report describes the existing local air quality conditions (base year 2018), and the predicted air quality in the future assuming that the Proposed Development does, or does not proceed. The assessment of traffic-related impacts focuses on 2024, which is the anticipated opening year of the Proposed Development. The assessment of construction dust impacts focuses on the anticipated duration of the construction works.

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

2 Policy Context and Assessment Criteria

2.1 The United Kingdom formally left the European Union (EU) on 31 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.

Clean Air Strategy 2019

2.3 The Clean Air Strategy (Defra, 2019a) 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

2.4 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, 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 much as 70%, of new car sales, and up to 40% of new van sales, being ultra-low emission by 2030.

2.5 The paper sets out a number of measures by which the Government will support this transition, but is clear that the Government expects this transition to be industry and consumer led. If these ambitions are realised, then road traffic-related NOx emissions can be expected to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in the tools utilised in carrying out this air quality assessment.

Planning Policy

National Policies

2.6 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 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".

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

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

and

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

2.8 More specifically on air quality, the NPPF makes clear that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through

traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".

2.9 The NPPF is supported by the 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 EU Limit Values"* and *"It is important that the potential impact of new development on air quality is taken into account … where the national assessment indicates that relevant limits have been exceeded or are near the limit".* The role of the local authorities is covered by the LAQM regime, with the PPG stating that local authority Air Quality Action Plans "*identify measures that will be introduced in pursuit of the objectives*". In addition, the PPG makes clear that *"Odour and dust can also be a planning concern, for example, because of the effect on local amenity"*.

2.10 The PPG states that:

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

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

London-Specific Policies

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

The London Plan

2.13 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.

2.14 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.

2.15 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.

2.16 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".

2.17 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".*

2.18 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

2.19 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

2.20 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 Sustainable Planning Guidance: Sustainable Design and Construction

2.21 The GLA's Sustainable Planning Guidance (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 2.15, above) should be implemented.

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

2.22 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 SPG 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

2.23 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 NO_2, but also have high levels of human exposure. They do not represent an exhaustive list of London's air quality hotspot locations, but locations where the GLA believes the problem to be most acute. They are also areas where the GLA considers there to be the most potential for air quality improvements and are, therefore, where the GLA and Transport for London (TfL) will focus actions to improve air quality. The Proposed Development is located within the A23 from Brixton to Streatham air quality Focus Area.

Local Transport Plan

2.24 The Lambeth Transport Plan (Lambeth, 2011) sets out the Council's vision for improving a number of key challenges relating to transport. Objective 3: Improve Air Quality states that:

"there are two main ways in which to help tackle poor air quality. These are:

- *Reduce the need to travel and/or travel sustainably, either by reducing unnecessary journeys in the first place, or by switching journeys to walking or cycling, public transport or car clubs.*
- *Using cleaner and more efficient fuels for motorised forms of transport."*

Local Policies

2.25 The Lambeth Local Plan (Lambeth, 2015) was adopted in September 2015 and within this, there is three policy which is relevant to air quality. Policy T1 relates to Sustainable travel and refers to the Lambeth Transport Plan 2011, outlined above.

2.26 Policy Q2 – Amenity states that: *"Development will be supported if…adequate amenity space is provided free from…pollution…"*

2.27 Policy EN4 – Sustainable design and construction states that: *"All development… will be required to meet high standards of sustainable design and construction feasible, relating to the scale, nature and form of the proposal."*

2.28 Lambeth Council introduced an air quality Guidance Note (GN) in 2016 sets out the Council's advice for reducing air pollution from all planning applications within the Borough. The objectives of the GN are:

- *to help ensure consistency in the approach to dealing with air quality and planning in Lambeth;*
- *to highlight the existing policy framework in London and Lambeth, and emphasise the importance of air quality as a material planning consideration;*
- *to identify the circumstances where detailed assessments and/or low emission strategies will be required as part of planning applications;*
- *to provide guidance on measures that can be implemented to mitigate the potentially harmful impacts of new developments on air quality in Lambeth;*
- *to provide guidance on the use of planning conditions and Section 106 obligations to improve air quality; and*
- *to provide guidance on the requirements of air quality assessments and the circumstances under which these will be required.*

Air Quality Action Plans

National Air Quality Plan

2.29 Defra has produced an Air Quality Plan to tackle roadside NO_2 concentrations in the UK (Defra, 2017); a supplement to the 2017 Plan (Defra, 2018a) was published in October 2018 and sets out the steps that the 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 Clean Air Zone (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

2.30 The London Borough of Lambeth has declared a borough-wide AQMA for exceedances of the annual mean and 1-hour mean NO_2 and the annual mean and 24-hour mean particulate matter objectives. The Council has developed an Air Quality Action Plan (Lambeth, 2017), which outlines the actions that the Council will take to improve air quality in Lambeth including:

- *"CHP and biomass air quality policies Lambeth's Air Quality Guidance Note encourages developers to select plant that meets the standards for emissions from combined heat and power and biomass plants as set out in the GLA Sustainable Design and Construction SPG and use ultra-low NOx boilers;*
- *Implementing London Plan Air Quality Neutral Policy Lambeth's Air Quality Guidance Note sets out the air quality neutral policies of the London Plan and Sustainable Design and Construction SPG;*
- *Ensuring emissions from construction are minimised Lambeth's Air Quality Guidance Note sets out Lambeth's requirements for dust control during construction;*
- *Encourage schools to join the TfL STARS (Sustainable Travel: Active, Responsible, Safe) accredited travel planning programme;*
- *Continue to support schools to implement travel plans moving from bronze to silver to gold;*

- *Engage with TfL Children's Traffic Club programme to add focus on air quality and active travel".*

Assessment Criteria

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

2.32 The UK-wide objectives for NO_2 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 NO_2 objective is unlikely to be exceeded at roadside locations where the annual mean concentration is below 60 $\mu g/m^3$ (Defra, 2018b). Therefore, 1-hour NO_2 concentrations will only be considered if the annual mean concentration is above this level. 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). The predicted annual mean PM_{10} concentrations are thus used as a proxy to determine the likelihood of an exceedance of the 24-hour mean PM_{10} objective. Where predicted annual mean concentrations are below 32 $\mu g/m^3$ it is unlikely that the 24-hour mean objective will be exceeded.

2.33 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 NO_2 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 NO_2 applies wherever members of the public might regularly spend 1-hour or more, including outdoor eating locations and pavements of busy shopping streets.

2.34 The European Union has also set limit values for NO_2, PM_{10} and $PM_{2.5}$ (The European Parliament and the Council of the European Union, 2008). The limit values for NO_2 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. The 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).

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

Table 1: Air Quality Criteria for Nitrogen Dioxide (NO_2), PM_{10} and $PM_{2.5}$

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO_2)	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
Fine Particles (PM_{10})	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3 [a]
Fine Particles ($PM_{2.5}$) [b]	Annual Mean	25 µg/m^3

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

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

Construction Dust Criteria

2.36 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.

Descriptors for Air Quality Impacts and Assessment of Significance

Construction Dust Significance

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

Operational Significance

2.38 There is no official guidance in the UK in relation to development control on how to describe air quality impacts, nor how to assess their significance. The approach developed jointly by

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

Environmental Protection UK (EPUK) and the IAQM (Moorcroft and Barrowcliffe et al, 2017) has therefore been used. The overall significance of the air quality impacts is determined using professional judgement, taking account of the impact descriptors. Full details of the EPUK/IAQM approach are provided in Appendix A3. The approach includes elements of professional judgement and the experience of the consultants who prepared this report is set out in Appendix A3.1.

3 Assessment Approach

Existing Conditions

3.1 Existing sources of emissions within the road traffic 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, 2019b). Local sources have also been identified through examination of the Council's Air Quality Review and Assessment reports.

3.2 Information on existing air quality has been obtained by collating the results of monitoring carried out by the London Borough of Lambeth. This covers both the road traffic study area and nearby sites, the latter being used to provide context for the assessment. Background concentrations have been defined using the 2017-based national pollution maps published by Defra (2019c). These cover the whole of the UK on a 1x1 km grid.

3.3 Exceedances of the annual mean EU limit value for NO_2 in the study area have been identified using the maps of roadside concentrations published by Defra (2019f), 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, 2019d), which are available for the years 2009 to 2017, show no exceedances of the limit values anywhere in the UK in 2017.

Construction Impacts

3.4 The construction dust assessment considers the potential for impacts within 350 m of the site boundary or within 50 m of roads used by construction vehicles. The assessment methodology follows the GLA's SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014b), which is based on that provided by the 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.

3.5 The first step in considering the construction traffic impacts of the Proposed Development has been to screen the construction 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. The main air pollutants of concern related to traffic emissions are NO_2 and fine particulate matter (PM_{10} and $PM_{2.5}$). The methodology employed to quantify impacts from construction vehicles emissions is to the same as that employed to determine operational road traffic impacts, described in the 'Road Traffic Impacts' section below. As a worst-case, the assessment of construction traffic impacts has been assessed for 2020, the anticipated start of construction, assuming both that the development does proceed (With Scheme), and does not proceed (Without Scheme).

Road Traffic Impacts

Modelling Methodology

Screening

3.6 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. The following sections describe the approach to dispersion modelling of road traffic emissions, which has been required for this project.

Sensitive Locations

3.7 Concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ have been predicted at a number of locations close to the Proposed Development. When selecting receptors, particular attention has been paid to assessing impacts close to junctions, where traffic may become congested and where there is a combined effect of several road links, and close to those roads where the traffic increases as a result of the Proposed Development will be greatest.

3.8 Six existing residential properties have been identified as receptors for the assessment. These locations are described in Table 2 and shown in Figure 1. In addition, concentrations have been modelled at the Brixton Road automatic monitoring site and diffusion tube monitoring site DT18 located on Stockwell Road, in order to verify the model outputs (see Appendix A5 for verification method).

Table 2: Description of Receptor Locations

Receptor	Description
Receptor 1 [b]	Residential property on Coldharbour Lane
Receptor 2 [b]	Residential property on Atlantic Road
Receptor 3 [a]	Residential property on Gresham Road
Receptor 4 [b]	Residential property on Brixton Road
Receptor 5 [a]	Residential property on Valentia Place
Receptor 6 [b]	Residential property on Valentia Place

[a] Receptors modelled at a height of 1.5 m to represent exposure at ground floor level.

[b] Receptors modelled at heights of 4.5 m to represent exposure at first floor level.

