



London Square Developments Ltd.

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# **GREGGS FACTORY, TWICKENHAM**

Air Quality Assessment





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## Air Quality Assessment

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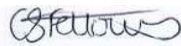
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## EXECUTIVE SUMMARY

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WSP has been commissioned by London Square Developments Ltd to undertake an air quality assessment to support a planning application for the proposed redevelopment of the former Greggs Factory in Twickenham. The proposal includes 116 residential units and one B1 commercial unit with associated parking (100 spaces).

This report presents the findings of the assessment, which addresses the potential air quality impacts during both the construction and operational phases of the proposed development. For both phases the type, source and significance of potential impacts were identified, and the measures that should be employed to minimise these proposed. The methodology followed in this study was discussed and agreed with the Environmental Health Officer at London Borough of Richmond Upon Thames Council.

A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the Institute of Air Quality Management (IAQM) methodology. This identified that there is a high to medium risk of dust soiling impacts and a medium to low risk of health impacts due to increases in particulate matter (PM<sub>10</sub>) concentrations during construction. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM<sub>10</sub> releases would be significantly reduced. The residual effects of dust and PM<sub>10</sub> generated by construction activities on air quality are therefore considered to be negligible. The residual effect of emissions to air from construction vehicles and plant on local air quality is also considered to be negligible.

A quantitative assessment of the potential impacts during the operational phase was undertaken using ADMS-Roads to predict the changes in nitrogen dioxide (NO<sub>2</sub>) and particulate matter (both PM<sub>10</sub> and PM<sub>2.5</sub>) concentrations that would occur due to traffic generated by the Proposed Development. The impacts of the operational phase on local quality are predicted to be negligible for all pollutants and the residual effect is not significant.

Predicted annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations at all the new exposure locations are classified as APEC A in accordance with the London Councils Air Pollution Exposure Criteria. Compliance for annual mean PM<sub>2.5</sub> has also been predicted at all new receptors. As such, mitigation will not be required.

The proposed development is not air quality neutral for transport emissions, as such mitigation will therefore be required. A mitigation strategy has been proposed by the Project Transport Consultant which would offset emissions.

With the implementation of appropriate mitigation and offsetting of transport emissions, the development proposals will comply with national, regional and local planning policy for air quality.

# 1. INTRODUCTION

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- 1.1.1. WSP has been commissioned by London Square Developments Ltd to carry out an assessment of the potential air quality impacts arising from the proposed development at the former Greggs Factory, Twickenham, hereafter referred to as the 'Proposed Development' or 'Application Site'.
- 1.1.2. The Application Site lies within the administrative boundary of the London Borough of Richmond Upon Thames (LBRT). The Application Site currently stands as a single industrial unit previously occupied by Greggs Bakery. Immediately north of the Application Site is River Crane and two residential terraced streets are located to the west and east by Crane Road and Norcutt Road respectively, the southern boundary is bordered by Edwin Road. The Application Site is shown in Figure 1.
- 1.1.3. The proposals are to provide 116 units of residential dwelling, a B1 commercial unit and 100 parking spaces. The heating and energy arrangement will also be supported by an electric heat pump system which is emission free.
- 1.1.4. This report presents the findings of an assessment of the potential air quality impacts of the Proposed Development during both the construction and operational phases. For both phases, the type, source and significance of potential impacts are identified, and the measures that should be employed to minimise these described.
- 1.1.5. This report also considers the potential exposure of future residents of the Proposed Development to local air pollution given the Application Site is located in the Richmond Air Quality Management Area (AQMA).
- 1.1.6. A glossary of terms used in this report is provided in Appendix A.



## 2. LEGISLATION, POLICY & GUIDANCE

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### 2.1. AIR QUALITY LEGISLATION & POLICY

2.1.1. A summary of the relevant air quality legislation and policy is provided below.

#### **UK AIR QUALITY STRATEGY**

- 2.1.2. The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS)<sup>1</sup>. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation.
- 2.1.3. The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C<sub>6</sub>H<sub>6</sub>), 1,3 butadiene (C<sub>4</sub>H<sub>6</sub>), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), sulphur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), and polycyclic aromatic hydrocarbons (PAHs). The standards and objectives for the pollutants considered in this assessment are given in Appendix B.
- 2.1.4. The air quality standards are levels recommended by the Expert Panel on Air Quality Standards (EPAQS) and the World Health Organisation (WHO) with regards to current scientific knowledge about the effects of each pollutant on health and the environment.
- 2.1.5. The air quality objectives are policy based targets set by the Government, which take into account economic efficiency, practicability, technical feasibility and timescale. Some objectives are equal to the EPAQS recommended standards or WHO guideline limits, whereas others involve a margin of tolerance, i.e. a limited number of permitted exceedances of the standard over a given period.
- 2.1.6. For the pollutants considered in this assessment, there are both long-term (annual mean) and short-term standards. In the case of NO<sub>2</sub>, the short-term standard is for a 1-hour averaging period, whereas for PM<sub>10</sub> it is for a 24-hour averaging period. These periods reflect the varying impacts on health of differing exposures to pollutants, for example temporary exposure on the pavement adjacent to a busy road, compared with the exposure of residential properties adjacent to a road.
- 2.1.7. The AQS contains a framework for considering the effects of a finer group of particles known as 'PM<sub>2.5</sub>' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM<sub>10</sub>. Local Authorities are required to work towards reducing emissions/concentrations of particulate matter within their administrative area. However, there is no statutory objective given in the AQS for PM<sub>2.5</sub> at this time.

