# AIR QUALITY ASSESSMENT

Ossory Road

Produced by XCO2 for Pocket Living

September 2021

**XCO2**
56 Kingsway Place, Sans Walk
London EC1R 0LU

+44 (0)20 7700 1000
mail@xco2.com
xco2.com

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|---|---|---|---|---|---|---|
| Remarks | Draft | For planning | | | | |
| Prepared by | SD | SD | | | | |
| Checked by | SG | SG | | | | |
| Authorised by | RM | RM | | | | |
| Date | 24/08/2021 | 02/09/2021 | | | | |
| Project reference | 9.257 | 9.257 | | | | |

# EXECUTIVE SUMMARY

An assessment has been undertaken to quantify the potential impacts on local air quality associated with the construction and operation of the proposed development at Ossory Road. Based on the results of the assessment, it is considered that redevelopment of the site would not cause a significant impact on local air quality.

An assessment of potential air quality impacts arising from the construction and operation of the proposed development in the London Borough of Southwark has been undertaken.

During the construction phase, the site has the potential to generate dust nuisance beyond the application boundary. However, through the implementation of a Dust Management Plan, the impacts will be effectively minimised and are unlikely to be significant.

Emissions from operational traffic associated with the proposed development is not anticipated to significantly affect local air quality, however dispersion modelling of emissions from traffic on the local road network has been undertaken to ascertain the likely level of exposure of future users of the proposed development to elevated nitrogen dioxide and particulate concentrations. The assessment indicates that $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations will be well within the relevant long and short-term air quality standards and therefore site is suitable for residential development, as proposed.

The proposed development will be connected to a district-heating network (DHN) planned for the area within the next five years. In in the interim, heat and hot water will be provided by communal low-NOx gas boilers.

The proposed development is air quality neutral with respect to building and transport-related emissions.

# INTRODUCTION

This report presents an assessment of the potential impact on local air quality of the construction and operation of a proposed development at Ossory Road in the London Borough of Southwark (LBS). The site location is presented in Figure 1.

The proposal comprises the demolition of existing building and erection of 11-storey building providing 117 residential dwellings (class C3) and light industrial space (class E) at ground floor with associated communal amenity spaces, servicing yard and access works.

The site falls within the LBS Air Quality Management Area (AQMA) which was declared in 2003 due to measured and modelled exceedances of the air quality objectives for nitrogen dioxide ($NO_2$) and particulate matter (as $PM_{10}$). The primary source of emissions of these pollutants in the Borough is road traffic.

The proposed development has potential to introduce the following air quality impacts:

- Suspended and re suspended fugitive dust emissions from demolition / construction activities; and
- Emissions from construction traffic, including re-suspended dust from HGV movements. and

An assessment has been undertaken to determine the potential impact on local air quality during both the construction and operational phases of the development, with recommendations made for mitigation where appropriate.

The proposed development will be car-free and operational traffic is therefore unlikely to affect local air quality, however detailed dispersion modelling of traffic on the local road network has been undertaken to assess the suitability of the site for commercial and residential development with regards to the exposure of future occupants to elevated pollutant concentrations.


Figure 1: Site Location

# POLICY CONTEXT

An overview of the relevant policy drivers for the assessment is provided in the following section.

## NATIONAL LEGISLATION

### *THE AIR QUALITY STRATEGY FOR ENGLAND, SCOTLAND, WALES AND NORTHERN IRELAND*

The Air Quality Strategy for England, Wales and Northern Ireland[1] was published in 2007 and sets out policy targets (objectives) for sulphur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), benzene ($C_6H_6$), carbon monoxide (CO), lead (Pb), particulate matter ($PM_{10}$, $PM_{2.5}$), 1,3-butadiene ($C_4H_6$) and polyaromatic hydrocarbons (PAH). The Standards are concentrations measured over a specified time period that are considered acceptable in terms of the effect on health and the environment. The Objectives are the target date on which exceedance of a Standard must not exceed a specified number.

In the context of the proposed development, the primary pollutants of concern are nitrogen dioxide ($NO_2$) and particulate matter ($PM_{10}$ and $PM_{2.5}$). The Air Quality Standards and Objectives for these pollutants, that are applicable in England, are presented in Table 1.

Table 1: National Air Quality Standards and Objectives

| Pollutant | Averaging Period | Standard | Objective |
|---|---|---|---|
| $NO_2$ | 1-hour | 200 µg/m$^3$, not to be exceeded more than 18 times per calendar year (a) | 31 December 2005 |
| | Annual | 40 µg/m$^3$ | |
| $PM_{10}$ | 24-hour | 50 µg/m$^3$, not to be exceeded more than 35 times per calendar year (b) | 31 December 2004 |
| | Annual | 40 µg/m$^3$ | |
| $PM_{2.5}$ | Annual | 25 µg/m$^3$ (c) | 2020 |

(a) Equivalent to the 99.8$^{th}$ percentile of 1-hour means.
(b) Equivalent to the 90.4$^{th}$ percentile of 24-hour means.
(c) National exposure reduction target

In January 2019, the UK government published a Clean Air Strategy[2], which outlines measures to reduce emissions from a wide range of sources including transport, farming and industry. The Strategy proposes new local powers to implement Clean Air Zones in problem areas, backed up by clear enforcement mechanisms. Whilst the UK has already adopted legally binding international targets to reduce emissions of key pollutants such as nitrogen oxides and particulate matter (as $PM_{10}$), the Strategy aims to reduce fine particulate emissions ($PM_{2.5}$) to ensure that public

[1] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, July 2007.
[2] Clean Air Strategy 2019, Defra, January 2019

exposure to concentrations above the more stringent WHO annual mean guideline value of 10 µg/m$^3$ is halved by 2025.

### *LOCAL AIR QUALITY MANAGEMENT*

The framework for Local Air Quality Management (LAQM) in the UK was introduced by the Environment Act 1995[3]. Local Authorities are required to regularly review and assess air quality to establish whether there are any locations where pollutant concentrations exceed the relevant air quality objectives or EU limit values. Where an exceedance is identified, the local authority is obliged to declare an Air Quality Management Area (AQMA) and prepare an Action Plan setting out measures to improve air quality and achieve compliance with the objective(s).

### *THE NATIONAL PLANNING POLICY FRAMEWORK*

The National Planning Policy Framework NPPF[4] sets out the Government's policies for planning and how these should be applied. With regard to air quality, the NPPF states that "*planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas'. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan*".

## REGIONAL POLICY

### *THE LONDON PLAN*

Policy SI1 (Improving Air Quality) of the London Plan[5] sets out the Grater London Authority's (GLA) commitment to improving air quality and public health and states:

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

*B. To tackle poor air quality, protect health and meet legal obligations the following criteria should be addressed:*

*1. Development proposals should not:*

*a) lead to further deterioration of existing poor air quality.*
*b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits.*
*c) create unacceptable risk of high levels of exposure to poor air quality.*

[3] Part IV of the Environment Act 1995
[4] Department for Communities and Local Government, National Planning Policy Framework, July 2021
[5] The London Plan 2021, The Spatial Development Strategy for Greater London, Greater London Authority, March 2021.

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

*a) Development proposals must be at least air quality neutral.*
*b) Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures.*
*c) Major development proposals must be submitted with an Air Quality Assessment. Air quality assessments should show how the development will meet the requirements of B1.*
*d) Development proposals in Air Quality Focus Areas or that are likely to be used by large numbers of people particularly vulnerable to poor air quality, such as children or older people, which do not demonstrate that design measures have been used to minimise exposure should be refused.*

*C. Masterplans and development briefs for large-scale development proposals subject to an Environmental Impact Assessment should consider how local air quality can be improved across the area of the proposal as part of an air quality positive approach. To achieve this a statement should be submitted demonstrating:*

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

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

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

The Greater London Authority (GLA) Sustainable Design and Construction supplementary planning guidance (SPG)[6] states that the requirement for a development to be at least 'air quality neutral' applies to major developments:

- 10 or more residential dwellings; or
- >1000m$^2$ of non-residential floorspace; or
- site area > 10,000m$^2$.

To assess whether a development is air quality neutral, annual building and transport-related NOx and $PM_{10}$ emissions are compared with 'air quality neutral' benchmarks provided within the SPG. Where these benchmarks are exceeded, following appropriate mitigation measures, the developer is required to off-set the impacts off-site make a financial contribution (e.g., through a section 106 agreement).

[6] Sustainable Design and Construction Supplementary Planning Guidance, Greater London Authority, April 2014.

## *LONDON ENVIRONMENT STRATEGY (2018)*

Chapter 4 of the London Environment Strategy[7] outlines the Mayor's commitment to improving air quality in London. The strategy aims plan to significantly reduce $NO_2$ and particulate ($PM_{10}$, $PM_{2.5}$ and black carbon) concentrations through a number of key objectives and policies:

*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.

## *GREATER LONDON AUTHORITY AIR QUALITY FOCUS AREAS*

Air Quality Focus Areas have been identified by the Greater London Authority (GLA) where there is high human exposure in locations where the annual mean air quality objective for $NO_2$ is exceeded. The purpose of the Focus Areas is to allow local authorities to target actions to improve air quality where it is most needed and to inform the planning process with regard to the air quality impact of new developments.