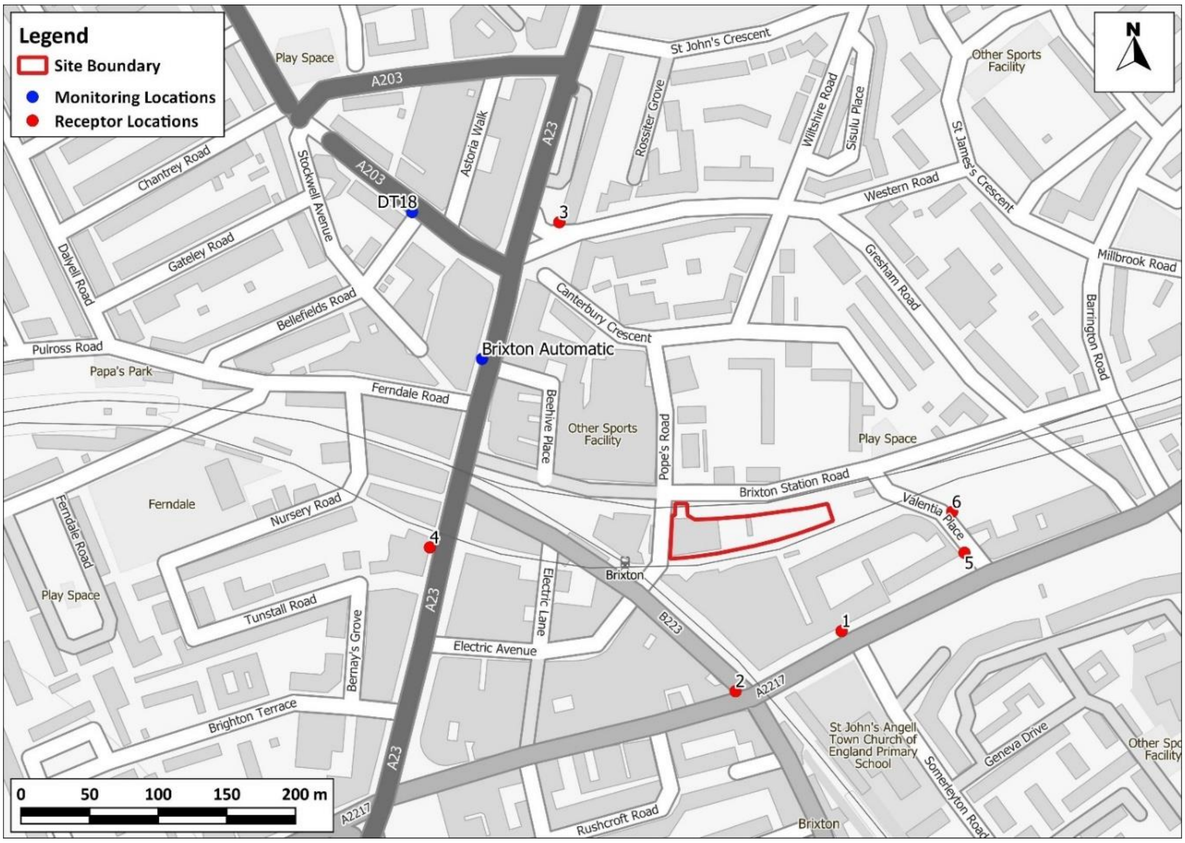

Figure 1: Receptor Locations

Modelling Methodology

3.9 Concentrations have been predicted using the ADMS-Roads dispersion model, with vehicle emissions derived using Defra's Emission Factor Toolkit (EFT) (v9.0) (Defra, 2020). Details of the model inputs, assumptions and the verification are provided in Appendix A5, together with the method used to derive base and future year background concentrations. Where assumptions have been made, a realistic worst-case approach has been adopted.

Assessment Scenarios

3.10 Nitrogen dioxide, PM_{10} and $PM_{2.5}$ concentrations have been predicted for a base year (2018), the peak construction year (2020) and the proposed year of opening (2024). The base year of 2018 has been used for verification, where the 2019 monitoring results for Lambeth are not yet published. For 2020 and 2024, predictions have been made assuming both that the development does proceed (With Scheme) and does not proceed (Without Scheme).

Traffic Data

3.11 Traffic data for the assessment have been provided by Caneparo Associates, who have undertaken the Transport Assessment for the Proposed Development, Blue Sky Building, who have undertaken the construction report, and are supplemented with data taken from the London Atmospheric Emissions Inventory (LAEI) (GLA, 2019). Further details of the traffic data used in this assessment are provided in Appendix A5.

Uncertainty

3.12 There are many components that contribute to the uncertainty of modelling predictions. The road traffic emissions dispersion model used in this assessment is dependent upon the traffic data that have been input, which will have inherent uncertainties associated with them. There are then additional uncertainties, as models are required to simplify real-world conditions into a series of algorithms.

3.13 An important stage in the process is model verification, which involves comparing the model output with measured concentrations (see Appendix A5). The level of confidence in the verification process is necessarily enhanced when data from an automatic analyser have been used, as has been the case for this assessment (see Appendix A5). As the model has been verified and adjusted, there can be reasonable confidence in the prediction of base year (2018) concentrations.

3.14 Predicting pollutant concentrations in a future year will always be subject to greater uncertainty. For obvious reasons, the model cannot be verified in the future, and it is necessary to rely on a series of projections provided by DfT and Defra as to what will happen to traffic volumes, background pollutant concentrations and vehicle emissions.

3.15 European type approval ('Euro') standards for vehicle emissions apply to all new vehicles manufactured for sale in Europe. These standards have, over many years, become progressively more stringent and this is one of the factors that has driven reductions in both predicted and measured pollutant concentrations over time.

3.16 Historically, the emissions tests used for type approval were carried out within laboratories and were quite simplistic. They were thus insufficiently representative of emissions when driving in the real world. For a time, this resulted in a discrepancy, whereby nitrogen oxides emissions from new diesel vehicles reduced over time when measured within the laboratory, but did not fall in the real world. This, in turn, led to a discrepancy between models (which predicted improvements in nitrogen dioxide concentrations over time) and measurements (which very often showed no improvements year-on-year).

3.17 Recognition of these discrepancies has led to changes to the type approval process. Vehicles are now tested using a more complex laboratory drive cycle and also through 'Real Driving Emissions' (RDE) testing, which involves driving on real roads while measuring exhaust emissions. For Heavy Duty Vehicles (HDVs), the new testing regime has worked very well and NOx emissions from the latest vehicles (Euro VI[2]) are now very low when compared with those from older models (ICCT, 2017).

3.18 For Light Duty Vehicles (LDVs), while the latest (Euro 6) emission standard has been in place since 2015, the new type-approval testing regime only came into force in 2017. Despite this delay, earlier work by AQC (2016) showed that Euro 6 diesel cars manufactured prior to 2017 tend to emit significantly less NOx than previous (Euro 5 and earlier) models.

3.19 AQC has analysed trends in measured NOx concentrations against trends in Defra's EFT model predictions for the period 2013 to 2019 (AQC, 2020). This has demonstrated that, while the EFT typically over-stated the improvements over the period 2013 to 2016, it has tended to under-state the improvements since 2016. Wider consideration of the assumptions built into the EFT suggests that, on balance, the EFT is unlikely to over-state the rate at which NOx emissions decline in the future at an 'average' site in the UK. In practice, the balance of evidence thus suggests that NOx concentrations are most likely to decline more quickly in the future, on average, than predicted by the EFT, especially against a base year of 2016 or later. Using EFT v9.0 for future-year forecasts in this report thus provides a robust assessment, given that the model has been verified against measurements made in 2018.

3.20 The Mayor of London confirmed in June 2018 that changes will be made to the existing LEZ in 2020, and that the Ultra Low Emission Zone (ULEZ) will be expanded in 2021. The changes are described in detail in Appendix A1, and can be expected to significantly reduce NOx emissions in London from 2020 onwards; however, they are not reflected in Defra's latest EFT and thus have not been considered in this assessment. The assessment presented in this report is, therefore, very much worst-case in this regard, and it is expected that background concentrations, baseline concentrations, and the impacts of the Proposed Development, will be lower than described in Sections 4 and 6 of this report. Appendix A8 presents uncertainties regarding the future fleet mix in

2 Euro VI refers to HDVs while Euro 6 refers to LDVs.

London and the scale of the reduction in NOx emissions that can be expected with the adoption of these changes.

'Air Quality Neutral'

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

3.22 Appendix A6 sets out the emissions benchmarks. The approach has been to calculate the emissions from the Proposed Development and to compare them with these benchmarks.

4 Site Description and Baseline Conditions

As discussed in Paragraph 1.1, the Site comprises a funnel shaped parcel of land situated between two large railway viaducts. The Site is bound by Popes Road to the West, at its widest point, and Valentia Place to the East, at its narrowest point. The Site comprises a single storey building currently in use as a retail store.

Local Air Quality Monitoring

4.1 The London Borough of Lambeth operates three automatic monitoring stations within the borough (as shown in Figure 2). Automatic monitoring station LB4 is located approximately 180 m northwest of the Site on Brixton Road. The London Borough of Lambeth also operates a number of nitrogen dioxide monitoring sites using diffusion tubes prepared and analysed by Gradko (using the 20% TEA in water method). These diffusion tube sites commenced monitoring in 2018 and include two co-located with automatic monitoring station LB4 on Brixton Road and at locations along Stockwell Road, Stockwell Park Walk, Acre Lane, Effra Road, Coldharbour Lane and Milkwood Road.

4.2 Results for the years 2013 to 2018 are summarised in Table 3 and the monitoring locations are shown in Figure 2.

Table 3: Summary of Nitrogen Dioxide (NO_2) Monitoring (2013-2018) [a b]

Site No.	Site Type	Location	2013	2014	2015	2016	2017	2018
Automatic Monitor - Annual Mean (µg/m³)								
LB4	Kerbside	Brixton Road	**112**	**149**	**129**	**118**	**95**	**95**
Objective			**40**					
Automatic Monitor - No. of Hours > 200 µg/m³								
LB4	Kerbside	Brixton Road	**250**	**1,732**	**883**	**539**	**75**	**83 (248)**
Objective			**18 (200) [c]**					
Diffusion Tubes - Annual Mean (µg/m³)								
DT1	Roadside	Brixton AQ Monitoring Station - co-located	-	-	-	-	-	**75.1**
DT2	Roadside	Brixton AQ Monitoring Station - co-located	-	-	-	-	-	**76.8**
DT17	Roadside	8 Stockwell Park Walk	-	-	-	-	-	**42.3**
DT18	Roadside	Stockwell Road/Bellefields Road	-	-	-	-	-	**52.2**
DT19	Roadside	Brixton Road bus stop Q (outside KFC)	-	-	-	-	-	**75.2**
DT20	Roadside	Effra Road/Kellett Road	-	-	-	-	-	39.4

Site No.	Site Type	Location	2013	2014	2015	2016	2017	2018
DT48	Roadside	Loughborough Junction 1	-	-	-	-	-	**48.0**
DT49	Roadside	Loughborough Junction 2	-	-	-	-	-	**40.1**
DT50	Roadside	Acre Lane	-	-	-	-	-	**47.4**
Objective			**40**					

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

[b] Data taken from 2018 Air Quality Annual Status Report for Lambeth (London Borough of Lambeth, 2019).