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<sup>1</sup> Department for Environment, Food and Rural Affairs (Defra) and the Devolved Administrations (2007). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 and 2)

## AIR QUALITY REGULATIONS

- 2.1.8. Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000<sup>2</sup> and the Air Quality (England) (Amendment) Regulations 2002<sup>3</sup> for the purpose of Local Air Quality Management (LAQM).
- 2.1.9. These Regulations require that likely exceedances of the AQS objectives are assessed in relation to:
- “...the quality of air at locations which are situated outside of buildings or other natural or man-made structures, above or below ground, and where members of the public are regularly present...”*
- 2.1.10. The Air Quality Standards Regulations 2010<sup>4</sup> transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM<sub>10</sub>, PM<sub>2.5</sub> and NO<sub>2</sub>. The limit values for NO<sub>2</sub> and PM<sub>10</sub> are the same concentration levels as the relevant AQS objectives and the limit value for PM<sub>2.5</sub> is a concentration of 25µg/m<sup>3</sup>.

## ENVIRONMENTAL PROTECTION ACT 1990 - CONTROL OF DUST AND PARTICULATES ASSOCIATED WITH CONSTRUCTION

- 2.1.11. Section 79 of the Environmental Protection Act 1990 gives the following definitions of statutory nuisance relevant to dust and particles:
- “Any dust, steam, smell or other effluvia arising from industrial, trade or business premises or smoke, fumes or gases emitted from premises so as to be prejudicial to health or a nuisance”;* and
- “Any accumulation or deposit which is prejudicial to health or a nuisance”*
- 2.1.12. Following this, Section 80 says that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.
- 2.1.13. There are no statutory limit values for dust deposition above which ‘nuisance’ is deemed to exist. Nuisance is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

## ENVIRONMENT ACT 1995

- 2.1.14. Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Regulations. Where the objectives are not likely to be achieved, an authority is required to designate an AQMA. For each AQMA the local authority is

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<sup>2</sup> The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928

<sup>3</sup> The Air Quality (England) (Amendment) Regulations 2002- Statutory Instrument 2002 No.3043

<sup>4</sup> The Air Quality Standards Regulations 2010 - Statutory Instrument 2010 No. 1001

required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future.

## CLEAN AIR STRATEGY

2.1.15. Defra published an updated Clean Air Strategy in 2019<sup>5</sup>, and this is aimed at tackling all sources of air pollution, making air healthier to breathe, protecting nature and boosting the economy. The strategy also sits alongside three other UK government strategies: our Industrial Strategy, our Clean Growth Strategy and our 25 Year Environment Plan.

2.1.16. The strategy proposes tough new goals to cut public exposure to particulate matter pollution, as per the recommendation by the World Health Organisation. Comprehensive action is required from all parts of government and society to participate in order to meet these goals. In particular, the Clean Air Strategy states:

*“New legislation will create a stronger and a more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanism.”*

## 2.2. PLANNING POLICY

2.2.1. A summary of the national, regional and local planning policy relevant to the Proposed Development and air quality is provided below.

### NATIONAL PLANNING POLICY

#### National Planning Policy Framework

2.2.2. The Government’s overall planning policies for England are described in the National Planning Policy Framework<sup>6</sup>. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:

- *‘... meeting the needs of the present without compromising the ability of future generations to meet their own needs*

2.2.3. One of the three overarching objectives of the NPPF is that planning should:

- *‘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.’*

2.2.4. In relation to air quality, the following paragraphs in the document are relevant:

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<sup>5</sup> Defra (2019). Clean Air Strategy 2019.

<sup>6</sup> Ministry of Housing, Communities and Local Government (2018). National Planning Policy Framework.