[7] London Environment Strategy, The Mayor of London, May 2018

The proposed development lies just outside AQFA 151, A2 Old Kent Road from East Street to Trafalgar Avenue.

## LOCAL POLICY

### *THE LONDON BOROUGH OF SOUTHWARK REVIEW AND ASSESSMENT OF AIR QUALITY*

The LBS carries out frequent review and assessments of air quality within the area and produces Updating and Screening Assessments and Progress Reports in accordance with the requirements of Defra.

Routine monitoring of $NO_2$ and $PM_{10}$ concentrations within the Borough have identified a large number of areas where the annual mean air quality objectives are exceeded. As a consequence, the Council have declared a borough wide AQMA.

The LBS's Air Quality Strategy[21] and Action Plan outlines the Council's commitment to improving air quality in the Borough. The strategic aims of the document are to:

- Manage local air quality;
- Reduce emissions from buildings;
- Increase public awareness;
- Reduce emissions from road traffic;
- Reduce carbon emissions;
- Regulate emissions;
- Support the GLA; and
- Support the Public Health Framework Objectives.

The Strategy draws on European and National legislation in conjunction with national, regional and local policy to manage and improve air quality across the Borough.

### *SAVED SOUTHWARK PLAN AND CORE STRATEGY (2011)*

The Saved Southwark Plan[22] and Core Strategy (2011)[23] are the current local plan documents that set out the planning policy for the Borough. With regard to air quality, policy 3.6 states that "*planning permission will not be granted for development that would lead to a reduction in air quality*".

### *NEW SOUTHWARK PLAN*

The New Southwark Plan[24] was submitted to the Secretary of State for examination in January 2020 and once adopted will replace the Southwark Plan (2007) and . The plan sets out how areas within the Borough will develop and the policies which will guide new developments to 2033. The following policies relate directly to air quality:

[21] Air Quality Strategy and Action Plan, Southwark Council, April 2017
[22] Saved Southwark Plan (2007) policies, April 2013
[23] Southwark Council Core Strategy, April 2011
[24] New Southwark Plan Proposed Submission Version, December 2017

Policy SP6 (Cleaner, greener, safer) – the LBS will "*lead the way in making people feel safe, creating cleaner streets, increasing recycling and reducing landfill waste*" by "*Improving our natural environment through the use of urban greening to reduce flood risk and improve air quality*".

Policy P66 (Improving air quality) – Development must:

- "*Achieve or exceed air quality neutral standards; and*
- *Address the impacts of poor air quality on building occupiers and public realm users by reducing exposure to and mitigating the effects of poor air quality. This must be achieved through design solutions that include:*
  - *i. Orientation and layout of buildings, taking into account vulnerable building occupiers, and public realm and amenity space users; and*
  - *ii. Ventilation systems; and*
  - *iii. Urban greening appropriate for providing air quality benefits proportionate to the scale of the development;*
  - *iv. 'Ultra-low' NOx boilers where the development is not connected to a decentralised energy network; or*
  - *v. Appropriate abatement technologies to bring emissions within the equivalent of 'ultra-low' NOx boiler emissions levels where decentralised energy networks are implemented or utilised.*
- *Where air quality neutral standards are not met for buildings or transport, measures to offset any shortfall will be required, according to the following hierarchy:*
  - *i. On-site measures; then*
  - *ii. Off-site measures; then*
  - iii. *Financial contributions to provide measures*".

# METHODOLOGY

This section outlines the assessment methodology, taking into account all relevant national and local policies and technical guidance relating to air quality.

## CONSTRUCTION DUST

The potential impact of dust generated during site enabling, earthworks and construction works at the proposed development has been undertaken in accordance with the Mayor of London's SPG for the control of dust and emissions during construction and demolition[25], which is closely aligned with the Institute of Air Quality Management (IAQM) construction dust guidance[26] . A full description of the construction dust methodology is provided in Appendix A.

A detailed assessment of dust impacts is required where there are human receptors within:

- 350m of the site boundary; or
- 50m of the route(s) used by construction vehicles on public roads, up to 500m from the site entrance(s).

For ecological impacts, a detailed assessment is required if there are dust sensitive habitat sites within

- 50m of the site boundary; or
- 50m of the route(s) used by construction vehicles on public roads, up to 500m from the site entrance(s).

The IAQM/ SPG methodology allows the potential risk of dust soiling and human health effects to be determined, based primarily on the sensitivity of nearby receptors (human and ecological) and the anticipated magnitude of the dust emission due to:

- Demolition;
- Earthworks;
- Construction; and
- Track-out (re-suspended dust from vehicle movements).

The assessment of dust risk is also based on professional judgement taking into account factors such as the prevailing wind direction, the proposed construction phasing, the likely duration of dust raising activities, local topography and existing air quality.

A range of best practice mitigation measures are provided within the guidance, which are dependent on the level of dust risk attributed to the site. It is recommended that these measures are incorporated into a Dust Management Plan (DMP) for the proposed development, which can be secured by way of a planning condition.

The significance of the residual impacts following appropriate mitigation is determined by professional judgement.

[25] The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, The Mayor of London, July 2014
[26] Guidance on the assessment of dust from demolition and construction, IAQM, v1.1 June 2016

## CONSTRUCTION TRAFFIC

Construction traffic will contribute to existing traffic levels on the surrounding road network. However, the temporary increase in traffic is considered unlikely to be significant in terms of total flow or construction duration.

All non-road mobile machinery (NRMM) will comply with the emission standards specified in the Mayor of London's Control of Dust and Emissions during Construction and Demolition SPG.

The impact of vehicular emissions of $NO_2$ and $PM_{10}$ from construction traffic and on-site machinery on local air quality is considered to be negligible.

## OPERATIONAL TRAFFIC

The Environmental Protection UK (EPUK)/ IAQM planning guidance[27] , states that for developments within or near an AQMA, a detailed assessment of traffic-related impacts is required where:

- There is a change in the annual average daily traffic (AADT) flow of light goods vehicles (LGV) of more than 100 vehicles; and/or
- There is a change in the AADT flow of heavy goods vehicles (HGV) of more than 25 vehicles; and/or
- There is a change in the road re-alignment by more than 5m; and/or
- A new junction is introduced, which will significantly alter vehicle speeds.

In the context of these screening criteria, LGV refers to vehicles of over 3.5 tonnes and HGV refers to vehicles above 3.5 tonnes.

The proposed development will have no allocated parking and it is expected that future residents will not be eligible for parking permits on nearby roads. Taxi trips, deliveries and servicing are expected to generate a maximum of 33 trips per day (of which 2 will be HGV's), fewer than the existing site uses. On the basis of the above criteria, the impact of operational traffic has therefore been scoped out of the assessment.

## EXPOSURE ASSESSMENT

The London Councils Air Quality Planning Guidance[28] provides criteria for determining the significance of exposure to air pollution and level of mitigation required. The Air Pollution Exposure Criteria (APEC) are presented in Table 2. The applicable ranges assume a downward trend in pollutant concentrations has been established, which is anticipated due to the uptake of electric vehicles and the implementation of the Ultra-Low Emission Zone.

Table 2: Air Pollution Exposure Criteria

| | Applicable Range $NO_2$ Annual Mean | Applicable Range $PM_{10}$ | Recommendation |
|---|---|---|---|
| **APEC - A** | > 5% below national | **Annual Mean:** | No air quality grounds for refusal; however, mitigation of any emissions should be considered. |

[27] Land-use Planning and Development Control: Planning for Air Quality, Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land use planning and development control process, January 2017.
[28] London Councils Air Quality and Planning Guidance, January 2007

| | | | |
|---|---|---|---|
| | objective | > 5% below national objective<br>**24 hr Mean:**<br>> 1-day less than national objective | |
| **APEC - B** | Between 5% below or above national objective | **Annual Mean:**<br>Between 5% above or below national objective<br>**24 hr Mean:**<br>Between 1-day above or below national objective. | May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g., Maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered, and internal pollutant emissions minimised. |
| **APEC - C** | > 5% above national objective | **Annual Mean:**<br>> 5% above national objective<br>**24 hr Mean:**<br>> 1-day more than national objective. | Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures. |

Detailed dispersion modelling of emissions from traffic on the local road network has been undertaken using the ADMS-Roads dispersion model, to predict pollutant concentrations at the proposed development and determine whether on-site mitigation will be required to protect future occupants from poor air quality.

A summary of the model input parameters is presented in Appendix B. The traffic flows used in the assessment have been projected to 2023 (the earliest opening year for the development) using TEMPro v7.2 [29]. The proposed development will not create a street canyon and therefore the effects of buildings on the predicted concentrations has not been included in the assessment.

## *EMISSION FACTORS*

Verification (2018) and opening year (2023) concentrations of NOx, $PM_{10}$ and $PM_{2.5}$ have been predicted using 2018 vehicle emission factors from the latest version of the Emissions Factor Toolkit (EFT_v10.1) [30]. This approach provides a conservative estimate of future air quality at the proposed development.