[c] Values in brackets are 99.79th percentiles, which are presented where data capture is <75%.

4.3 Measured annual mean NO_2 concentrations were above the objective at all monitoring locations, except DT20 in 2018. The majority of these monitoring locations are situated alongside heavily trafficked roads. The Site is set back from major roads, and as such nitrogen dioxide concentrations are likely to be significantly lower than the concentrations in Table 3.

4.4 Between 2013 and 2018, there is a clear downward trend in the NO_2 concentrations at the LB4, Brixton Road monitor.

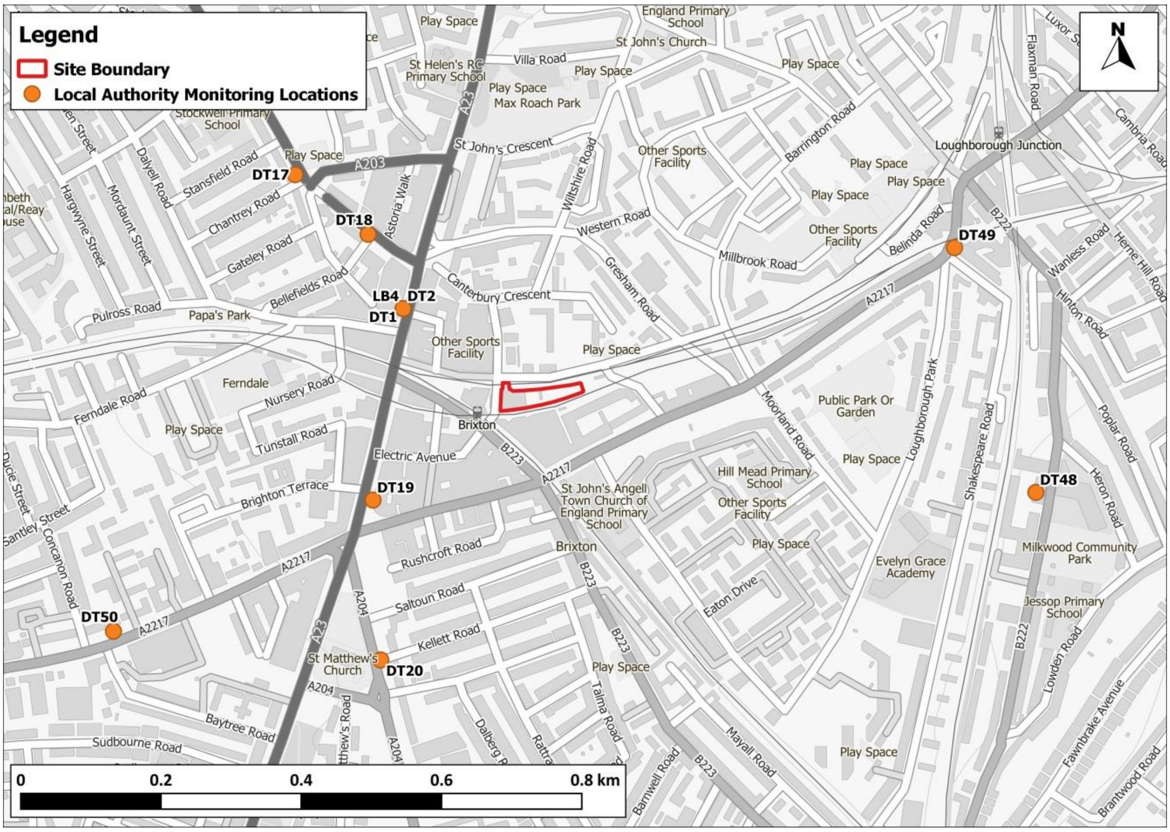

Figure 2: Monitoring Locations

4.5 The LB4 kerbside automatic monitoring station, located adjacent to the A23 Brixton Road in Brixton, approximately 180 m to the northwest of the Proposed Development, is the closest station which measured PM_{10} concentrations in 2018. Data capture was low, however, concentrations (including the 90.4^{th} percentile of daily means) were well below the objectives. Results for the years 2013 to 2018 are summarised in Table 4. The measured PM_{10} concentrations have been below the relevant objectives in all but one year since 2013. There are no monitors measuring $PM_{2.5}$ concentrations in the London Borough of Lambeth.

Table 4: Summary of PM_{10} Automatic Monitoring (2013-2018) [a] [b]

Site No.	Site Type	Location	2013	2014	2015	2016	2017	2018
PM_{10} Annual Mean (µg/m³)								
LB4	Kerbside	Brixton Road	32	30	28	**40**	35	30
Objective			**40**					
PM_{10} No. Days >50 µg/m³								
LB4	Kerbside	Brixton Road	13 (46.6)	12 (43.7)	11 (39.5)	**57**	27	13 (46.0)
Objective			**35 (50)** [c]					

a Exceedances of the objectives are shown in bold.

b Reference equivalent. Data taken from the 2018 Air Quality Annual Status Report for Lambeth (London Borough of Lambeth, 2019).

c Where data capture is low, the 90.4th percentile of daily means is provided in parentheses.

Exceedances of EU Limit Value

4.6 There are several AURN monitoring sites within the Greater London Urban Area that have measured exceedances of the annual mean NO_2 limit value. Furthermore, Defra's roadside annual mean NO_2 concentrations (Defra, 2019e), which are used to report exceedances of the limit value to the EU, identify exceedances of this limit value in 2017 along many roads in London, including the A23 near 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 2019, do not identify any exceedances in the study area. As such, there is considered to be no risk of an EU limit value exceedance in the vicinity of the Proposed Development by the time that it is operational.

4.7 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 a LEZ and an ULEZ, thus 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 Mayors Transport Strategy.

Background Concentrations

4.8 Estimated background concentrations at the Proposed Development have been determined for 2018, 2020 and 2024 using Defra's 2017-based background maps (Defra, 2019c). The background concentrations are set out in Table 5 and have been derived as described in Appendix A5. The background concentrations are all well below the objectives.

Table 5: Estimated Annual Mean Background Pollutant Concentrations in 2018, 2020, and 2024 ($\mu g/m^3$)

Year	NO_2	PM_{10}	$PM_{2.5}$
2018 [a]	28.4	18.4	12.5
2020 [b]	24.6	17.9	12.1
2024 [c]	21.1	17.2	11.6
Objectives	**40**	**40**	**25** [a]

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

Baseline Dispersion Model Results

4.9 Baseline concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ have been modelled at each of the existing receptor locations (see Figure 1 and Table 2 for receptor locations). The results, which cover both the existing (2018) and future year (2024) baseline (Without Scheme), are set out in Table 6 and Table 7 and the 2020 baseline are in Appendix A6 . The modelled road components of nitrogen oxides, PM_{10} and $PM_{2.5}$ have been increased from those predicted by the model based on a comparison with local measurements (see Appendix A5 for the verification methodology).

Table 6: Modelled Annual Mean Baseline Concentrations of Nitrogen Dioxide ($\mu g/m^3$) at Existing Receptors [a]

Receptor	2018	2024 Without Scheme
Receptor 1	38.3	26.6
Receptor 2	**46.9**	31.1
Receptor 3	**54.1**	33.8
Receptor 4	<u>**68.1**</u>	**41.5**
Receptor 5	36.0	25.1
Receptor 6	33.9	23.9
Objective	**40**	

[a] Exceedances of the annual mean objective are shown in bold, and concentrations greater than 60 $\mu g/m^3$, where the 1-hour mean objective is potentially exceeded, are underlined.

Table 7: Modelled Annual Mean Baseline Concentrations of PM_{10} and $PM_{2.5}$ at Existing Receptors (µg/m³)

Receptor	PM_{10} [a]		$PM_{2.5}$	
	2018	2024 Without Scheme	2018	2024 Without Scheme
Receptor 1	20.1	18.8	13.5	12.5
Receptor 2	21.2	19.8	14.2	13.0
Receptor 3	22.1	20.6	14.8	13.5
Receptor 4	24.5	22.9	16.3	14.8
Receptor 5	19.5	18.2	13.2	12.1
Receptor 6	19.2	17.9	13.0	12.0
Objective / Criterion	32 [a]		25 [b]	

[a] While the annual mean PM_{10} objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG16 (Defra, 2018b). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

2018 Baseline

4.10 The predicted annual mean concentrations of nitrogen dioxide exceed the objective at the receptors located on Atlantic Road (Receptor 2), receptors located on, or in proximity to, Brixton Road (Receptors 3 and 4). The annual mean nitrogen dioxide concentration is above 60 µg/m³ at Receptor 4; it is, therefore, likely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 2.32) at this location. At all other receptors, it is unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded.

4.11 The predicted annual mean concentrations of PM_{10} and $PM_{2.5}$ are below the objectives at all receptors in 2018. The annual mean PM_{10} concentrations are below 32 µg/m³ at all receptors and it is, therefore, unlikely that the 24-hour mean PM_{10} objective will be exceeded at this receptor, however it is unlikely there will be any exceedances at any other receptor considered.

2024 Baseline

4.12 The predicted annual mean concentrations of nitrogen dioxide are below the objective at all receptor locations, apart from Receptor 4. All of the predictions for PM_{10} and $PM_{2.5}$ are below the objectives. The annual mean PM_{10} concentration is below 32 µg/m³ at all receptors and it is, therefore, likely that the 24-hour mean PM_{10} objective will be exceeded at this receptors, however it is unlikely there will be any exceedances at all other receptors considered.

4.13 The annual mean nitrogen dioxide concentrations are below 60 µg/m^3 at every receptor; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 2.32).

5 Construction Phase Impact Assessment

Construction Traffic

Initial Screening Assessment of Development-Generated Construction Traffic Emissions

5.1 The Proposed Development will generate a maximum of 53 Heavy Duty Vehicles (HDV) AADT at any year of construction. Such an increase would occur on the site access, and Valentia Place. Beyond Valentia Place, the distribution of traffic would mean that the number of HDVs on construction routes would fall below 25 daily trips. EPUK & IAQM (Moorcroft and Barrowcliffe et al, 2017) consider that a detailed assessment is required where a development leads to an increase in HDV movements of more than 25 Annual Average Daily Trips (AADT) in an AQMA. A quantitative assessment of construction vehicle emissions has been carried out to determine the impacts on existing sensitive receptors located alongside the affected routes.