- Paragraph 54, which states ‘*Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition.*’
- Paragraph 103, which states ‘*Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health.*;
- Paragraph 170, which states ‘*Planning policies and decisions should contribute to and enhance the natural and local environment by: ...e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.*;
- Paragraph 180, which states ‘*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.*’
- Paragraph 181, which states ‘*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.*’;
- Paragraph 183, which states ‘*The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.*’

## REGIONAL PLANNING POLICY

### London Environment Strategy

2.2.5. The Mayor's London Environment Strategy<sup>7</sup> details a range of actions to improve the environment. Within the Strategy, air quality is one of the main areas identified as requiring improvement and the objectives of the strategy are summarised below:

- Support and empower London and its communities, particularly the most disadvantaged and those in priority locations, to reduce their exposure to poor air quality;
- Achieve legal compliance with UK and EU limits as soon as possible, including mobilising action from London Boroughs, Government and other partners; and
- Establish and achieve new, tighter air quality targets for a cleaner London by transitioning to a zero emission London by 2050, and meeting World Health Organisation health based guidance for air quality.

### The London Plan: Spatial Development Strategy for Greater London (consolidated with alterations since 2011)

2.2.6. Policy 7.14 of the London Plan<sup>8</sup> is specific to the improvement of air quality and states that development proposals should:

- *'Minimise increased exposure to existing poor air quality and make provision to address local problems of air quality';*
- *'Promote sustainable design and construction in order to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition';*
- *'Be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality';*
- *'Ensure that where provision needs to be made to reduce emissions from a development, this is usually made on site'; and*
- *'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.'*

### Draft London Plan

2.2.7. A 'consolidated' draft version of a new London Plan was produced in July 2019<sup>9</sup>, which shows all of the Mayor's suggested changes following the Examination in Public of the draft plan. In this document, Policy SI1 Improving air quality states:

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<sup>7</sup> Greater London Authority (2018). London Environment Strategy.

<sup>8</sup> Mayor of London (March 2016) The London Plan: Spatial Development Strategy for Greater London Consolidated with alterations since 2011.

<sup>9</sup> Greater London Authority (2019). The Draft London Plan - Consolidated Suggested Changes. Available at: [https://www.london.gov.uk/sites/default/files/draft\\_london\\_plan\\_-\\_consolidated\\_changes\\_version\\_-\\_clean\\_july\\_2019.pdf](https://www.london.gov.uk/sites/default/files/draft_london_plan_-_consolidated_changes_version_-_clean_july_2019.pdf)

*“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) reduce air quality benefits that result from the Mayor’s or boroughs’ activities to improve air quality*

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

- a) Development proposals must be at least air quality neutral*
- b) Development proposals should use design solutions to prevent or minimise increased exposure to existing air pollution and make provision to address local problems of air quality in preference to post-design or retro-fitted mitigation measures*
- c) 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*
- b) 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”.*

## LOCAL PLANNING POLICY

### Local Plan

- 2.2.8. The Local Plan<sup>10</sup> was adopted by the council on 3<sup>rd</sup> July 2018, and it incorporates the main modifications recommended by the Inspector and additional modifications made by the Council. Policy LP10, Local Environment Impacts, Pollution and Land Contamination states that:
- “The Council promotes good air quality design and new technologies. Developers should secure at least ‘Emissions Neutral’ development. To consider the impact of introducing new developments in areas already subject to poor air quality, the following will be required:*
- 1) an air quality impact assessment, including where necessary, modelled data.*
  - 2) mitigation measures to reduce the development’s impact upon air quality, including the type of equipment installed, thermal insulation and ducting abatement technology.*
  - 3) measures to protect the occupiers of new developments from existing sources.*
  - 4) strict mitigation for developments to be used by sensitive receptors such as schools, hospitals and care homes in areas of existing poor air quality; this also applies to proposals close to developments used by sensitive receptors.*
- 2.2.9. The Council requires submission of a Construction Management Statement (CMS) for developments outlined in the policy above. In addition, the Council will also request through planning conditions, that the GLA Regulation relating to Non-Road Mobile Machinery (NRMM) is imposed where necessary.
- 2.2.10. The Council will be preparing SPDs and/or Advice Notes to provide additional guidance on local environmental impacts, pollution, air quality, noise and construction management, which will contain further guidance and clear requirements, including methodologies, for the various assessments that may need to be submitted as part of certain types of planning applications.
- 2.2.11. Policy LP 44 – Sustainable Travel Choices states that:
- “The Council will work in partnership to promote safe, sustainable and accessible transport solutions, which minimise the impacts of development including in relation to congestion, air pollution and carbon dioxide emissions “.*
- 2.2.12. The Policy seeks to promote more sustainable modes of transport, such as walking, cycling and public transport, as well as supporting the retention and use of river transport, and efficient, safe and sustainable freight transport. The Council’s aim is to minimise impacts of developments in relation to congestion and air pollution.

## 2.3. GUIDANCE

- 2.3.1. A summary of the publications referred to in the undertaking of this assessment is provided below.

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<sup>10</sup> London Borough of Richmond upon Thames (2018). Adopted Local Plan.