The predicted NOx concentrations have been converted to $NO_2$ using version 8.1 of the NOx to $NO_2$ calculator, available from the Defra air quality website[31].

## *METEOROLOGICAL DATA*

Meteorological data from London City Airport (approximately 7 km east-northeast of the proposed development) has been used in the dispersion modelling.

[29] https://www.gov.uk/government/publications/tempro-downloads
[30] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html
[31] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

### *SENSITIVE RECEPTORS*

Concentrations have been predicted across the proposed development site, at a height of 1.5m, using a Cartesian receptor grid of 5m resolution.

### *VERIFICATION*

There is an inherent level of uncertainty associated with any assessment process; however, the methodology presented has been developed to minimise errors where possible. Potential errors in predicted concentrations due to uncertainties in the assessment source activity data (e.g., traffic flows and emission factors) and the estimated background concentration are minimised by the verification of modelled concentrations using local monitoring data.

The 2016 Local Air Quality Management Technical Guidance (LAQM.TG16) [32] recommends that modelled concentrations should be within 25% of monitored concentrations, ideally within 10%. Where there is a large discrepancy between modelled and measured concentrations, it is considered necessary to adjust the model results to reflect local air quality more accurately.

The modelled concentrations have been verified using data from the Old Kent Road automatic monitoring station (SWK5). Details of the model verification process are presented in Appendix C.

## BUILDING EMISSIONS

The proposed development will be connected to a district-heating network (DHN) planned for the area within the next five years. In in the interim, heat and hot water will be provided by communal low-NOx gas boilers. The boilers will be compliant with the NOx emission limit of 40 mg/kWh, as specified by the Mayor of London's Sustainable Design and Construction SPG.

An air quality neutral assessment has been undertaken, based on the anticipated energy usage of the development.

32 Local Air Quality Management Technical Guidance (LAQM.TG16), Defra, February 2018

# BASELINE AIR QUALITY

Through an analysis of local monitoring data, a description of existing air quality near the proposed development is provided and appropriate baseline pollutant concentrations are determined for use in the assessment.

## LOCAL AIR QUALITY MONITORING

Air quality monitoring is undertaken automatically at six locations in LBS. A description of the two monitoring sites that are considered relevant to the assessment (SWK5 and SWK6) is presented in Table 3. Both sites are affiliated to the London Air Quality Network (LAQN) and therefore the measured data are subject to high levels of quality assurance (QA) and quality control (QC).

Table 3: Automatic Monitoring Sites

| Site Name | Type | Easting | Northing | Pollutants Monitored | Approximate Location Relative to Proposed Development |
|---|---|---|---|---|---|
| Old Kent Road (SWK5) | Roadside | 534844 | 177515 | NOx, $NO_2$, $PM_{10}$ | 900m southeast |
| Elephant and Castle (SWK6) | Urban Background | 531893 | 178846 | NOx, $NO_2$, $PM_{10}$ | 2.3 km northwest |

Annual mean NOx, $NO_2$ and $PM_{10}$ concentrations measured at this location between 2015 and 2019 and are summarised in Table 4, together with the number of measured exceedances of the short-term AQO's. Data from 2020 has not been included in the assessment due to the influence of the Covid-19 pandemic on traffic levels.

The automatic monitoring data indicates that background annual mean $NO_2$ and $PM_{10}$ concentrations are below the air quality objectives of 40 µg/m$^3$. There have been no measured exceedances of the short-term objective for $NO_2$ over the past five years and the number of exceedances of the 24-mean $PM_{10}$ objective was also well within the 35 allowable per annum.

Concentrations close to Old Kent Road are close to, or exceed 40 µg/m$^3$, however the number of hourly means above 200 µg/m$^3$ is consistently well below the 18 allowable within the short-term objective.

Concentrations of $NO_2$ at both sites have shown a significant decline in recent years and this this is a trend that has been widely observed across London, where there was an average decline between 2016 and 2019 of 21%[33].

[33] Air pollution monitoring data in London: 2016 to 2020, Greater London Authority, February 2020.

Table 4: Automatic Monitoring Data

| Statistic | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|
| **Old Kent Road (Roadside)** | | | | | |
| Annual Mean NOx (µg/m$^3$) | 96.5 | 135.6 | 94.1 | 87 | 74.8 |
| Annual Mean $NO_2$ (µg/m$^3$) | **42** (a) | **53** (a) | **42** | **41** | 35 |
| Number of Predicted Exceedances of the 1-Hour Mean AQO for $NO_2$ of 200 µg/m$^3$ | 1 (a) | 1 (a) | 0 | 0 | 0 |
| Annual Mean $PM_{10}$ (µg/m$^3$) | 21 (a) | 24 | 22 | 22 | 24 (a) |
| Number of Predicted Exceedances of the 24-Hour Mean AQO for $PM_{10}$ of 50 µg/m$^3$ | 4 (a) | 18 | 19 | 8 | 2 (a) |
| **Elephant and Castle (Urban Background)** | | | | | |
| Annual Mean NOx (µg/m$^3$) | 63.7 | 72.4 | 52.2 | 45.6 | 45.8 |
| Annual Mean $NO_2$ (µg/m$^3$) | **41** (a) | 39 | 34 | 32 | 30 |
| Number of Predicted Exceedances of the 1-Hour Mean AQO for $NO_2$ of 200 µg/m$^3$ | 0 (a) | 0 | 0 | 0 | 0 |
| Annual Mean $PM_{10}$ (µg/m$^3$) | 20 (a) | 26 (a) | 19 | 20 | 17 (a) |
| Number of Predicted Exceedances of the 24-Hour Mean AQO for $PM_{10}$ of 50 µg/m$^3$ | 4 | 21 | 1 | 2 | 14 (a) |
| (a) Data capture < 90% | | | | | |

LBS also measure ambient $NO_2$ concentrations via an extensive network of passive diffusion tubes. A summary of the tubes in closest proximity to the proposed development is presented in Table 5. The locations of the diffusion tubes are shown in Figure 2. Five years of annual mean $NO_2$ concentrations measured at these locations are presented in Table 6. Exceedances of the air quality objective are highlighted in bold.

Table 5: Diffusion Tube Monitoring Sites

| ID | Site Name | Type | Easting | Northing |
|---|---|---|---|---|
| SDT 1 /2/3 | Co - location Tubes at Old Kent Road AQMS | Roadside | 534844 | 177515 |
| SDT 49 | Lamppost 129-08 Lynton Road (west) | Kerbside | 533873 | 178592 |
| SDT 55 | Lamppost 11A St Georges Way (South Side) | Kerbside | 533350 | 177603 |
| SDT 56 | Coburg School Coburg Road SE17 | Kerbside | 533636 | 177933 |
| SDT 90 | Lamppost adjacent to 375 Old Kent Road | Kerbside | 533800 | 178220 |
| SDT 91 | Lamppost adjacent to 221 Old Kent Road | Kerbside | 533379 | 178556 |
| SDT 150 | Lamppost (2302 - L14) Albany Road | Kerbside | 533522 | 178187 |

Table 6: Annual Mean $NO_2$ Concentrations measured by Diffusion Tube (µg/m$^3$)

| ID | Type | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| SDT 1 /2/3 | Roadside | **43.6** | **47.9** | **42.8** | **42.9** | 36.6 |
| SDT 49 | Kerbside | - | 35.9 | 33.8 | 29.3 | 28.1 |
| SDT 55 | Kerbside | - | **40.6** | 39.0 | 37.9 | 32.9 (a) |
| SDT 56 | Kerbside | - | 33.0 | 31.8 (a) | - | - |
| SDT 90 | Kerbside | - | - | **66.0 (a)** | **67.5** | **55.2** |
| SDT 91 | Kerbside | - | - | **69.4 (a)** | **61.9** | **56.0** |
| SDT 150 | Kerbside | - | - | - | - | 38.9 (a) |
| (a) Data capture < 90% | | | | | | |

The data show that the annual mean air quality objective of 40 ug/m$^3$ is consistently exceeded at locations in close proximity to Old Kent Road. Measurements across the UK[34] have shown that the 1-hour $NO_2$ objective is likely to be exceeded if the annual mean concentration is above 60 µg/m$^3$. The concentrations measured at the kerbside locations on Old Kent Road in 2017 and 2018 were above this threshold, indicating a likely breach of the short-term objective. The measured concentrations at locations adjacent to more minor roads (such as the application site) in the area are within the objective.

## FUTURE BASELINE AIR QUALITY

The proposed development will fall within the expanded ULEZ (due to be introduced in October 2021) and not withstanding a major increase in road traffic, it is anticipated that baseline pollutant concentrations in the area are unlikely to significantly increase in the future.