Detailed Assessment of Development-Generated Construction Traffic Emissions

5.2 The number of HGV vehicles that will access the Site during demolition and construction has been provided for each construction phase by Blue Sky Building. EPUK and IAQM (Moorcroft and Barrowcliffe et al, 2017) considers that a detailed assessment of air quality may be required if a development leads to a change of more than 25 AADT HDV movements on roads in an AQMA with relevant exposure. The Proposed Development will generate a maximum of 53 HDVs AADT's in any year of construction. As such, further assessment has been carried out to determine the impacts that such increases could have on air quality at receptors located along the affected roads. The dispersion model ADMS-Roads was used, and it was predicted that an increase in 53 HDV movements per day would lead to increases in annual mean NO_2 concentrations of less than 0.3 µg/m^3 at any of the selected worst-case receptors (see Appendix A6), and less than 0.1 µg/m^3 at any receptor predicted to be exceeding the annual mean objective. Concentration of PM_{10} and $PM_{2.5}$ would increase by a maximum of 0.1 µg/m^3 at any receptor.

5.3 Such increases will have a negligible impact on air quality at sensitive receptor locations, and thus further assessment is not required.

5.4 The effects associated with off-site construction traffic emissions are considered to be 'not significant'.

Construction Dust Assessment

5.5 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.

Demolition

5.6 There will be a requirement to demolish the existing retail building, predominantly constructed of concrete framing, with an approximate total volume of 7,000 m^3. The method of demolition will be dictated based on accessibility. After a soft strip, 360^0 excavators fitted with jaws and breaker points will demolish the single storey building. An on-site crusher will be used before removal or recycling of the material. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for demolition is considered to be *small.*

Earthworks

5.7 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 8. Overall, it is considered that, when dry, this soil has the potential to be moderately dusty.

Table 8: 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	Sandy to Sandy Loam

[a] grain size 0.06 – 2.0 mm.

[b] grain size > 2.0 mm.

5.8 The Site covers an area of approximately 2,700 m^2 and most of this will be subject to earthworks, involving removal of the foundations of the demolished building, breaking up of a paved area and excavation. 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 *medium*.

Construction

5.9 Construction will involve a part G + 19, part G + 8 -storey mixed-use building, with a total volume of around 70,000 m^3. Dust will arise from vehicles travelling over unpaved ground, the handling and storage of dusty materials, and from the cutting of concrete. The construction will take place over a 3-year period. Based on the example definitions set out in Table A2.1 in Appendix A2, the dust emission class for construction is considered to be *medium*.

Trackout

5.10 The number of heavy vehicles accessing the Site, which may track out dust and dirt, has been estimated be a maximum of 62 outward heavy vehicle movements per day. 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*.

5.11 Table 9 summarises the dust emission magnitude for the Proposed Development.

Table 9: Summary of Dust Emission Magnitude

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

Sensitivity of the Area

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

Sensitivity of the Area to Effects from Dust Soiling

5.13 The IAQM guidance, upon which the GLA's guidance is based, explains that residential properties are 'high' sensitivity receptors to dust soiling (Table A2.2 in Appendix A2). There are approximately 20 residential properties within 20 m of the Site (see Figure 3). Using the matrix set out in Table A2.3 in Appendix A2, the area to the south of the Site is of 'high' sensitivity to dust soiling.

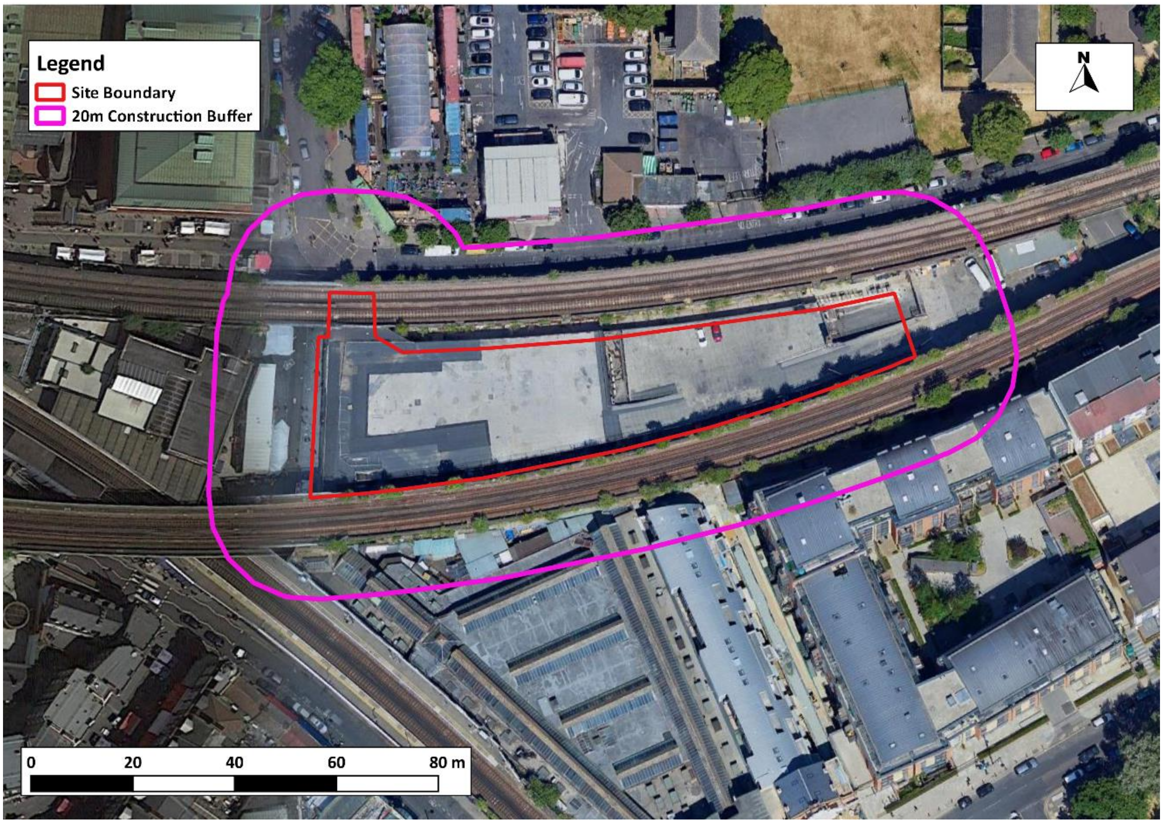

Figure 3: 20 m Distance Band around Construction Area

Imagery ©2020 Google.

5.14 Table 9 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 40 residential properties within 20 m of the roads along which material could be tracked (see Figure 4), and Table A2.3 in Appendix A2 thus indicates that the area is of 'high' sensitivity to dust soiling due to trackout.

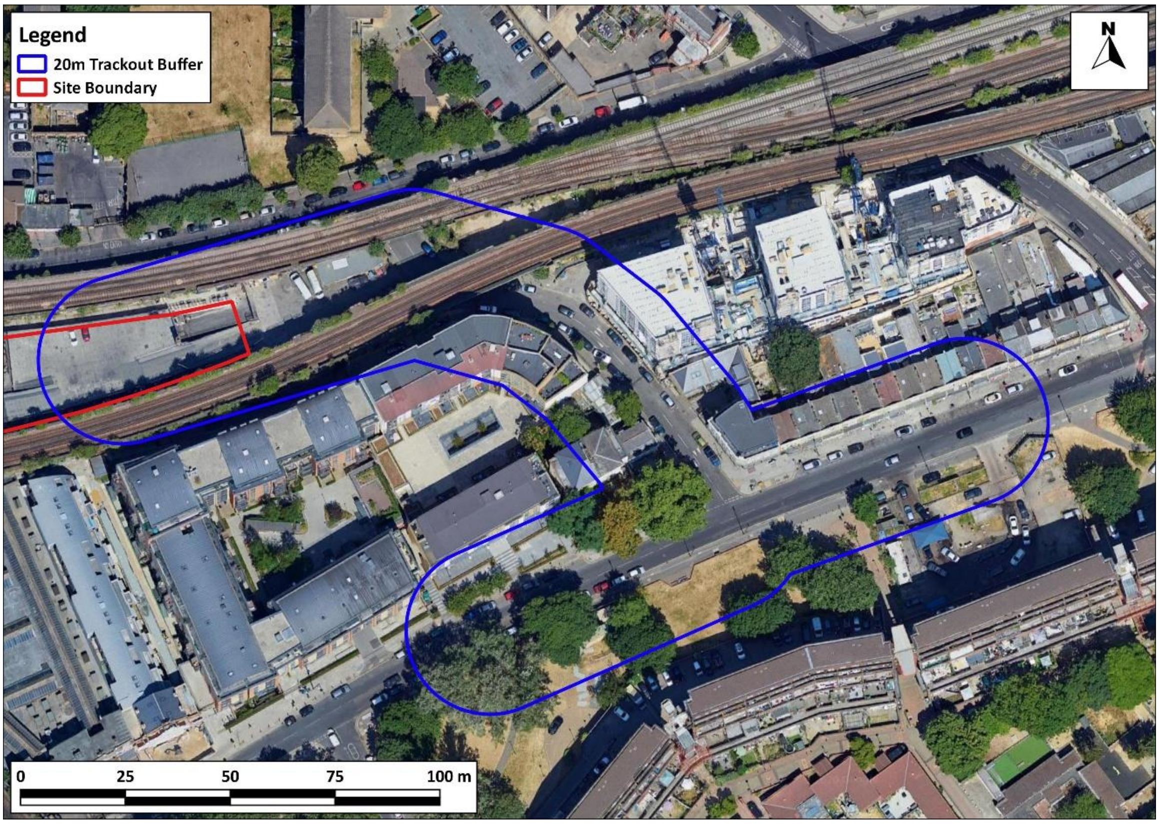

Figure 4: 20 m Distance Band around Roads Used by Construction Traffic Within 200 m of the Site Exit

Imagery ©2020 Google.

Sensitivity of the Area to any Human Health Effects

5.15 Residential properties are also classified as being of 'high' sensitivity to human health effects, while places of work are classified as being of 'medium' sensitivity. The matrix in Table A2.4 in Appendix A2 requires information on the baseline annual mean PM_{10} concentration in the area. As shown in Table 7, it is considered that the modelled PM_{10} concentration of 20.5 µg/m^3 at the closest receptor to the Site (Receptor 6) is representative of background concentrations at the Site. Using the matrix in Table A2.4 in Appendix A2, the area surrounding the onsite works and the area surrounding roads along which material may be tracked from the site are of 'low' sensitivity.

Sensitivity of the Area to any Ecological Effects

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

Summary of the Area Sensitivity

5.17 Table 10 summarises the sensitivity of the area around the proposed construction works.

Table 10: Summary of the Area Sensitivity

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

Risk and Significance

5.18 The dust emission magnitudes in Table 9 have been combined with the sensitivities of the area in Table 10 using the matrix in Table A2.7 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 11. These risk categories have been used to determine the appropriate level of mitigation as set out in Section 7.1 (step 3 of the assessment procedure).