## **LONDON LOCAL AIR QUALITY MANAGEMENT TECHNICAL GUIDANCE**

- 2.3.2. The Mayor of London has published guidance for use by the London Boroughs in their review and assessment work<sup>11</sup>. This guidance, referred to in this document as LLAQM.TG (16), has been used where appropriate in the assessment presented herein.

## **LOCAL AIR QUALITY MANAGEMENT REVIEW AND ASSESSMENT TECHNICAL GUIDANCE**

- 2.3.3. The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities outside of their London Boroughs in their review and assessment work<sup>12</sup>. This guidance, referred to in this document as LAQM.TG (16), has been used to assess operational phase effects because LLAQM.TG (16) does not include suitable guidance.

## **LAND-USE PLANNING & DEVELOPMENT CONTROL: PLANNING FOR AIR QUALITY**

- 2.3.4. Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance<sup>13</sup> that offers comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and the possible mitigation measures that may be implemented to minimise these impacts.

## **GUIDANCE ON THE ASSESSMENT OF DUST FROM DEMOLITION AND CONSTRUCTION**

- 2.3.5. This document<sup>14</sup> published by the IAQM was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM<sub>10</sub> impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

## **NATIONAL PLANNING PRACTICE GUIDANCE – AIR QUALITY**

- 2.3.6. This guidance<sup>15</sup> provides a number of guiding principles on how the planning process can take into account the impact of new development on air quality, and explains how much detail air quality assessments need to include for proposed developments, and how impacts on air quality can be mitigated. It also provides information on how air quality is taken into account by Local Authorities in

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<sup>11</sup> Mayor of London (May 2016) London Local Air Quality Management (LLAQM) Technical Guidance (LLAQM.TG (16))

<sup>12</sup> Defra (2018) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG (16)

<sup>13</sup> Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality

<sup>14</sup> Institute of Air Quality Management (Version 1.1 Updated June 2016). Guidance on the Assessment of Dust from Demolition and Construction

<sup>15</sup> Department of Communities and Local Government (DCLG) (2014). National Planning Practice Guidance



both the wider planning context of Local Plans and neighbourhood planning, and in individual cases where air quality is a consideration in a planning decision.

### **LONDON COUNCILS GUIDANCE FOR AIR QUALITY ASSESSMENTS**

- 2.3.7. The London Councils have published guidance<sup>16</sup> for undertaking air quality assessments in the London Boroughs, the majority of which have declared AQMAs. The guidance sets out suggested methods for undertaking such an assessment within London and provides a methodology to assist in determining the impacts of a development proposal on air quality. The focus of the document is the difference in air quality as a result of the proposed development.

### **MAYOR OF LONDON'S SUPPLEMENTARY PLANNING GUIDANCE FOR THE CONTROL OF DUST AND EMISSIONS DURING CONSTRUCTION AND DEMOLITION**

- 2.3.8. This Supplementary Planning Guidance<sup>17</sup> (SPG) builds on the voluntary guidance published in 2006 by the London Councils to establish best practice in mitigating impacts on air quality during construction and demolition work. The SPG incorporates more detailed guidance and best practice, and seeks to address emissions from NRMM through the use of a Low Emission Zone, which was introduced in September 2015.
- 2.3.9. The SPG provides a methodology for assessing the potential impact of construction and demolition activities on air quality following the same procedure as set out in the IAQM guidance. It then identifies the relevant controls and mitigation measures that should be put in place to minimise any adverse impacts. These are set out in draft in an air quality assessment report submitted with the planning application, and are then formalised post submission as an Air Quality and Dust Management Plan. Details of site air quality monitoring protocols are also provided with varying requirements depending on the size of the site and the potential risk of adverse impacts.

### **GREATER LONDON AUTHORITY: SUSTAINABLE DESIGN AND CONSTRUCTION SUPPLEMENTARY PLANNING GUIDANCE**

- 2.3.10. Section 4.3 of this SPG provides guidance on when a developer will be required to undertake an air quality assessment, how design and transport measures can be used to minimise emissions to air, and sets out emissions standards for combustion plant.
- 2.3.11. The SPG also contains guidance on assessing the air quality neutrality of a proposed development in order to comply with the London Plan and the Mayor's Air Quality Strategy. Air Quality neutral benchmarks for both transport and buildings NO<sub>x</sub> and PM<sub>10</sub> emissions are provided within the SPG.
- 2.3.12. Developments that do not exceed these benchmarks (considered separately) will be considered to be 'air quality neutral', whilst developments that exceed the benchmarks after appropriate on-site mitigation measures have been incorporated will be required to off-set any excess in emissions off site. This can be achieved by providing NO<sub>x</sub> and PM abatement measures in the vicinity of the

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<sup>16</sup> London Councils (January 2007): Air Quality and Planning Guidance – Revised version

<sup>17</sup> Mayor of London (July 2014): The control of dust and emissions during construction and demolition – Supplementary Planning Guidance.

development, such as: green planting/walls and screens, with special consideration given to planting that absorbs or suppresses pollutants; upgrade or abatement work to combustion plant; retro-fitting abatement technology for vehicles and flues; and exposure reduction. These measures can be secured by condition or Section 106 contribution. Air quality monitoring is not eligible for funding as it is not considered to contribute to actual air quality improvements.