[34] D Laxen and B Marner: Analysis of the relationship between 1-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites, July 2003

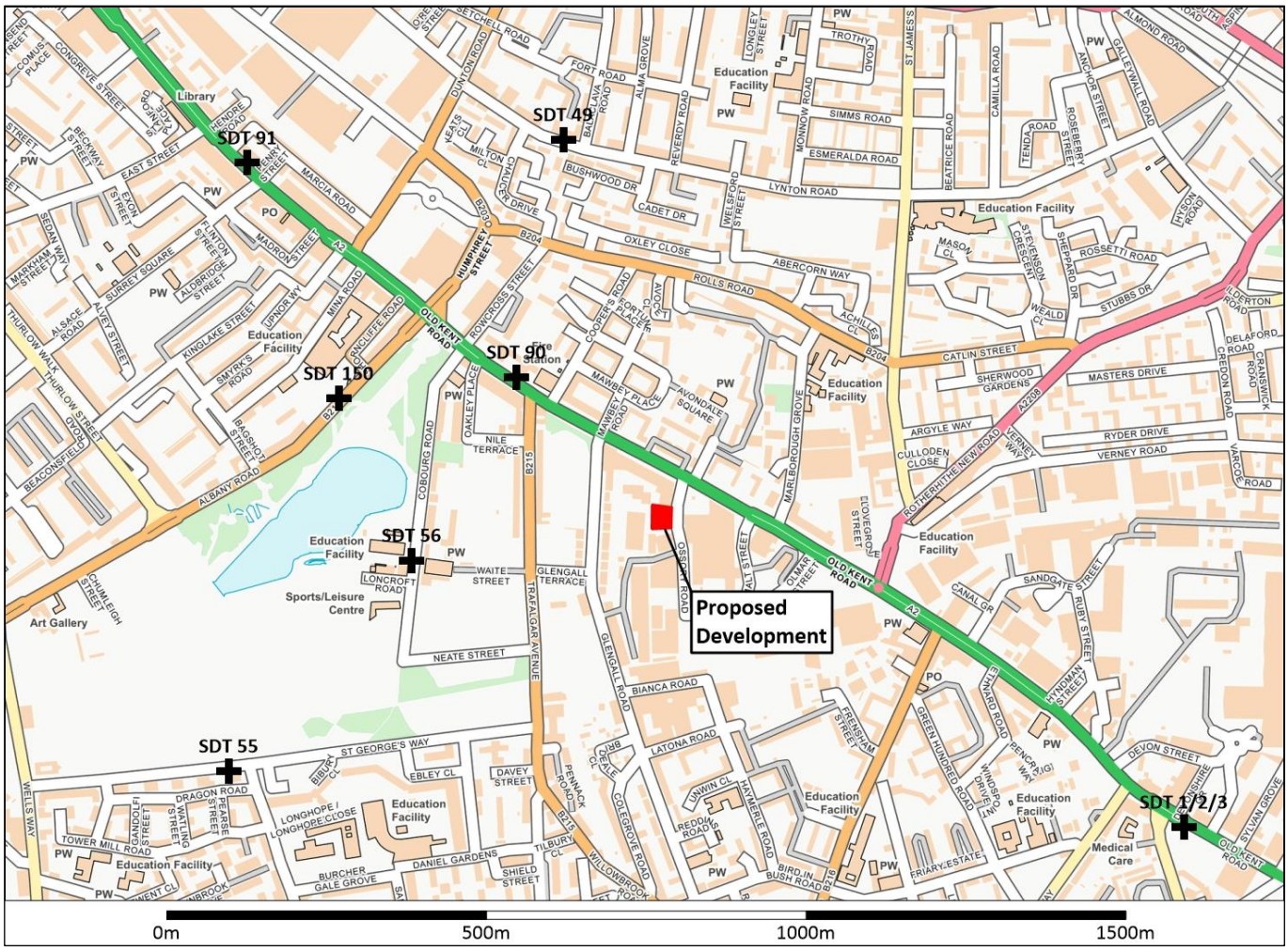


Figure 2: Location of Diffusion Tubes (Contains Ordnance Survey data © Crown copyright and database right 2021)

## DEFRA MAPPED BACKGROUND CONCENTRATIONS

For comparison with the Elephant and Castle data, and in the absence of a local $PM_{2.5}$ monitoring site, background concentrations have been obtained from the Defra UK Background Air Pollution maps[35]. These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. The latest background maps were issued in August 2020 and are based on 2018 monitoring data, with projections for future years.

The maximum 2018 (for consistency with the traffic data, meteorological data and emission factors used) annual mean $NO_2$, $PM_{10}$ and $PM_{2.5}$ concentrations for the proposed development and the two automatic monitoring sites have been determined from contour plots of the mapped data and are presented in Table 7 .

The $NO_2$ and $PM_{10}$ urban background concentrations measured at SWK6 are higher than the mapped concentrations at both SWK5 and the proposed development. Whilst the measured NOx concentration at SWK6 is slightly lower than

[35] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

the mapped concentration at the proposed development, for consistency, the measured concentration has been used in the assessment.

The 2018 concentrations have been used to predict pollutant concentrations in the opening year of the development (2023). Since a year-on-year decline in background pollutant concentrations is expected due to the gradual renewal of the vehicle fleet and the increased uptake of electric vehicles, using 2018 background concentrations is considered to provide a conservative estimate of the potential exposure of future occupants to poor air quality.

Table 7: Mapped and Measured 2018 Annual Mean Background Pollutant Concentrations (µg/m$^3$)

| Pollutant | Elephant and Castle (SWK6) Measured | Old Kent Road (SWK5) Mapped | Proposed Development Mapped | Assessment (Verification and 2023 Exposure) | AQO/ EAL |
|---|---|---|---|---|---|
| NOx | 45.6 | 43.4 | 46.1 | 45.6 | - |
| $NO_2$ | 32.0 | 27.9 | 29.9 | 32.0 | 40 |
| $PM_{10}$ | 20.0 | 19.6 | 19.9 | 20.0 | 40 |
| $PM_{2.5}$ | n/a | 12.7 | 12.8 | 12.8 | 25 |

# POTENTIAL IMPACTS

The potential impacts and significance of these impacts on air quality during the construction and operational phases of the development are identified in this section. Suggested mitigation measures are outlined in a subsequent section of the report.

## CONSTRUCTION DUST

### *SENSITIVITY OF THE AREA TO DUST IMPACTS*

The assessment of dust impacts is dependent on the proximity of the most sensitive receptors to the site boundary.

A summary of the receptor and area sensitivity to health and dust soiling impacts is presented in Table 8. The sensitivity of the area to health impacts is dependent on the existing $PM_{10}$ concentration. Based on the data from the AQMS on Old Kent Road, existing annual mean $PM_{10}$ concentrations in the area are unlikely to exceed 24 µg/m$^3$.

Table 8: Sensitivity of Receptors and the Local Area to Health and Dust Soiling Impacts

| Receptor | Distance from Site Boundary | Number of Receptors | Sensitivity to Health Impacts | | Sensitivity to Dust Soiling Impacts | |
|---|---|---|---|---|---|---|
| | | | Receptor | Area | Receptor | Area |
| Residential Properties | <20 m | 10 - 100 | High | Low | High | High |
| | <50 m | 10 - 100 | | Low | | Medium |
| | <100m | >100 | | Low | | Medium |
| Christian Centre | <20 m | 10 - 100 | Medium | Low | Medium | Medium |
| Phoenix Primary School | ~ 300 m | >100 | High | Low | High | Low |
| Asda Car Park | ~ 120 m | 10 - 100 | Low | Low | Low | Low |
| **Overall Sensitivity of the Area** | | | **Low** | | **High** | |

The precise behaviour of the dust, its residence time in the atmosphere and the distance it may travel before being deposited, will depend upon a number of factors. These include wind direction and strength, local topography and the presence of intervening structures (buildings, etc.) that may intercept dust before it reaches sensitive locations. Furthermore, dust would be naturally suppressed by rainfall.

A wind rose for London City Airport is presented in Figure 3, which shows that the prevailing wind is from the southwest, therefore receptors to the northeast of the site are most likely to experience dust impacts during the construction phase.

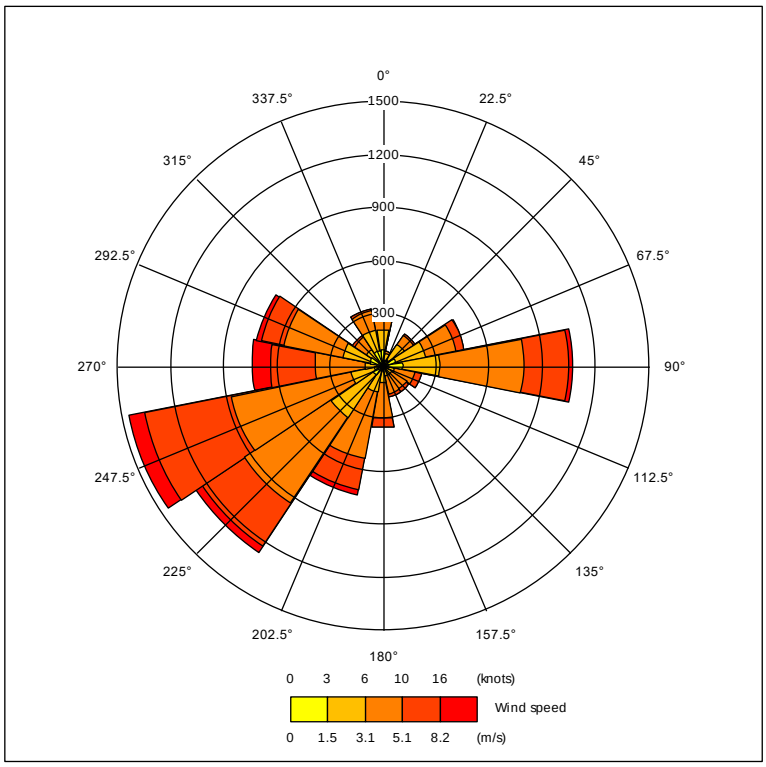


Figure 3: Wind Rose London City Airport (2018)

## *DUST EMISSION MAGNITUDE*

The magnitude of the likely dust emission from demolition, earthworks, construction and trackout, has been evaluated using the criteria in Table A5 of Appendix A and is presented in Table 9.