Table 11: Summary of Risk of Impacts Without Mitigation

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

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

6 Operational Phase Impact Assessment

Impacts at Existing Receptors

Initial Screening Assessment of Development-Generated Road Traffic Emissions

6.1 The trip generation of the Proposed Development on local roads (as provided by Caneparo Associates) has initially been compared to the screening criteria set out in the EPUK/IAQM guidance (Moorcroft and Barrowcliffe et al, 2017) (see Paragraphs A3.7 to A3.10 in Appendix A3). The Proposed Development is expected to increase AADT flows by a maximum of 178 vehicles along Valentia Place, which is above the screening threshold of 100 LDVs (the screening threshold for inside of an AQMA), thus a detailed assessment is required.

Detailed Assessment of Development-Generated Road Traffic Emissions

6.2 Predicted annual mean concentrations of nitrogen dioxide, PM_{10} and $PM_{2.5}$ in 2024 for existing receptors are set out in Table 12 and Table 13 for both the "Without Scheme" and "With Scheme" scenarios. These tables also describe the impacts at each receptor using the impact descriptors given in Appendix A3.

Table 12: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2024 (μg/m^3) [a]

Receptor	Without Scheme	With Scheme	% Change [b]	Impact Descriptor
Receptor 1	26.6	26.6	0	Negligible
Receptor 2	31.1	31.2	0	Negligible
Receptor 3	33.8	33.8	0	Negligible
Receptor 4	**41.5**	**41.6**	0	Negligible
Receptor 5	25.1	25.3	1	Negligible
Receptor 6	23.9	24.1	0	Negligible
Objective	**40**		**-**	**-**

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

[b] % changes are relative to the objective and have been rounded to the nearest whole number.

Table 13: Predicted Impacts on Annual Mean PM_{10} and $PM_{2.5}$ Concentrations in 2024 (µg/m³)

Receptor	Annual Mean PM_{10} (µg/m³)				Annual Mean $PM_{2.5}$ (µg/m³)			
	Without Scheme	With Scheme	% Change [a]	Impact Descriptor	Without Scheme	With Scheme	% Change [a]	Impact Descriptor
Receptor 1	18.8	18.8	0	Negligible	12.5	12.5	0	Negligible
Receptor 2	19.8	19.8	0	Negligible	13.0	13.1	0	Negligible
Receptor 3	20.6	20.6	00	Negligible	13.5	13.5	0	Negligible
Receptor 4	22.9	23.0	0	Negligible	14.8	14.8	0	Negligible
Receptor 5	18.2	18.3	00	Negligible	12.1	12.2	0	Negligible
Receptor 6	17.9	18.0	0	Negligible	12.0	12.0	0	Negligible
Criterion	32 [b]		-	-	25 [c]		-	-

a % changes are relative to the criterion and have been rounded to the nearest whole number.

b While the annual mean PM_{10} objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG16 (Defra, 2018b). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

Nitrogen Dioxide

6.3 the annual mean nitrogen dioxide concentrations are below the objective at all receptors, apart from Receptor 4. At Receptor 4, the annual mean nitrogen dioxide concentration is above the objective in 2024 without and with the Proposed Development, and therefore the Proposed Development is not causing the exceedance.

6.4 The percentage changes in concentrations, relative to the air quality objective (when rounded), are predicted to be 1% at Receptor 5 and 0% at all other receptors. Using the matrix in Table A3.1 (Appendix A3), these impacts are described as *negligible*.

6.5 The annual mean nitrogen dioxide concentrations are below 60 µg/m³ at every receptor; it is, therefore, unlikely that the 1-hour mean nitrogen dioxide objective will be exceeded (see Paragraph 2.32).

6.6 The changes to the LEZ and ULEZ described in Paragraphs A8.4 and A8.5, which the Mayor of London has confirmed are to be implemented, will result in significant reductions in NOx emissions across London. It has not, however, been possible to account for these in this assessment.

Consequently, the results for nitrogen dioxide presented in Table 12 are likely to represent a significant over-prediction both in terms of total concentrations and impact magnitude (see Paragraph 3.20 and Appendix A8).

PM_{10} and $PM_{2.5}$

6.7 The annual mean PM_{10} and $PM_{2.5}$ concentrations are below the relevant criteria at all receptors, with or without the Proposed Development. Furthermore, the annual mean PM_{10} concentrations are below 32 µg/m^3 at all receptors and it is, therefore, unlikely that the 24-hour mean PM_{10} objective will be exceeded at any of the receptors.

6.8 The percentage changes in both PM_{10} and $PM_{2.5}$ concentrations, relative to the applied annual mean criteria (when rounded), are predicted to be zero at all of the receptors. Using the matrix in Table A3.1 (Appendix A3), these impacts are described as *negligible.*

Significance of Operational Air Quality Effects

6.9 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; pollutant concentrations at all of the selected worst-case existing receptors (apart from Receptor 4) along the local road network will be well below the air quality objectives, and impacts at all receptors are predicted to be negligible.

7 'Air Quality Neutral'

7.1 The purpose of the London Plan's requirement that development proposals be 'air quality neutral' is to prevent the gradual deterioration of air quality throughout Greater London. The 'air quality neutrality' of a development, as assessed for the Proposed Development in this section, does not directly indicate the potential of the development to have significant impacts on human health (this has been assessed separately in the previous section).

Building Emissions

7.2 The Proposed Development will include air source heat pumps (ASHP), which have zero onsite emissions, and small-scale low NOx individual boilers for heating, cooling and hot water, which will only have small emissions associated them.

7.3 The Proposed Development will also include a diesel backup generator for emergency use only. At this stage the details of the emissions associated with the diesel backup generator are unavailable. It is considered that with the granting of any planning permission, the London Borough of Lambeth will provide a suitably worded planning condition requesting that further details on the impact of the diesel backup generator on local air quality are provided to the Council prior to the operation of the Proposed Development, as well as an updated Air Quality Neutral assessment. As such the impact to air quality of the backup generator has not been considered further in this assessment.

7.4 Appendix A6 shows the Building Emissions Benchmarks (BEBs) for each land use category. Table 14 shows the calculation of the BEBs for the Proposed Development.

Table 14: Calculation of Building Emissions Benchmark for the Development

Description		Value	Reference
A	Gross Internal Floor Area of A1 Retail Units (m^2)	1,186.5	DP9
B	NOx BEB for A1 Retail Units ($g/m^2/annum$)	22.6	Table A7.1
C	Gross Internal Floor Area of A3 Retail Units (m^2)	1,186.5	DP9
D	NOx BEB for A3 Retail Units ($g/m^2/annum$)	22.6	Table A7.1
E	Gross Internal Floor Area of B1 Offices (m^2)	25,980	DP9
F	NOx BEB for B1 Offices ($g/m^2/annum$)	30.8	Table A7.1
G	Gross Internal Floor Area of D1(c-h) (m^2)[a]	647	DP9
H	NOx BEB for D1(c-h) ($g/m^2/annum$)	31	Table A7.1
Total BEB NOx Emissions (kg/annum)		936.3	(A x B + C x D + E x F + G x H) / 1000

[a] Specific D1/D2 floor split is currently unknown, therefore the most stringent D use class benchmark has been used, to provide a conservative Air Quality Neutral assessment.

7.5 As emissions of NOx from the ASHPS are zero and the emissions from the small-scale individual boilers will be small, as such the Proposed Development is judged to be better than air quality neutral in terms of building emissions.

Road Transport Emissions

7.6 The Transport Emissions Benchmarks (TEBs) are based on the number of car trips generated by different land-use classes of the Proposed Development, together with the associated trip lengths and vehicle emission rates.

7.7 Caneparo Associates has advised that the Proposed Development is expected to generate a total of 41,632 car trips: 14,600 car trips per year from the A1/A3 retail units and a further 27,032 car trips per year from the B1 offices. The proposed D1/D2 uses are not expected to generate any transport trips and therefore have not been considered further in this air quality neutral assessments.

7.8 Appendix A6 provides default values for the average trip length for A1/A3 in retail units and B1 offices in Inner 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 Proposed Development (Table 15). These have then been compared with the TEBs for the Proposed Development set out in Table 16.

Table 15: Calculation of Transport Emissions for the Proposed Development [a]

	Description	Value		Reference
Retail (A1/A3)				
A	Total Car Trips per Year [b]	14,600		Caneparo Associates
B	Average Distance per Trip (km)	5.9		Table A7.3
		NOx	PM_{10}	-
C	Emissions per Vehicle-km (g)	0.370	0.0665	Table A7.4
D	Residential Transport Emissions (kg/annum)	31.9	5.7	A x B x C / 1,000
Office (B1)				
E	Total Car Trips per Year [b]	27,032		Caneparo Associates
F	Average Distance per Trip (km)	7.7		Table A7.3
		NOx	PM_{10}	-
G	Emissions per Vehicle-km (g)	0.370	0.0665	Table A7.4
H	Office Transport Emissions (kg/annum)	77.0	13.8	E x F x G / 1,000
Entire Proposed Development				
Total Transport Emission (kg/annum)		108.9	19.6	D + H

[a] The approach taken by Caneparo Associates to calculate expected Car Trips per Year from the development assumes no material primary trips for users, for D1/D2 use classes.

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

Table 16: Calculation of Transport Emissions Benchmarks for the Proposed Development [a]

Description		Value		Reference
Retail (A1/A3)				
A	Gross Internal Floor Area of Offices (m^2)	2,370		DP9
		NOx	PM_{10}	-
B	Benchmark Emissions (g/m^2/annum)	219	39.3	Table A7.2
C	Retail TEBs (kg/annum)	519.7	93.3	A x B / 1000
Office (B1)				
D	Gross Internal Floor Area of Offices (m^2)	25,980		DP9
		NOx	PM_{10}	
E	Benchmark Emissions (g/m^2/annum)	11.4	2.05	Table A7.2
F	Office TEBs (kg/annum)	296.2	53.3	D x E / 1000
Entire Proposed Development				
Total TEBs (kg/annum)		815.9	146.5	C + F

[a] The approach taken by Caneparo Associates to calculate expected Car Trips per Year from the development assumes no material primary trips for users, particularly by vehicle, for D1/D2 use classes. Thus, D1/D2 has not been included in TEBs calculations.

7.9 The Total 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.

8 Mitigation

Mitigation Included by Design

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

- adoption of a Dust Management Plan (DMP) or Construction Environmental Management Plan (CEMP) to minimise the environmental impacts of the construction works;
- provision of a detailed travel plan setting out measures to encourage sustainable means of transport (public, cycling and walking); and
- provision of pedestrian and cycle access to the Proposed Development, including cycle parking.