### **AIR QUALITY NEUTRAL PLANNING SUPPORT GUIDANCE**

- 2.3.13. The Air Quality Neutral Planning Support guidance<sup>18</sup> provides a methodology for assessing the air quality neutrality of proposed developments in London.

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<sup>18</sup> AQC and ENVIRON UK Ltd (2014). Air Quality Neutral Planning Support.

## 3. SCOPE & METHODOLOGY

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### 3.1. SCOPE

3.1.1. The scope of the assessment has been determined in the following way:

- Consultation with the Environmental Health Officer (EHO) at LBRT Council to agree the scope of the assessment and the methodology;
- Review of LBRT's latest review and assessment reports<sup>19</sup> and air quality data for the area surrounding the Application Site, including data from LBRT, Defra<sup>20</sup> and the London Air websites<sup>21</sup>;
- Desk study to confirm the locations of nearby existing receptors that may be sensitive to changes in local air quality, and a review of the masterplan for the Proposed Development to establish the location of new sensitive receptors; and
- Review of the traffic data provided by the Project Transport Consultant (WSP).

3.1.2. The scope of the assessment includes consideration of the potential impacts on local air quality resulting from:

- Dust and particulate matter generated by on-site activities during the construction phase;
- Increases in pollutant concentrations as a result of exhaust emissions arising from construction traffic and plant; and
- Increases in pollutant concentrations as a result of exhaust emissions arising from traffic generated by the Proposed Development once operational.

3.1.3. In addition, the potential exposure of future residents of the Proposed Development to poor air quality will also be considered.

3.1.4. The assessment results and conclusions will be used to inform a judgement as to compliance with national, regional and local planning policy.

### 3.2. METHODOLOGY

#### CONSTRUCTION PHASE

3.2.1. Dust comprises particles typically in the size range 1-75 micrometres ( $\mu\text{m}$ ) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emission. Dust therefore, is unlikely to cause long-term or widespread changes to local air quality; however, its deposition on property and cars can cause

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<sup>19</sup> London Borough of Richmond upon Thames (2019). Air Quality Annual Status Report for 2018. ASR London Borough of Richmond upon. Available at: [https://www.richmond.gov.uk/media/17479/air\\_quality\\_annual\\_status\\_report\\_2019.pdf](https://www.richmond.gov.uk/media/17479/air_quality_annual_status_report_2019.pdf). Accessed on 17/10/2019.

<sup>20</sup> Defra Local Air Quality Management (LAQM) Support Pages. Available at: <http://laqm.defra.gov.uk/> Accessed on 23/01/2019.

<sup>21</sup> London Air Website. Available at: <http://www.londonair.org.uk/LondonAir/Default.aspx>. Accessed on 23/01/2019.

'soiling' and discolouration. This may result in complaints of nuisance through amenity loss or perceived damage caused, which is usually temporary.

- 3.2.2. The smaller particles of dust (less than 10µm in aerodynamic diameter) are known as particulate matter (PM<sub>10</sub>) and represent only a small proportion of total dust released; this includes a finer fraction, known as PM<sub>2.5</sub> (with an aerodynamic diameter less than 2.5µm). As these particles are at the smaller end of the size range of dust particles they remain suspended in the atmosphere for a longer period of time than the larger dust particles, and can therefore be transported by wind over a wider area. PM<sub>10</sub> and PM<sub>2.5</sub> are small enough to be drawn into the lungs during breathing, which in sensitive members of the public could have a potential impact on health.
- 3.2.3. An assessment of the likely significant impacts on local air quality due to the generation and dispersion of dust and PM<sub>10</sub> during the construction phase has been undertaken with reference to: the Mayor of London's SPG for the control of dust and emissions during construction and demolition; the available information for this phase of the Proposed Development provided by the Client and Project Team; and professional judgement.
- 3.2.4. The Mayor of London's SPG requires a Dusk Risk Assessment to be undertaken following the methodology published by the IAQM, which assesses the risk of potential dust and PM<sub>10</sub> impacts from the following four sources: demolition; earthworks; general construction activities and track-out<sup>22</sup>. It considers the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM<sub>10</sub> levels to assign a level of risk. Risks are described in terms of there being a low, medium or high risk of dust impacts. Once the level of risk has been ascertained, then site specific mitigation proportionate to the level of risk is identified, and the significance of residual effects determined. A summary of the IAQM assessment methodology is provided in Appendix C.
- 3.2.5. In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Application Site and in the vicinity of the Application Site itself. As information on the number of vehicles and plant associated with the construction phase was not available at the time of writing, a qualitative assessment of their impact on local air quality has been undertaken using professional judgement and by considering the following:
- The number and type of construction traffic and plant likely to be generated by this phase of the Development;
  - The number and proximity of sensitive receptors to the Application Site and along the likely routes to be used by construction vehicles; and
  - The likely duration of the construction phase and the nature of the construction activities undertaken.