Table 9: Evaluation of Dust Emission Magnitude

| Dust Source | IAQM Criteria | Proposed Development | Dust Emission Magnitude |
|---|---|---|---|
| Demolition | Total building volume ($m^3$) | 6,372 | Small |
| | Potentially dusty material? | Brick, concrete | Medium |
| | On-site crushing and screening? | No | Small |
| | Maximum height of demolition activities above ground-level (m) | 7.8 | Small |
| | Demolition during wetter months? | Cannot be guaranteed | Medium |
| **Overall Dust Emission Magnitude From Demolition** | | | **Small** |
| Justification: Whilst it cannot be guaranteed that the works will be undertaken during wetter months, based on the minor scale of the proposed works, a dust emission magnitude of 'small' is considered appropriate. | | | |
| Earthworks | Earthworks area ($m^2$) | 1,139 | Small |
| | Soil type? | Assumed potentially dusty | Medium |
| | Number of heavy earth moving vehicles active at any one time | <5 | Small |
| | Maximum bund height (m) | <4 | Small |
| | Total material moved (tonnes) | < 20,000 | Small |
| | Earthworks during wetter months? | Cannot be guaranteed | Medium |
| **Overall Dust Emission Magnitude From Earthworks** | | | **Medium** |
| Construction | Total building volume ($m^3$) | 28,410 | Medium |
| | Potentially dusty construction materials? | Brick, concrete | Medium |
| | On-site concrete batching? | No | Small |
| | Sandblasting? | No | Small |
| **Overall Dust Emission Magnitude From Construction** | | | **Medium** |
| Trackout | Number of outward HGV movements in any one day | <10 | Small |
| | Dusty surface material? | Assumed potentially dusty | Medium |
| | Unpaved road length (m) | < 50m | Small |
| **Overall Dust Emission Magnitude From Trackout** | | | **Small** |
| Justification: The site area is small, and the majority of the vehicles will access the site from the roadside. On this basis a dust emission magnitude for trackout of 'small' is considered appropriate. | | | |

## *ASSESSMENT OF DUST RISK PRIOR TO MITIGATION*

A summary of the potential risk of dust impacts, prior to mitigation, is presented in Table 10. The overall risk is assessed as 'medium'.

Table 10: Risk of Dust Impacts Prior to Mitigation

| Dust Source | Area Sensitivity | | Emission Magnitude | Human Health Risk | Dust Soiling Risk | Overall Risk |
|---|---|---|---|---|---|---|
| | Human Health | Dust Soiling | | | | |
| **Demolition** | Low | High | Small | Negligible | Medium | **Medium** |
| **Earthworks** | Low | High | Medium | Low | Medium | **Medium** |
| **Construction** | Low | High | Medium | Low | Medium | **Medium** |
| **Trackout** | Low | High | Small | Negligible | Low | **Low** |

# PREDICTED AIR QUALITY AT THE PROPOSED DEVELOPMENT

The potential impact of local air quality on future occupants of the development are identified in this section.

## NITROGEN DIOXIDE

Predicted ground-floor level annual mean $NO_2$ concentrations across the development site due to emissions from traffic on the local road network are presented as a contour plot in Figure 4. The predicted concentrations are below 38 µg/m$^3$ across the site and therefore the development falls within exposure category **APEC-A**, with respect to $NO_2$.

The predicted concentrations at the façade of the proposed new building are less than 60% of the 60 µg/m$^3$ threshold for a potential exceedance of the 1-hour mean air quality objective and therefore the risk of non-compliance at the development is negligible.

The proposed residential dwellings will be located at first-floor level and above. Pollutant concentrations due to traffic emissions decline rapidly with height from the ground and the dispersion modelling therefore indicates that annual mean $NO_2$ concentrations will be well below the long-term air quality objective at the façade of the residential dwellings. The site is therefore suitable for residential development, as proposed.

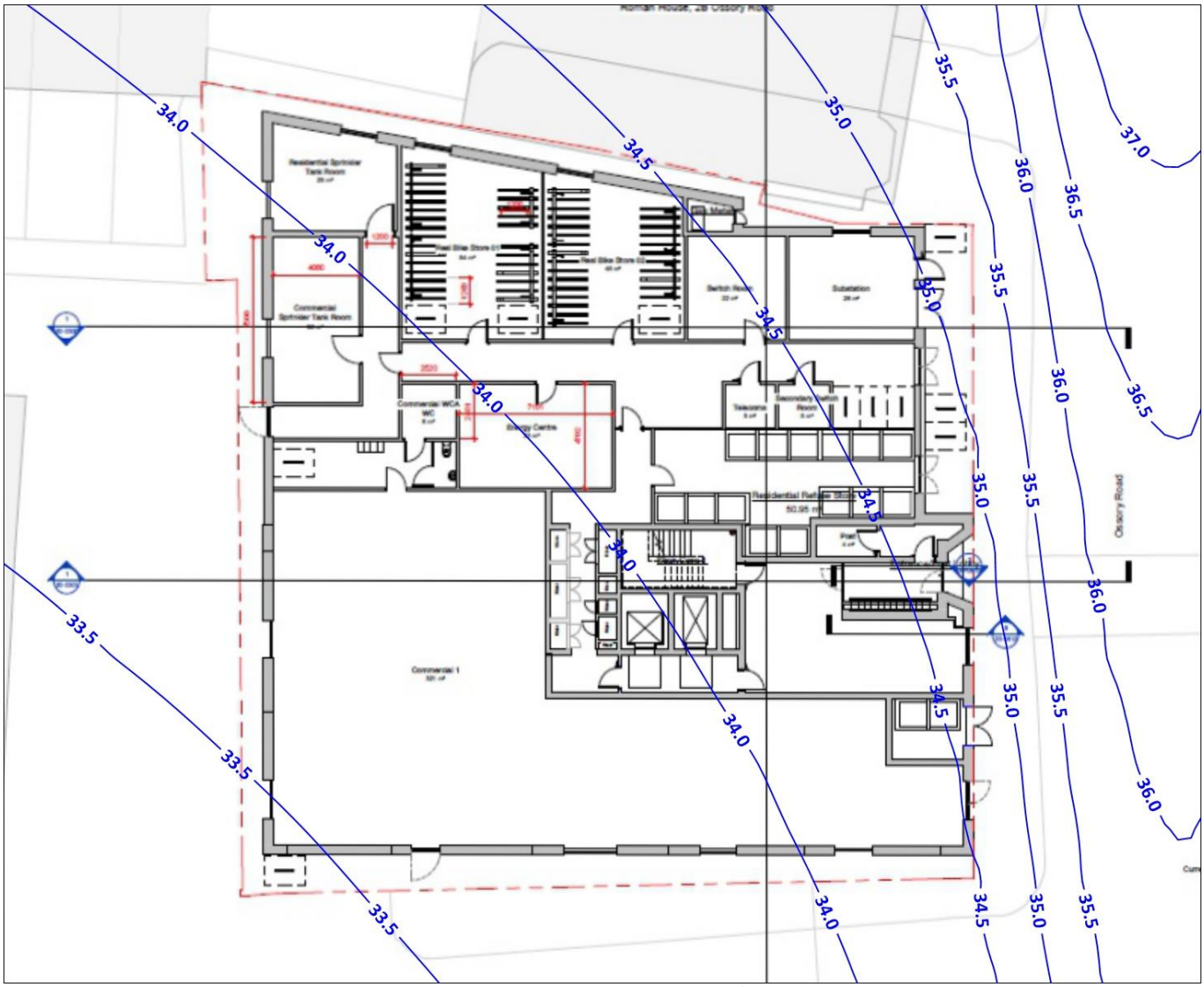


Figure 4: Predicted Ground-Floor Level Annual Mean $NO_2$ Concentrations (µg/m$^3$)

## PARTICULATE MATTER

Predicted annual mean $PM_{10}$ and $PM_{2.5}$ concentrations at ground-floor level across the proposed development site are presented as contour plots in Figure 5 and Figure 6, respectively. The concentrations at the site are less than 55% of the long-term air quality standards and therefore the development falls within exposure category **APEC-A** for particulate matter.