Recommended Mitigation

Construction Impacts

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

8.3 The Site has been identified as a *Medium* Risk site during demolition, earthworks, construction, and trackout, as set out in Table 11. 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 and are consistent with the Blue Sky Building (BSB) Construction Management Plan (dated March 2020) submitted as part of the planning application.

8.4 The mitigation measures should be written into a DMP. 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 London Borough of Lambeth should advise as to the appropriate air quality monitoring procedure and timescale on a case-by-case basis.

8.5 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

8.6 The assessment has demonstrated that the Proposed Development will not cause any new 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 Proposed Development.

8.7 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.

9 Conclusions

9.1 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. With these measures in place, it is expected that any residual effects will be 'not significant'.

9.2 The impact of emissions from construction vehicles on the local road network have been shown to have a negligible impact on local air quality.

9.3 The additional traffic generated by the Proposed Development will affect air quality at existing properties along the local road network. The assessment has demonstrated for annual mean nitrogen dioxide, the percentage increases are predicted to range from 0% to 1%, and the impacts will all be *negligible*. The increases in annual mean concentrations of PM_{10} and $PM_{2.5}$ at relevant locations, relative to the objectives, will be 0% (when rounded) and the impacts will all be *negligible*.

9.4 The changes to the LEZ and ULEZ described in Paragraphs A1.5 and A1.7, which the Mayor of London has confirmed are to be implemented, will result in significant reductions in NOx emissions across London. It has not, however, been possible to account for these in this assessment. Consequently, the results for nitrogen dioxide set out in this assessment are likely to represent a significant over-prediction both in terms of total concentrations and impact magnitude (see Paragraph 3.20 and Appendix A8).

9.5 The building and transport related emissions associated with the Proposed Development are both below the relevant benchmarks. The Proposed Development therefore complies with the requirement that all new developments in London should be at least air quality neutral.

9.6 The overall operational air quality effects of the Development are judged to be 'not significant'. This conclusion is based on the impacts at existing receptors all being *negligible*.

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11 Glossary

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

kph	Kilometres Per hour
kW	Kilowatt
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LDV	Light Duty Vehicles (<3.5 tonnes)
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
$\mu g/m^3$	Microgrammes per cubic metre
MCPD	Medium Combustion Plant Directive
MW_{th}	Megawatts Thermal
NO	Nitric oxide
NO_2	Nitrogen dioxide
NOx	Nitrogen oxides (taken to be NO_2 + NO)
NPPF	National Planning Policy Framework
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
OLEV	Office for Low Emission Vehicles
PHV	Private Hire Vehicle
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
$PM_{2.5}$	Small airborne particles less than 2.5 micrometres in aerodynamic diameter
PPG	Planning Practice Guidance
RDE	Real Driving Emissions
SCR	Selective Catalytic Reduction
SPG	Supplementary Planning Guidance
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
TfL	Transport for London
TRAVL	Trip Rate Assessment Valid for London
ULEZ	Ultra Low Emission Zone
WHO	World Health Organisation
ZEC	Zero Emission Capable

12 Appendices

A1 London-Specific Policies and Measures

London Plan

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

"Development proposals should:

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

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

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

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

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

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. 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 m³, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level
Medium	Total building volume 20,000 m³ – 50,000 m³, potentially dusty construction material, demolition activities 10-20 m above ground level
Small	Total building volume <20,000 m³, 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 m², 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 m² – 10,000 m², 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 m², 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 m³, piling, on site concrete batching; sandblasting
Medium	Total building volume 25,000 m³ – 100,000 m³, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	Total building volume <25,000 m³, 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.

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 A2.6 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

A2.9 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 A2.7 as a method of assigning the level of risk for each activity.

STEP 3: Determine Site-specific Mitigation Requirements

A2.10 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 A8.

STEP 4: Determine Significant Effects

A2.11 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'.

A2.12 The IAQM guidance recognises that, even with a rigorous dust management plan in place, it is not possible to guarantee that the dust mitigation measures will be effective all of the time, for instance under adverse weather conditions. The local community may therefore experience occasional, short-term dust annoyance. The scale of this would not normally be considered sufficient to change the conclusion that the effects will be 'not significant'.

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

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

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

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

3 For demolition, earthworks and construction, distances are taken either from the dust source or from the boundary of the site. For trackout, distances are measured from the sides of roads used by construction traffic. Without mitigation, trackout may occur from roads up to 500 m from sites with a *large* dust emission magnitude 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 [3]

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

Table A2.5: Table A2.6: Sensitivity of the Area to Ecological Effects [3]

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

Table A2.7: 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.

Impact Descriptors and 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.

Impact Descriptors

A3.16 Impact description involves expressing the magnitude of incremental change as a proportion of a relevant assessment level and then examining this change in the context of the new total concentration and its relationship with the assessment criterion. Table A3.1 sets out the method for determining the impact descriptor for annual mean concentrations at individual receptors, having been adapted from the table presented in the guidance document. For the assessment criterion the term Air Quality Assessment Level or AQAL has been adopted, as it covers all pollutants, i.e. those with and without formal standards. Typically, as is the case for this assessment, the AQAL will be the air quality objective value. Note that impacts may be adverse or beneficial, depending on whether the change in concentration is positive or negative.

Table A3.1: Air Quality Impact Descriptors for Individual Receptors for All Pollutants [a]

Long-Term Average Concentration At Receptor In Assessment Year [b]	Change in concentration relative to AQAL [c]				
	0%	1%	2-5%	6-10%	>10%
75% or less of AQAL	Negligible	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Negligible	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Negligible	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Negligible	Moderate	Substantial	Substantial	Substantial

[a] Values are rounded to the nearest whole number.

[b] This is the "Without Scheme" concentration where there is a decrease in pollutant concentration and the "With Scheme" concentration where there is an increase.

[c] AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

Assessment of Significance

A3.17 There is no official guidance in the UK in relation to development control on how to assess the significance of air quality impacts. The approach within the EPUK/IAQM guidance has, therefore, been used in this assessment. The guidance is that the assessment of significance should be based on professional judgement, with the overall air quality impact of the development described as either 'significant' or 'not significant'. In drawing this conclusion, the following factors should be taken into account:

- the existing and future air quality in the absence of the development;
- the extent of current and future population exposure to the impacts;
- the influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- the potential for cumulative impacts. In such circumstances, several impacts that are described as '*slight*' individually could, taken together, be regarded as having a significant effect for the purposes of air quality management in an area, especially where it is proving difficult to reduce concentrations of a pollutant. Conversely, a '*moderate*' or '*substantial*'

impact may not have a significant effect if it is confined to a very small area and where it is not obviously the cause of harm to human health; and

- the judgement on significance relates to the consequences of the impacts; will they have an effect on human health that could be considered as significant? In the majority of cases, the impacts from an individual development will be insufficiently large to result in measurable changes in health outcomes that could be regarded as significant by health care professionals.

A3.18 The guidance is clear that other factors may be relevant in individual cases. It also states that the effect on the residents of any new development where the air quality is such that an air quality objective is not met will be judged as significant.

A3.19 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 A3.1.

A4 Professional Experience

Dr Denise Evans, BSc (Hons) PhD MIEnvSc MIAQM

Dr Evans is an Associate Director with AQC, with more than 20 years' relevant experience. She has prepared air quality review and assessment reports for local authorities, and has appraised local authority air quality assessments on behalf of the UK governments, and provided support to the Review and Assessment helpdesk. She has extensive modelling experience, completing air quality and odour assessments to support applications for a variety of development sectors including residential, mixed use, urban regeneration, energy, commercial, industrial, and road schemes, assessing the effects of a range of pollutants against relevant standards for human and ecological receptors. Denise also has experience of completing assessments for the purposes of Permit applications. She has acted as an Expert Witness and is a Member of the Institute of Air Quality Management.

Guido Pellizzaro BSc (Hons) MIAQM MIEnvSc PIEMA

Guido Pellizzaro is an Associate Director with AQC, with more than 14 years' experience in the field of air quality management and assessments. His main experience relates to managing and delivering air quality assessments for major planning applications and EIA development. Guido is a Member of the Institute of Environmental Sciences (MIEnvSci), Member of the Institute of Air Quality Management (MIAQM) and Practitioner of the Institute of Environmental Management and Assessment.

David Bailey, BSc (Hons)

Mr Bailey is an Assistant Consultant with AQC, having joined the Company in 2018. Prior to joining AQC he gained a degree in Environmental Science from the University of Brighton, where his studies included modules focused on Air Quality Management. He is now gaining experience in air quality and greenhouse gas assessments, with the use of the ADMS-Roads and ADMS-5 dispersion modelling software. In addition, he has also gained experience in diffusion tube and automatic monitoring, including data ratification.

Lauren Armstrong, BSc (Hons) MSc

Mrs Armstrong is an Assistant Consultant with AQC, having joined the company in February 2020. Prior to joining AQC she completed an MSc degree in Climate Change: Environment, Science and Policy at King's College London where her studies explored the physical and social aspects of a changing climate and environment, research methods and environmental monitoring. She is now gaining experience in the field of air quality monitoring and assessment.

A5 Modelling Methodology

Model Inputs

A5.1 Predictions have been carried out using the ADMS-Roads dispersion model (v4.1). The model requires the user to provide various input data, including emissions from each section of road and the road characteristics (including road width, street canyon width, street canyon height and porosity, where applicable). Vehicle emissions have been calculated based on vehicle flow, composition and speed data using the EFT (Version 9.0) published by Defra (2020).

A5.2 Hourly sequential meteorological data from London City Airport for 2018 have been used in the model. The London City Airport meteorological monitoring station is located approximately 12 km to the north east of the Site. It is deemed to be the nearest monitoring station representative of meteorological conditions in the vicinity of the Site; both the Site and the London City Airport meteorological monitoring station are located in London where they will be influenced by the effects of inland meteorology over urban topography.

A5.3 All roads in the study area have a number of canyon-like features, which reduce dispersion of traffic emissions, and can lead to concentrations of pollutants being higher here than they would be in areas with greater dispersion. For the purposes of modelling, it has therefore been assumed that the front façade of all buildings within the study area form street canyons, and have been modelled as a street canyons using ADMS-Roads' advanced canyon module, with appropriate input parameters determined from plans, local mapping and photographs. The advanced canyon module has been used along with the urban canopy flow module, the input data for which have been published by Cambridge Environmental Research Consultants (CERC, 2016), who developed the ADMS models. Figure A6.1 shows the modelled canyons.