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<sup>22</sup> Track-out is defined as the transport of dust and dirt from the construction/ demolition site onto the public road network, where it may deposit and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/ demolition site with dusty material, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

## OPERATIONAL PHASE

- 3.2.6. Of the pollutants included in the AQS, concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have been considered in this assessment as road traffic is a major source of these pollutants. Concentrations of these pollutants tend to be close to, or in exceedance of, the objectives in urban locations.
- 3.2.7. For the prediction of impacts due to emissions arising from road traffic during the operation of the Proposed Development, the dispersion model ADMS-Roads (version 4.1.1.0) has been used. This model uses detailed information regarding traffic flows on the local road network, surface roughness, and local meteorological conditions to predict pollutant concentrations at specific receptor locations.
- 3.2.8. Meteorological data, such as wind speed and direction, is used by the model to determine pollutant transportation and levels of dilution by the wind. Meteorological data used in the model was obtained from the Met Office observing station at Heathrow for 2017. This station is considered to provide representative data for the assessment. The wind rose and other modelling parameters are presented in Appendix F.
- 3.2.9. A summary of the traffic data and pollutant emission factors used in the assessment can be found in Appendix D. It includes details of the Annual Average Daily Traffic (AADT) flows, vehicle speeds (km/h) and the percentage of Heavy Duty Vehicles (HDVs) for the local road network in all assessment years considered. Traffic speeds were reduced at junctions in line with guidance provided in LAQM.TG (16), and using professional judgement. The road network is also presented in Figure 1.
- 3.2.10. For the assessment, three scenarios were modelled, as follows:
- 2017 – Model Verification and Baseline;
  - 2022 – Without Development; and
  - 2022 – With Development.
- 3.2.11. 2017 is the most recent year for which monitoring data and meteorological data are available to enable verification of the model results, and so this year has been used as the baseline year for this assessment. 2022 is the anticipated opening year of the Proposed Development.
- 3.2.12. The traffic flows for the ‘without development’ scenarios include flows for committed developments in the locality of the Application Site but do not include any contribution to road traffic from the Proposed Development itself. The traffic flows for the ‘with development’ scenarios include contributions to road traffic from the Proposed Development itself and the nearby committed developments.
- 3.2.13. Committed developments have been accounted for in the future scenarios in 2022, as the future traffic flows are determined by using Trip End Model Presentation Program (TEMPro) factors. These figures were provided by the Project Transport Consultant.

### Vehicle Emission Factors

- 3.2.14. Vehicle emission factors for use in the assessment have been obtained using the Emission Factor Toolkit (EFT) version 8.0.1 (published in December 2017) available on the Defra website. The EFT allows for the calculation of emission factors arising from road traffic for all years between 2015 and 2030. For the predictions of future year emissions, the toolkit considers factors such as anticipated advances in vehicle technology and changes in vehicle fleet composition, such that vehicle emissions are assumed to reduce over time. However, there is currently some uncertainty over how

representative the future predictions are. To address this uncertainty, emission rates calculated by Air Quality Consultants (AQC) Ltd's 'Calculator Using Realistic Emissions for Diesels (CURED) V3A'<sup>23</sup> have also been used. The CURED tool has been developed to address the uncertainties associated with future vehicle emissions. Table 1 provides a summary of the how the emission factors were derived in the assessment.

**Table 1 – Derivation of Vehicle Emission Factors in the Assessment**

Modelling Scenarios	Vehicle Emission Factors
2017 – Model Verification and Baseline	Defra's EFT for all modelled pollutants
2022 – Without and With Development	CURED for NO <sub>x</sub> Defra's EFT for PM <sub>10</sub> and PM <sub>2.5</sub>

3.2.15. Table 1 shows that the 2017 vehicle emission factors have not been calculated using the AQC's methodology because the latest CURED emission factors show no deviation in NO<sub>x</sub> emission rates between the years 2016 and 2019 in comparison to the Defra's EFT. Deviations can only be observed from the year 2020 onwards therefore CURED is applied to NO<sub>x</sub> emissions for opening year 2022.