LAQM.TG(16) provides a relationship between predicted annual mean $PM_{10}$ concentrations and the likely number of exceedances of the short-term (24-hour mean) $PM_{10}$ objective of 50 µg/m$^3$. The objective allows 35 exceedances per year, which is equivalent to an annual mean of 32 µg/m$^3$. On this basis, the dispersion modelling indicates that compliance with the short-term $PM_{10}$ objective will be achieved at all locations on site.

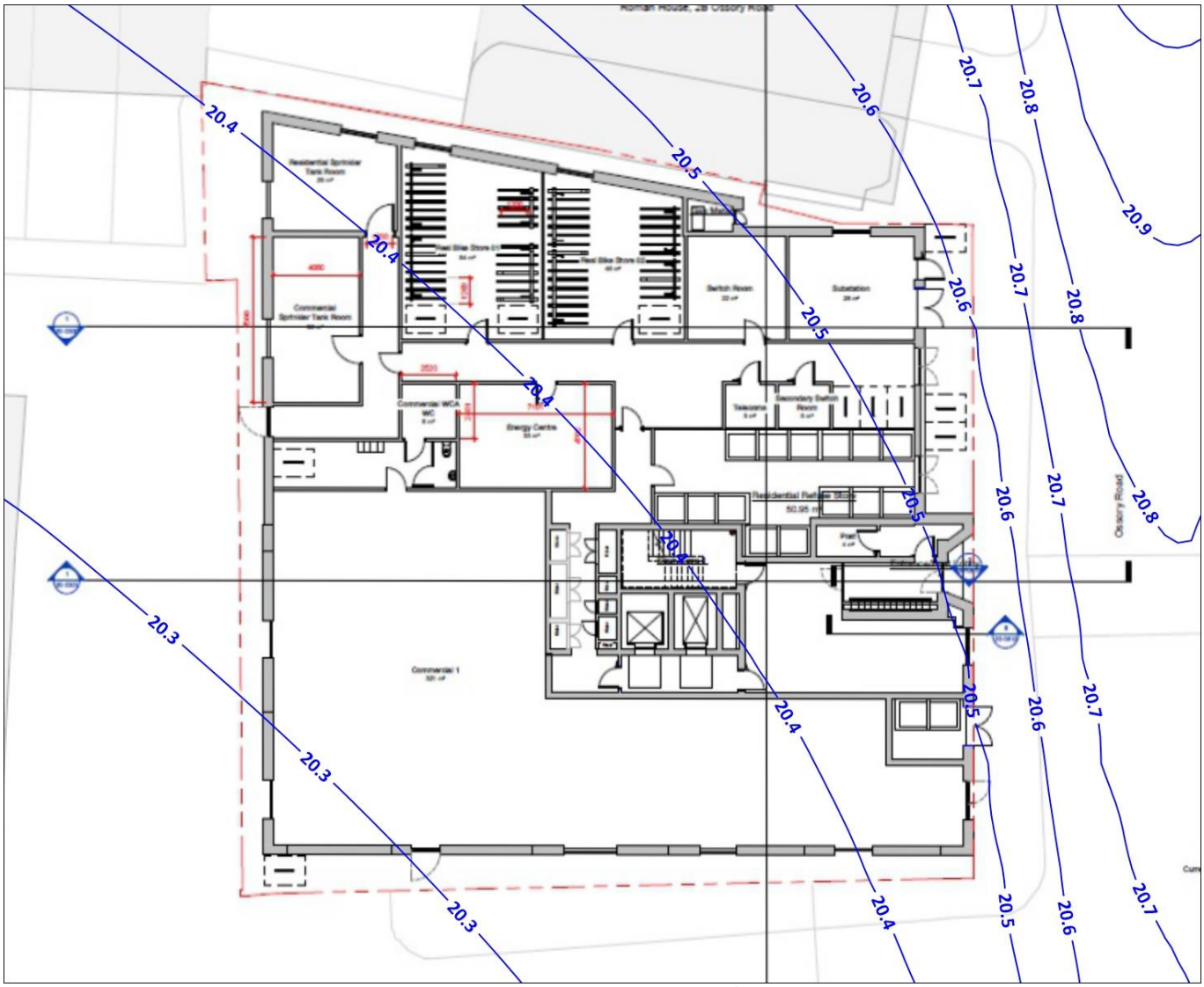


Figure 5: Predicted Ground-Floor Level Annual Mean $PM_{10}$ Concentration ($\mu g/m^3$)

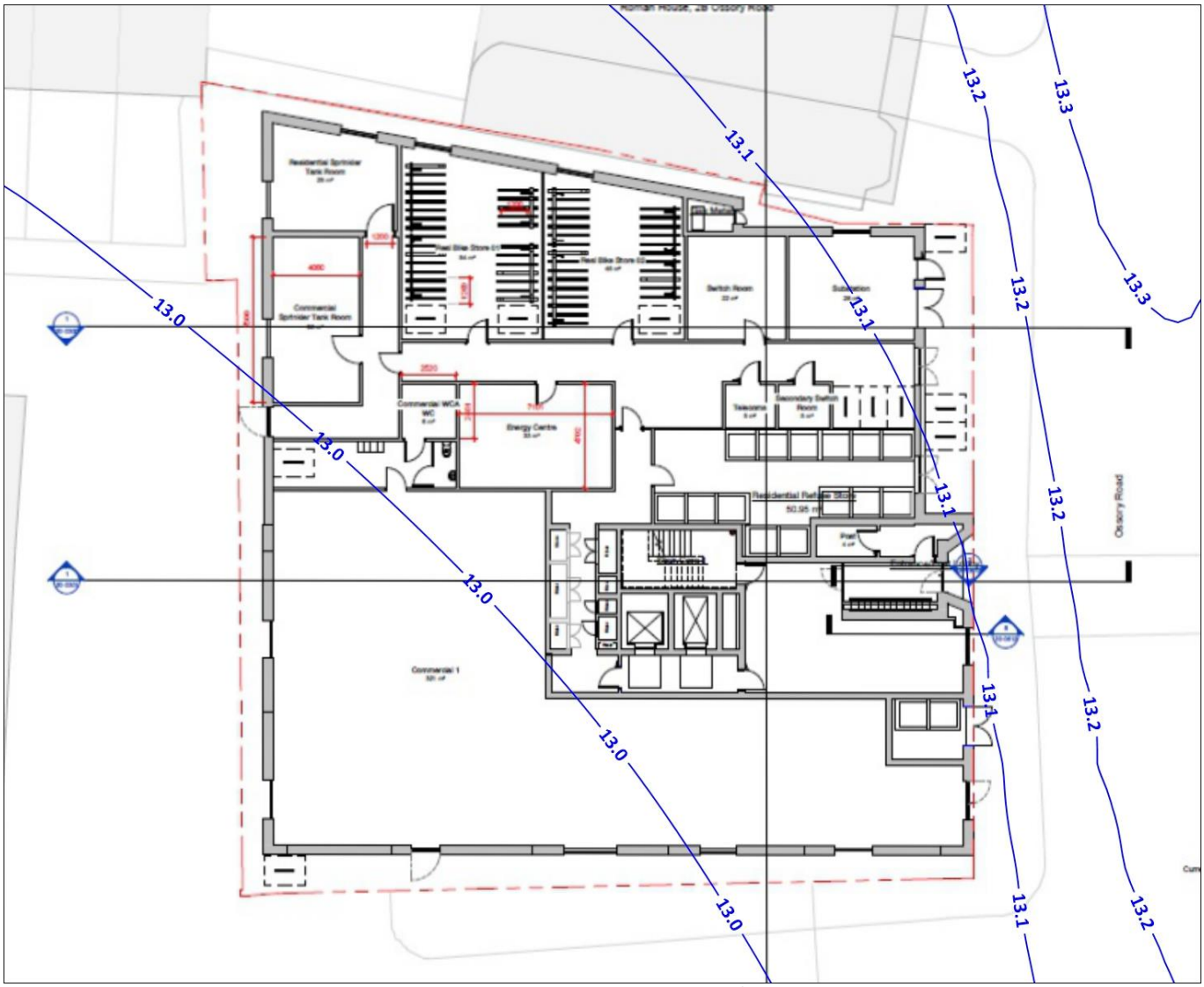


Figure 6: Predicted Ground-Floor Level Annual Mean $PM_{2.5}$ Concentration (µg/m$^3$)

# AIR QUALITY NEUTRAL ASSESSMENT

This section presents an air quality neutral assessment in accordance with The London Plan.

## BUILDING EMISSIONS

The air quality neutral assessment compares the building-related emissions with benchmarked emissions based on the floor space and land-use as specified in the Air Quality Neutral Planning Support Document (PSD).

The proposed development will be connected to a district-heating network (DHN) planned for the area within the next five years. In in the interim, heat and hot water will be provided by communal low-NOx gas boilers.

The PSD states that '*it is not necessary for a developer to demonstrate compliance with the $PM_{10}$ benchmark where gas is the only fuel used on site*'. On this basis, the air quality neutral assessment has been undertaken for NOx emissions only.

The Building Emission Benchmarks (BEBs) and benchmarked emissions for the proposed development are presented in Table 11.