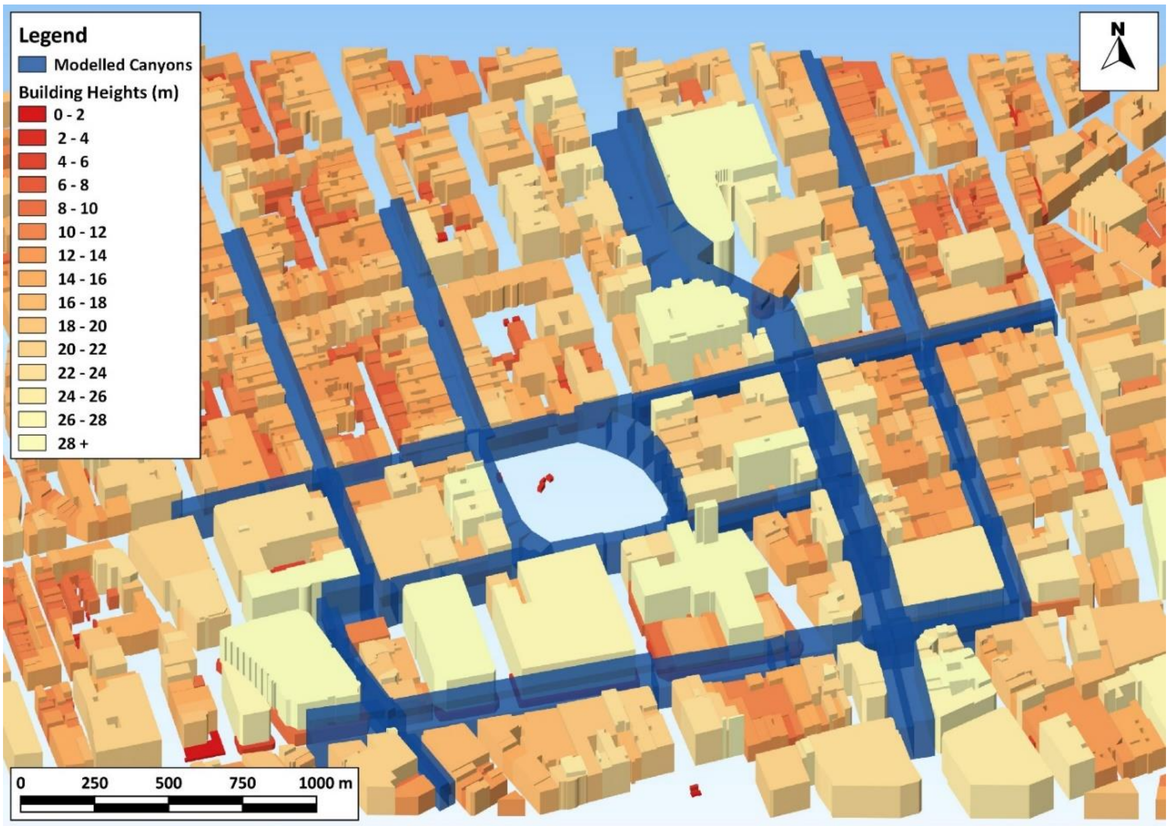

Figure A5.1: Modelled Canyons

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A5.4 AADT flows, diurnal flow profiles, speeds, and vehicle fleet composition data have been provided by Caneparo Associates, who have undertaken the transport assessment work for the Proposed Development. Traffic data for Gresham Road, Coldharbour Lane, and Stockwell Park Walk have been taken from the London Atmospheric Emissions Inventory (LAEI) (GLA, 2019). The 2016 LAEI flows have been factored forwards to the assessment year of 2024 using growth factors derived using the TEMPro System v7.2 (DfT, 2017). Traffic speeds have been estimated based on professional judgement, taking account of the road layout, speed limits and the proximity to a junction. The traffic data used in this assessment are summarised in Table A5.1. Diurnal and monthly flow profiles for the traffic have been derived from the national profiles published by DfT (2019).

Table A5.1: Summary of Traffic Data used in the Assessment (AADT Flows) [a]

Road Link	2018		2020 (Without Scheme)		2020 (With Scheme)		2024 (Without Scheme)		2024 (With Scheme)	
	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
Brixton Station Road	1,387	7.0	1,428	7.0	1,444	8.0	1,517	7.0	1,557	7.0
B223 Atlantic Road	6,353	8.6	6,541	8.6	6,578	9.1	6,949	8.6	7,065	8.6
Pope's Road	610	1.6	628	1.6	644	4.0	667	1.6	707	1.9
Valentia Place	1,809	9.2	1,863	9.2	1,916	11.7	1,979	9.2	2,167	8.9
A23 Brixton Road	28,906	15.4	29,762	15.4	29,804	15.5	31,618	15.4	31,754	15.4
A203 Stockwell Road	13,185	11.1	13,575	11.1	13,591	11.2	14,422	11.1	14,467	11.1
Coldharbour Lane (East of Atlantic Road)	13,406	6.4	13,802	6.4	13,802	6.4	14,595	6.4	14595	6.4
Coldharbour Lane (West of Atlantic Road)	13,555	7.4	13,956	7.4	13,956	7.4	14,757	7.4	14,757	7.4
Gresham Street	3,898	28.3	4,013	28.3	4,013	28.3	4,244	28.3	4,244	28.3
Stockwell Park Walk	8,270	13.2	8,515	13.2	8,515	13.2	9,004	13.2	9,004	13.2

A5.5 Figure A5.2 shows the road network included within the model, along with the speed at which each link was modelled, and defines the study area.

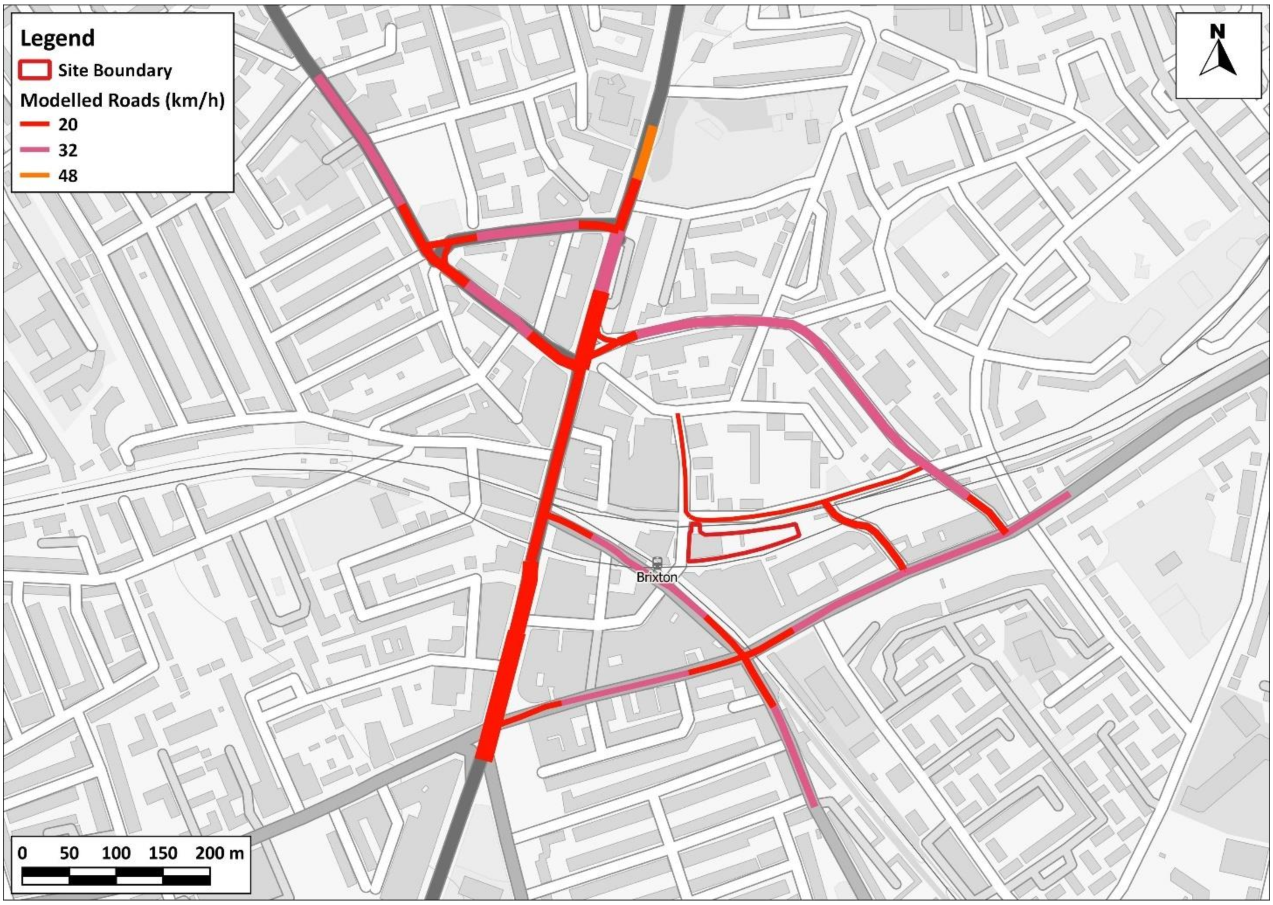

Figure A5.2: Modelled Road Network & Speed

Background Concentrations

A5.6 The background pollutant concentrations across the study area have been defined using the 2017-based national pollution maps published by Defra (2019c). These cover the whole of the UK on a 1x1 km grid and are published for each year from 2017 until 2030. The background annual mean nitrogen oxides and nitrogen dioxide maps for 2018 have been calibrated against concurrent measurements from national monitoring sites (AQC, 2019). The calibration factor calculated has also been applied to future year backgrounds. This has resulted in slightly higher predicted nitrogen oxides and nitrogen dioxide concentrations for the future assessment year than those derived from the Defra maps.

Model Verification

A5.7 In order to ensure that ADMS-Roads accurately predicts local concentrations, it is necessary to verify the model against local measurements.

Nitrogen Dioxide

A5.8 Most nitrogen dioxide (NO_2) is produced in the atmosphere by reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions of nitrogen oxides (NOx = NO + NO_2). The model has been run to predict the annual mean NOx concentrations during 2018 at the Brixton Road automatic monitoring site, and DT18 diffusion tube monitoring sites. Concentrations have been modelled at 2.0 m and 2.2 m the height of the monitors respectively.

A5.9 The model output of road-NOx (i.e. the component of total NOx coming from road traffic) has been compared with the 'measured' road-NOx. Measured road-NOx has been calculated from the measured NO_2 concentrations and the predicted background NO_2 concentration using the NOx from NO_2 calculator (Version 7.1) available on the Defra LAQM Support website (Defra, 2020).

A5.10 The unadjusted model has under predicted the road-NOx contribution; this is a common experience with this and most other road traffic emissions dispersion models. An adjustment factor has been determined as the slope of the best-fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure A5.3). The calculated adjustment factor of 2.51 has been applied to the modelled road-NOx concentration for each receptor to provide adjusted modelled road-NOx concentrations.