3.2.16. The methodology above has been agreed with the EHO at LBRT.

#### **Selection of background concentrations**

3.2.17. Background pollutant concentrations used in the assessment have been taken from the national maps provided on the Defra website<sup>24</sup>, where background concentrations of those pollutants included within the AQS have been mapped at a grid resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2015 and 2030. The maps assume that background concentrations will improve (i.e. reduce) over time, in line with the predicted reduction in vehicle emissions and emissions from other sources. Background concentrations for 2017 have been utilised in the '2017 – model verification and baseline' scenario, whilst background concentrations for 2022 have been used to represent the opening year, both without and with development.

3.2.18. The Defra backgrounds for NO<sub>2</sub> have been adjusted as per AQC's methodology<sup>25</sup>. This allows the user to derive more realistic future background concentrations of NO<sub>2</sub> for using with the CURED emission factors. AQC produced this methodology as they found that Defra background maps tend to under-predict concentrations of NO<sub>x</sub> and NO<sub>2</sub> as a result of disparity relating to the on-road emission performance of modelled diesel vehicles. The methodology also calibrates the background concentrations against more recent monitoring data for Automatic Urban and Rural Network sites, to

<sup>23</sup> Air Quality Consultants (2018). Development of the CURED V3A Emissions Model.

<sup>24</sup> <https://uk-air.defra.gov.uk/data/laqm-background-home>

<sup>25</sup> Air Quality Consultants (2019). Deriving Background Concentrations of NO<sub>x</sub> to NO<sub>2</sub> for Use in 'CURED 3A'.

provide more realist indications of background concentrations, as opposed to the optimistic Defra mapped background.

3.2.19. The above approach has been agreed in consultation with the EHO at LBRT.

3.2.20. Further details on the background concentrations are provided in Section 4 of this report.

### **MODEL VERIFICATION AND PROCESSING OF RESULTS**

3.2.21. The ADMS-Roads dispersion model has been widely validated for this type of assessment and is considered fit for purpose. Model validation undertaken by the software developer will not have included validation in the vicinity of the Application Site.

3.2.22. To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of verification aims to minimise modelling uncertainty and systematic error by correcting modelled road-NO<sub>x</sub> results by an adjustment factor to increase confidence in the results. This was completed following the methodology specified in Chapter 7, Section 4, of LAQM.TG (16).

3.2.23. Details of the verification factor calculations are presented in Appendix E. An adjustment factor of 3.0 was obtained during the verification process, which indicated that the model was under-predicting. This factor was applied to the model road-NO<sub>x</sub> outputs prior to conversion to annual mean NO<sub>2</sub> concentrations utilising the NO<sub>x</sub> to NO<sub>2</sub> calculator (version 6.1, released November 2017) provided by Defra<sup>26</sup>.

3.2.24. In the absence of relevant local monitoring of PM<sub>10</sub> and PM<sub>2.5</sub> the modelled concentrations of these pollutants have been adjusted by the same factor as for road-NO<sub>x</sub>. The total concentrations are then determined by adding the adjusted modelled concentrations and relevant background concentrations. The number of days with PM<sub>10</sub> concentrations greater than 50µg/m<sup>3</sup> was then estimated using the relationship with the annual mean concentration described in LLAQM.TG (16).

3.2.25. Once processed, the predicted concentrations were compared against the relevant AQS objectives for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> set out in Appendix B.

### **Selection of Sensitive Receptors**

3.2.26. Sensitive locations are places where the public or sensitive ecological habitats may be exposed to pollutants resulting from activities associated with the Proposed Development. These will include locations sensitive to an increase in dust deposition and PM<sub>10</sub> exposure as a result of on-site construction activities, and locations sensitive to exposure to gaseous pollutants emitted from the exhausts of construction and operational traffic associated with the Proposed Development

### **CONSTRUCTION PHASE**

3.2.27. The IAQM assessment is undertaken where there are:

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<sup>26</sup> Defra NO<sub>x</sub> to NO<sub>2</sub> Calculator. Available at: <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxsector> [Accessed: 23.1.19].

- 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or
- 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

3.2.28. It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

### OPERATIONAL PHASE

- 3.2.29. Locations that are sensitive to pollutants emitted from engine exhausts, include places where members of the public are likely to be regularly present over the period of time prescribed in the AQS. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 15-minute mean or 1-hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24-hour mean or annual mean) may be more appropriate. Box 1.1 of LLAQM.TG (16) provides examples of the locations where the air quality objectives should/should not apply.
- 3.2.30. To complete the assessment of operational phase impacts, a number of 'receptors' representative of locations of relevant public exposure were identified at which pollution concentrations were predicted. Receptors have been located adjacent to the roads that are likely to experience the greatest change in traffic flows or composition, and therefore NO<sub>2</sub> and particulate matter concentrations, as a result of the Proposed Development. In addition, there are no designated ecological receptors near the Application Site, hence, further assessment is not required.
- 3.2.31. To complete the exposure assessment, pollution concentrations were also predicted at a number of locations within the Application Site. The receptors have been selected to be representative at each façade of the Proposed Development.
- 3.2.32. The locations of the assessment receptors are shown on Figure 1 and listed in Table 2 below.