Table 11: Benchmarked Building Emissions

| Land Use Class | GIA ($m^2$) | BEB (g NOx/$m^2$/annum) | Benchmarked Emissions (kg NOx/annum) |
|---|---|---|---|
| Residential (C3) | 5,564 | 26.2 | 145.7 |
| Business (E) | 1,119 | 30.8 | 34.5 |
| **Total Benchmarked NOx Emission** | | | **180.2** |

Building-related emissions for the proposed development are presented in Table 12 and have been derived from the anticipated energy usage (gas) for the site and the London Atmospheric Emissions Inventory (LAEI) default NOx emission factor for domestic and commercial land-uses as specified in the PSD.

The annual building NOx emission for the proposed development is below the benchmarked emission; therefore, the proposed development is **Air Quality Neutral with respect to building-related emissions**.

Table 12: Development Building Emissions

| Land Use Class | Energy Usage (kWh/annum) | Emission Factor (kg NOx/kWh) | Building Emissions (kg NOx/annum) |
|---|---|---|---|
| Residential | 194,590 | 0.0000785 | 15.3 |
| Commercial | 10,600 | 0.000194 | 2.1 |
| **Total Building-Related NOx Emission** | | | **17.4** |

## TRANSPORT EMISSIONS

The air quality neutral assessment for transport-related emissions compares the emissions from traffic generated by the site with benchmarked emissions based on land-use as specified in the Air Quality Neutral Planning Support Document (PSD)[36].

The proposed development is expected to generate 33 vehicle-movements per day, of which 25 would be associated with the residential dwellings and the remainder with the light industrial (class E) uses.

The residential and office (assumed to be representative of light industrial use) TEBs for Inner London and benchmarked emissions for NOx and $PM_{10}$ are presented in Table 13.

Table 13: Benchmarked Transport Emissions

| Pollutant/ Land-Use | Number of Dwellings or GIA | TEB (g /dwelling or $m^2$ /annum) | Benchmarked Emissions (kg/annum) |
|---|---|---|---|
| **NOx** | | | |
| Residential | 117 dwellings | 558 | 65.3 |
| Light Industrial | 1,119 $m^2$ | 11.4 | 12.7 |
| **Total Benchmarked NOx** | | | **78.0** |
| **$PM_{10}$** | | | |
| Residential | 117 dwellings | 100 | 11.7 |
| Light Industria | 1,119 $m^2$ | 2.05 | 2.3 |
| **Total Benchmarked $PM_{10}$** | | | **14.0** |

Transport-related emissions associated with the proposed development are presented in Table 14 and have been calculated using the anticipated trip generation for the site, trip lengths and emission factors for Inner London.

Table 14: Development Transport Emissions

| Parameter | Residential | Community (Retail) |
|---|---|---|
| Daily Trips | 25 | 8 |
| Annual trips | 9,125 | 2,920 |
| Average distance travelled per trip (km) | 3.7 | 7.7 |
| Annual distance (km) | 33,763 | 22,484 |
| NOx Emission Factor (g/km) | 0.370 | |
| NOx Emission (kg/annum) | 12.5 | 8.3 |
| **Total NOx Emission (kg/annum)** | **20.8** | |
| $PM_{10}$ Emission Factor (g/km) | 0.0665 | |
| $PM_{10}$ Emission (kg/annum) | 2.2 | 1.5 |
| **Total $PM_{10}$ Emission (kg/annum)** | **3.7** | |

[36] Air Quality Neutral Planning Support Update, GLA 80371, April 2014

The development transport emissions for $NO_2$ and $PM_{10}$ are well below the benchmarked emissions, therefore the proposed development is **Air Quality Neutral with respect to transport-related emissions**.

# MITIGATION

The following mitigation measures will be required during the construction and operational phases to minimise the air quality impacts arising from the development.

## CONSTRUCTION PHASE

London Best Practice Guidance for dust control will be implemented, as appropriate, during the construction phase through the Construction Environmental Management Plant (CEMP) for the proposed development.

The risk of dust soiling and human health impacts from the site has been assessed as medium during demolition, construction and earthworks and low from trackout, prior to mitigation. In accordance with the GLA construction dust guidance, the 'highly recommended' measures detailed in Table 15 should be incorporated into the CEMP. The 'desirable' measures detailed in Table 16 should also be considered for inclusion.

The significance of dust impacts on nearby receptors following the implementation of appropriate and best practice mitigation is considered to be negligible.

Table 15: Highly Recommended Mitigation Measures

| Description | Mitigation Measure |
|---|---|
| Site management | - Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.<br>- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site Manager.<br>- Display the head or regional office contact information.<br>- Record and respond to all dust and air quality pollutant emissions complaints.<br>- Make the complaints log available to the local authority when asked.<br>- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.<br>- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.<br>- Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook. |
| Preparing and maintaining the site | - Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.<br>- Erect solid screens or barriers around dusty activities or at the site boundary that are at least as high as any stockpiles on site.<br>- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.<br>- Avoid site runoff of water or mud.<br>- Keep site fencing, barriers and scaffolding clean using wet methods.<br>- Remove materials from site as soon as possible.<br>- Cover, seed or fence stockpiles to prevent wind whipping.<br>- If relevant, put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly. Potentially agree monitoring locations with the Local Authority if required and where possible, commence baseline monitoring at least three months before phase begins. |

| Description | Mitigation Measure |
|---|---|
| Operating vehicle/machinery and sustainable travel | - Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.<br>- Ensure all vehicles switch off engines when stationary - no idling vehicles.<br>- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.<br>- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.<br>- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing). |
| Operations | - Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g., suitable local exhaust ventilation systems.<br>- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.<br>- Use enclosed chutes and conveyors and covered skips.<br>- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.<br>- 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<br>- Avoid bonfires and burning of waste materials |
| Demolition | - Ensure water suppression is used during demolition operations.<br>- Avoid explosive blasting, using appropriate manual or mechanical alternatives.<br>- Bag and remove any biological debris or damp down such material before demolition. |
| 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. |

Table 16: Desirable Mitigation Measures

| Description | Mitigation Measure |
|---|---|
| Preparing and maintaining the site | - Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.<br>- Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary. |
| Operating vehicle/machinery and sustainable travel | - Impose and signpost a maximum-speed-limit of 10mph on surfaced haul routes and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate). |

| Description | Mitigation Measure |
|---|---|
| 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). |
| | - Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.<br>- Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil.<br>- Only remove secure covers in small areas during work and not all at once. |
| Construction | - Avoid scabbling (roughening of concrete surfaces) if possible.<br>- 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.<br>- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust. |
| 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.<br>- Avoid dry sweeping of large areas.<br>- Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.<br>- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable). |

## OPERATIONAL PHASE

Detailed dispersion modelling of traffic on Old Kent Road and Ossory Road indicates that concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ will be well within the relevant long and short-term air quality standards at the façade of the proposed new building (APEC-A). On this basis, mitigation measures are not required to protect future occupants from poor air quality.

The proposed development will include secure cycle storage to encourage sustainable transport.

# SUMMARY AND CONCLUSIONS

An assessment has been undertaken to assess the potential impacts on local air quality associated with the construction and operation of the proposed development.

An assessment of the potential impacts during the construction phase has been carried out in accordance with the latest Institute of Air Quality Management guidance; this has shown that releases of dust and $PM_{10}$ are likely to occur during site activities. However, through good site practice and the implementation of suitable mitigation measures, the impact of dust and $PM_{10}$ releases may be effectively mitigated, and the resultant impacts are considered to be negligible.

The proposed development will generate fewer trips per day than the existing site uses. The transport-related emissions have been assessed as air quality neutral.

Detailed dispersion modelling has been undertaken to predict concentrations of $NO_2$, $PM_{10}$ and $PM_{2.5}$ at the proposed development site to determine whether mitigation will be required to protect future occupants from poor air quality. The predicted concentrations are below the relevant long and short-term air quality objective at the proposed development (exposure category APEC-A).

The proposed development will be connected to a district-heating network (DHN) planned for the area within the next five years. In in the interim, heat and hot water will be provided by communal low-NOx gas boilers.

An air quality neutral assessment for building-related emissions has been undertaken, based on the anticipated energy (gas) usage of the site. The proposed development has been assessed as air quality neutral with respect to building-related emissions.

Based on the results of the assessment and with the implementation of the recommended construction-phase mitigation measures, it is considered that air quality would not pose a constraint to the redevelopment of the site as proposed.

# APPENDIX A –CONSTRUCTION DUST METHODOLOGY

Factors defining the sensitivity of a receptor to dust impacts are presented in Table A1.