A5.11 The total nitrogen dioxide concentrations have then been determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx to NO_2 calculator. Figure A5.4 compares final adjusted modelled total NO_2 at each of the monitoring sites to measured total NO_2, and shows a close agreement.

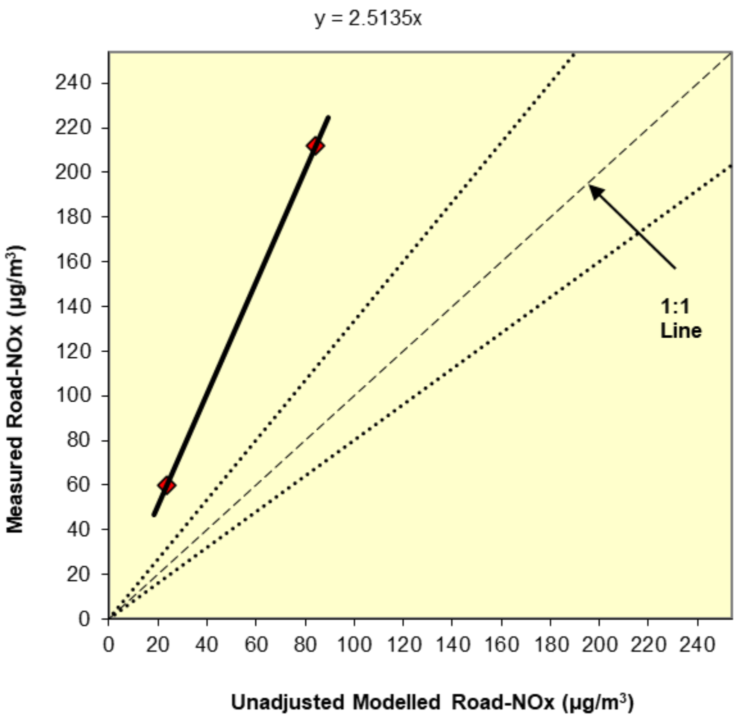

Figure A5.3: Comparison of Measured Road NOx to Unadjusted Modelled Road NOx Concentrations. The dashed lines show ± 25%.

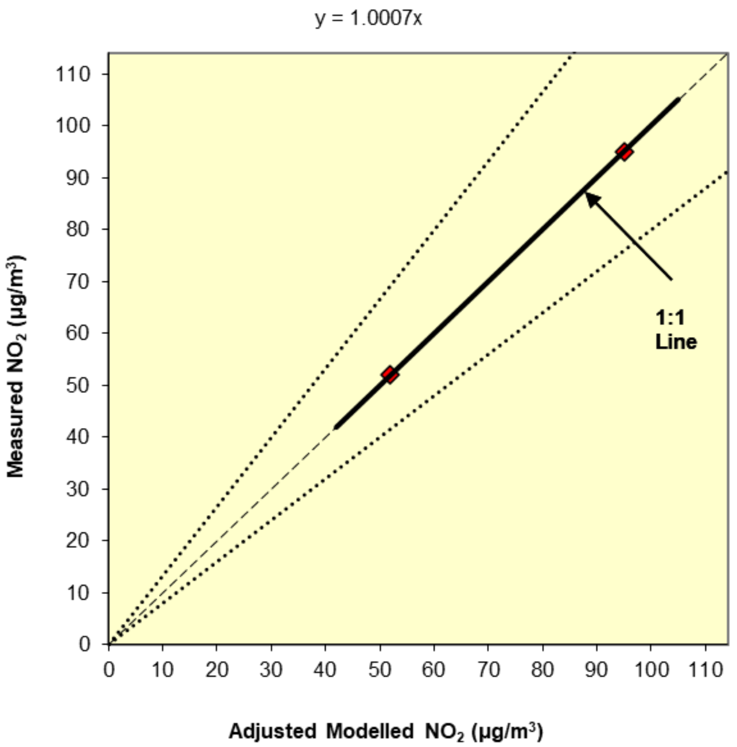

Figure A5.4: Comparison of Measured Total NO_2 to Final Adjusted Modelled Total NO_2 Concentrations. The dashed lines show ± 25%.

PM_{10} and $PM_{2.5}$

A5.12 The model has also been run to predict annual mean road-PM concentrations during 2018. In order to calculate a verification factor for PM a similar process to calculating the road-NOx adjustment factor has been followed.

A5.13 The measured road-PM_{10} and modelled road-PM_{10} concentrations are compared to provide the factor for PM_{10}. The data used to calculate the adjustment factor are provided below:

- Measured PM_{10}: 30.0 μg/m^3
- Background PM_{10}: 18.4 μg/m^3
- 'Measured' road-PM_{10} (measured – background): 30.0 –18.4 = 11.6 μg/m^3
- Modelled road-PM_{10} = 4.75 μg/m^3
- Road-PM_{10} adjustment factor: 11.6/4.75 = **2.44**

A5.14 There are no nearby $PM_{2.5}$ monitors. It has therefore not been possible to verify the model for $PM_{2.5}$. The model outputs of road-$PM_{2.5}$ have therefore been adjusted by applying the adjustment factor calculated for road PM_{10}.

Model Post-processing

A5.15 The model predicts road-NOx concentrations at each receptor location. These concentrations have been adjusted using the adjustment factor set out above, which, along with the background NO2, has been processed through the NOx to NO_2 calculator available on the Defra LAQM Support website (Defra, 2020). The traffic mix within the calculator has been set to "All London traffic", which is considered suitable for the study area. The calculator predicts the component of NO2 based on the adjusted road-NOx and the background NO_2.

A6 Construction Traffic Modelling Results

A6.1 The full set of modelling results for the impacts from construction traffic are shown in Table A6.1 and Table A6.2.

Table A6.1: Predicted Impacts on Annual Mean Nitrogen Dioxide Concentrations in 2020 (µg/m³) [a]

Receptor	Without Scheme	With Scheme	% Change [b]	Impact Descriptor
Receptor 1	32.1	32.1	0	Negligible
Receptor 2	38.1	38.3	0	Negligible
Receptor 3	**41.9**	**42.0**	0	Negligible
Receptor 4	**52.0**	**52.1**	0	Negligible
Receptor 5	30.1	30.3	1	Negligible
Receptor 6	28.5	28.7	1	Negligible
Objective	**40**		**-**	**-**

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

[b] % changes are relative to the objective and have been rounded to the nearest whole number.

Table A6.2: Predicted Impacts on Annual Mean PM_{10} and $PM_{2.5}$ Concentrations in 2020 (µg/m³)

Receptor	Annual Mean PM_{10} (µg/m³)				Annual Mean $PM_{2.5}$ (µg/m³)			
	Without Scheme	With Scheme	% Change [a]	Impact Descriptor	Without Scheme	With Scheme	% Change [a]	Impact Descriptor
Receptor 1	19.5	19.5	0	Negligible	13.0	13.0	0	Negligible
Receptor 2	20.4	20.5	0	Negligible	13.6	13.6	0	Negligible
Receptor 3	21.3	21.3	0	Negligible	14.1	14.1	0	Negligible
Receptor 4	23.6	23.6	0	Negligible	15.4	15.4	0	Negligible
Receptor 5	18.9	18.9	0	Negligible	12.7	12.7	0	Negligible
Receptor 6	18.6	18.6	0	Negligible	12.5	12.6	0	Negligible
Criterion	**32 [b]**		**-**	**-**	**25 [c]**		**-**	**-**

[a] % changes are relative to the criterion and have been rounded to the nearest whole number.

[b] While the annual mean PM_{10} objective is 40 µg/m³, 32 µg/m³ is the annual mean concentration above which an exceedance of the 24-hour mean PM_{10} objective is possible, as outlined in LAQM.TG16 (Defra, 2018b). A value of 32 µg/m³ is thus used as a proxy to determine the likelihood of exceedance of the 24-

hour mean PM_{10} objective, as recommended in EPUK & IAQM guidance (Moorcroft and Barrowcliffe et al, 2017).

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

A6.2 The modelled road network is the same as for the operational assessment, as shown in Figure A5.2.

A7 'Air Quality Neutral'

A7.1 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.

A7.2 The benchmarks for heating and energy plant (termed 'Building Emissions Benchmarks' or 'BEBs') are set out in Table A7.1, while the 'Transport Emissions Benchmarks' ('TEBs') are set out in Table A7.2. 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 A7.3 and Table A7.4 (upon which the TEBs are based) is used. Similarly, the information in Table A7.5 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 A7.6 alone may be used to consider the air quality neutrality of a development. These have been derived from the Trip Rate Assessment Valid for London (TRAVL) database.

Table A7.1: Building Emissions Benchmarks (g/m² 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 A7.2: 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, 2019).

Table A7.3: 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 A7.4: Average Road Traffic Emission Factors in London in 2010

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

Table A7.5: Average Emissions from Heating and Cooling Plant in Buildings in London in 2010

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

Table A7.6: 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

A8 London Vehicle Fleet Projections

A8.1 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.

A8.2 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.

A8.3 The changes are not projected to have a significant effect on PM_{10} and $PM_{2.5}$ concentrations, although a small reduction is predicted.

A8.4 AQC's report on the performance of Defra's EFT (AQC, 2020) 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. 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.

A8.5 As outlined in Paragraph 3.20, 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 A8.1 and A8.2 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.

A9 Construction Mitigation

A9.1 The following is a set of best-practice measures from the GLA guidance (GLA, 2014b) that should be incorporated into the specification for the works. These measures are included in the Blue Sky Building Construction Management Plan (March 2020) and should be written into a Dust Management Plan. Some of the measures may only be necessary during specific phases of work, or during activities with a high potential to produce dust, and the list should be refined and expanded upon in liaison with the construction contractor when producing the Dust Management Plan.

Site Management

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

Preparing and Maintaining the Site

- Plan the site layout so that machinery and dust-causing activities are located away from receptors, as far as is possible;
- erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;

- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods;
- 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; and
- 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 the standards set within the GLA's Control of Dust and Emissions During Construction and Demolition SPG. This outlines that, from 1 September 2015, all NRMM of net power 37 kW to 560 kW used on the site of a major development in Greater London must meet Stage IIIA of EU Directive 97/68/EC (The European Parliament and the Council of the European Union, 1997) and its subsequent amendments as a minimum. From 1 September 2020 NRMM used on any site within Greater London will be required to meet Stage IIIB of the Directive as a minimum
- 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;
- produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials; and
- implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems;

- ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using recycled water where possible and appropriate;
- use enclosed chutes, conveyors and covered skips;
- minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste Management

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

Measures Specific to Demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust);
- ensure water suppression is used during demolition operations;
- avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Earthworks

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

Measures Specific to Construction

- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and

- for smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

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;
- access gates should be located at least 10 m from receptors, where possible; and
- apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site.