Table A1: Receptor Sensitivity

| Receptor Sensitivity | Human Health | Dust Soiling | Ecological |
|---|---|---|---|
| High | - Locations where members of the public are exposed over a time period relevant to the air quality objectives for $PM_{10}$ (a)<br>- Examples include residential dwellings, hospitals, schools and residential care homes. | - Regular exposure<br>- High level of amenity expected.<br>- Appearance, aesthetics or value of the property would be affected by dust soiling.<br>- Examples include residential dwellings, museums, medium and long-term car parks and car showrooms. | - Nationally or Internationally designated site with dust sensitive features (b)<br>- Locations with vascular species (c) |
| Medium | - Locations where workers are exposed over a time period relevant to the air quality objectives for $PM_{10}$ (a)<br>- Examples include office and shop workers (d) | - Short-term exposure<br>- Moderate level of amenity expected<br>- Possible diminished appearance or aesthetics of property due to dust soiling<br>- Examples include parks and places of work | - Nationally designated site with dust sensitive features (b)<br>- Nationally designated site with a particularly important plant species where dust sensitivity is unknown |
| Low | - Transient human exposure<br>- Examples include public footpaths, playing fields, parks and shopping streets | - Transient exposure<br>- Enjoyment of amenity not expected.<br>- Appearance and aesthetics of property unaffected<br>- Examples include playing fields, farmland (e), footpaths, short-term car parks and roads | - Locally designated site with dust sensitive features (b) |

a) In the case of the 24-hour objective, a relevant location would be one where individuals may be exposed for eight hours or more in a day.

b) Ecosystems that are particularly sensitive to dust deposition include lichens and acid heathland (for alkaline dust, such as concrete).

c) Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

d) Does not include workers' exposure to $PM_{10}$ as protection is covered by Health and Safety at Work legislation.

e) Except commercially sensitive horticulture.

The sensitivity of the area is dependent on the number of receptors within each sensitivity class and their distance from the source. Human health impacts are also dependent on the existing $PM_{10}$ concentrations in the area.

Table A2 and Table A3 summarise the criteria for determining the overall sensitivity of the area to dust soiling and health impacts respectively. The sensitivity of the area to ecological impacts is presented in Table A4.

Table A2: Sensitivity of the Area to Dust Soiling Effects on People and Property

| Receptor Sensitivity | Number of Receptors | Distance from the Source | | | |
|---|---|---|---|---|---|
| | | <20m | <50m | <100m | <350m |
| 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 |

Table A3: Sensitivity of the Area to Health Impacts from Dust

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

Table A4: Sensitivity of the Area to Ecological Impacts from Dust

| Receptor Sensitivity | Distance from the Source | |
|---|---|---|
| | <20m | <50m |
| High | High | Medium |
| Medium | Medium | Low |
| Low | Low | Low |

The magnitude of the dust impacts for demolition, earthworks, construction and trackout is classified as small, medium or large depending on the scale of the proposed works as detailed in Table A5.

Table A5: Dust Emission Magnitude

| Receptor Sensitivity | Large | Medium | Small |
|---|---|---|---|
| Demolition | - Total building volume >50,000m$^3$<br>- Potentially dusty material (e.g., concrete)<br>- Onsite crushing and screening<br>- Demolition activities >20m above ground level. | - Total building volume 20,000 - 50,000m$^3$<br>- Potentially dusty material<br>- Demolition activities 10 - 20m above ground level. | - Total building volume <20,000m$^3$<br>- Construction material with low potential for dust release<br>- Demolition activities <10m above ground level<br>- Demolition during wetter months |
| Earthworks | - Total site area >10,000m$^2$<br>- Potentially dusty soil type (e.g., clay)<br>- >10 heavy earth moving vehicles active at any one time<br>- Formation of bunds >8m in height<br>- Total material moved >100,000 tonnes | - Total site area 2,500 - 10,000m$^2$<br>- Moderately dusty soil type (e.g., silt)<br>- 10 heavy earth moving vehicles active at any one time<br>- Formation of bunds 4 - 8m in height<br>- Total material moved 20,000 - 100,000 tonnes | - Total site area <2,500m$^2$<br>- Soil type with large grain size (e.g., sand)<br>- <5 heavy earth moving vehicles active at any one time<br>- Formation of bunds <4m in height<br>- Total material moved <20,000 tonnes<br>- Earthworks during wetter months |
| Construction | - Total building volume >100,000m$^3$<br>- On site concrete batching<br>- Sandblasting | - Total building volume 25,000 - 100,000m$^3$<br>- Potentially dusty construction material (e.g., concrete)<br>- On site concrete batching | - Total building volume <25,000m$^3$<br>- Material with low potential for dust release (e.g., metal cladding or timber |
| Trackout | - >50 HGV movements in any one day (a)<br>- Potentially dusty surface material (e.g., high clay content)<br>- Unpaved road length >100m | - 10 - 50 HGV movements in any one day (a)<br>- Moderately dusty surface material (e.g., silt)<br>- Unpaved road length 50 - 100m | - <10 HGV movements in any one day (a)<br>- Surface material with low potential for dust release |

| | | | |
|---|---|---|---|
| | | | - Unpaved road length <50m |
| a) HGV movements refer to outward trips (leaving the site) by vehicles of over 3.5 tonnes | | | |

For each dust emission source, the worst-case area sensitivity is used in combination with the dust emission magnitude to determine the risk of dust impacts prior to mitigation as illustrated in Tables A6, A7 and A8.

Table A6: Risk of Dust Impacts from Demolition

| Area Sensitivity | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Medium Risk |
| Medium | High Risk | Medium Risk | Low Risk |
| Low | Medium Risk | Low Risk | Negligible Risk |

Table A7: Risk of Dust Impacts from Earthworks and Construction

| Area Sensitivity | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Low Risk |
| Medium | Medium Risk | Medium Risk | Low Risk |
| Low | Medium Risk | Low Risk | Negligible Risk |

Table A8: Risk of Dust Impacts from Trackout

| Area Sensitivity | Dust Emission Magnitude | | |
|---|---|---|---|
| | Large | Medium | Small |
| High | High Risk | Medium Risk | Low Risk |
| Medium | Medium Risk | Low Risk | Negligible Risk |
| Low | Low Risk | Low Risk | Negligible Risk |

# APPENDIX B – ADMS-ROADS INPUT PARAMETERS

Table B1: Summary of ADMS-Roads Input Parameters

| Parameter | 2018 Verification | 2023 Exposure |
|---|---|---|
| ADMS-Roads Model Version | 5.1 | 5.1 |
| Vehicle Emission Factors | EFT v10.1 for 2018 | EFT v10.1 for 2023 |
| Meteorological Data | Hourly sequential data from London City Airport (2018) | Hourly sequential data from London City Airport (2018) |
| Surface Roughness | 1.0m | 1.0m |
| Monin-Obukhov Length | 75m | 75m |

Table B2: Summary of Traffic Data for Verification

| Road Link | 2018 AADT | HGV, including buses and coaches (%) | Average Speed (kph) |
|---|---|---|---|
| Old Kent Road | 33,933 (a) | 10.0 | 24 |
| (a) DfT ATC 56089 | | | |

Table B2: Summary of Traffic Data for Exposure

| Road Link | 2023 AADT | HGV, including buses and coaches (%) | Average Speed (kph) |
|---|---|---|---|
| Old Kent Road | 40,411 (a) | 9.9 | 24 |
| Ossory Road | 3,557 (b) | 5.0 | 16 |
| (a) DfT ATC 56091 with Tempro v7.2 growth factor applied to project to 2023<br>(b) DfT 2018 average AADT for a minor road in London, with Tempro v7.2 growth factor applied to project to 2023 | | | |

# APPENDIX C – MODEL VERIFICATION

## *NITROGEN DIOXIDE*

Predicted annual mean $NO_2$ and $PM_{10}$ concentrations have been compared with the 2018 concentrations measured by the Old Kent Road AQMS. Data from the co-located diffusion tubes are considered less reliable than the AQMS data and have therefore not been used for verification purposes.

Most nitrogen dioxide ($NO_2$) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM.TG16.

Measured Road-NOx (i.e., the component of total NOx coming from road traffic) and Road-$PM_{10}$ concentrations have been calculated by subtracting the background concentrations measured at Elephant and Castle from the total measured NOx and $PM_{10}$ concentrations.

The ratio of the measured and modelled Road-NOx and Road-$PM_{10}$ contributions provides an adjustment factor for the modelled concentrations.

The model verification calculations are presented in Table C1. In accordance with the technical guidance the adjustment factor for $PM_{10}$ has also been applied to the modelled Road-$PM_{2.5}$ concentrations.

Table C1: Verification Calculations

| Parameter | Old Kent Road AQMS |
|---|---|
| **NOx** | |
| Measured NOx Concentration | 87.0 µg/m$^3$ |
| Background NOx Concentration (Elephant and Castle, 2018) | 45.6 µg/m$^3$ |
| Measured Road-NOx Concentration | 41.4 µg/m$^3$ |
| Modelled Road-NOx Concentration | 21.9 µg/m$^3$ |
| **Adjustment Factor** | **1.9** |
| **$PM_{10}$** | |
| Measured $PM_{10}$ Concentration | 22.0 µg/m$^3$ |
| Background $PM_{10}$ Concentration (Elephant and Castle, 2018) | 20.0 µg/m$^3$ |
| Measured Road-$PM_{10}$ Concentration | 2.0 µg/m$^3$ |
| Modelled Road-NOx Concentration | 1.4 µg/m$^3$ |
| **Adjustment Factor** | **1.4** |

**XCO2**
56 Kingsway Place, Sans Walk
London EC1R 0LU

+44 (0)20 7700 1000
mail@xco2.com
xco2.com