**Table 2 - Receptor Locations Used in the Assessment**

Receptor	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
E1	Residential property on Edwin Road	515342	173211	1.5
E2	Residential property on Colne Road	515312	173152	1.5
E3	Residential property on Gould Road	515246	173327	1.5
E4	Residential property on Crane Road	515270	173326	1.5
E5	Residential property on Crane Road	515292	173194	1.5
E6	Residential property on May Road	515206	173282	1.5
E7	Residential property on May Road	515234	173151	1.5



Receptor	Description/ Address	Grid Reference		Height above Ground Level (m)
		X	Y	
E8	Residential property on May Road	515262	173131	1.5
E9	Residential property on May Road	515302	173039	1.5
E10	Residential property on Andover Road	514869	173054	1.5
E11	Residential property on Meadway	514909	172949	1.5
E12	Residential property on Staines Road (first floor)	514979	172977	4.5
E13	Residential property on Health Road	515461	173070	1.5
E14	Residential property on Health Road (first floor)	515774	173141	4.5
E15	Residential property on Kings Street (first floor)	516188	173161	4.5
E16	Residential property on Kings Street	516170	173088	1.5
E17	Residential property on York Street (first floor)	516296	173338	4.5
E18	Residential property on London Road (first floor)	516251	173334	4.5
E19	Residential property on London Road	516040	173737	1.5
E20	Residential property on The Green	515490	173058	1.5
E21	Trafalgar Infant School	514741	173070	1.5
E22	Twickenham Primary Academy	515478	173076	1.5
E23	Archdeacon Cambridge's CoE Primary School	515290	172804	1.5
N1	New receptor within the Proposed Development	515344	173227	1.5
N2	New receptor within the Proposed Development	515349	173292	1.5
N3	New receptor within the Proposed Development	515371	173212	1.5
N4	New receptor within the Proposed Development	515254	173329	1.5
N5	New receptor within the Proposed Development	515221	173338	1.5
N6	New receptor within the Proposed Development	515322	173362	1.5

### 3.3. SIGNIFICANCE CRITERIA

#### CONSTRUCTION PHASE

- 3.3.1. The IAQM assessment methodology recommends that significance criteria are only assigned to the identified risk of dust impacts occurring from a construction activity with appropriate mitigation measures in place. For almost all construction activities, the application of effective mitigation should prevent any significant effects occurring to sensitive receptors and therefore the residual effect will normally be negligible.
- 3.3.2. For the assessment of the impact of exhaust emissions from plant used on-site and construction vehicles accessing and leaving the Site on local concentrations of NO<sub>2</sub> and particulate matter, the significance of residual effects have been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance, which are described below.
- 3.3.3. A quantitative assessment for the construction phase has not been made, as it is anticipated that the number of construction vehicles will not exceed the threshold<sup>27</sup> detailed in the EPUK/ IAQM guidance. Hence the overall impact is not considered to be significant and further assessment is not be required.

#### OPERATIONAL PHASE

- 3.3.4. The approach provided in the EPUK/IAQM guidance has been used within this assessment to assist in describing the air quality effects of additional emissions from traffic generated by the Proposed Development once operational.
- 3.3.5. This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in Table 3.

**Table 3 - Impact Descriptors for Individual Receptors**

Long term average concentration at receptors in assessment year	% Change in Concentration Relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% AQAL	Negligible	Slight	Moderate	Moderate

<sup>27</sup> The EPUK/IAQM guidance document Planning for Air Quality provides criteria which can be used to determine if a detailed assessment of air quality is required. For on-road construction vehicles (HGVs), a detailed assessment is not required if there is likely to be a permanent change of less than 25 AADT within or adjacent to an AQMA. In the absence of detailed construction information, HGV flows are estimated to be in the region of 10-50 AADT, however, this will be for the duration of the construction works only.

95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

Notes

AQAL = Air Quality Assessment Level, which for this assessment related to the UK Air Quality Strategy objectives.

Where the %change in concentrations is <0.5%, the change is described as 'Negligible' regardless of the concentration.

When defining the concentration as a percentage of the AQAL, 'without scheme' concentration should be used where there is a decrease in pollutant concentration and the 'with scheme;' concentration where there is an increase.

Where concentrations increase, the impact is described as adverse, and where it decreases as beneficial.

- 3.3.6. The EPUK/IAQM guidance notes that the criteria in Table 3 should be used to describe impacts at individual receptors and should be considered as a starting point to make a judgement on significance of effects, as other influences may need to be accounted for. The EPUK/IAQM guidance states that the assessment of overall significance should be based on professional judgement, considering several factors, including:
- The existing and future air quality in the absence of the development;
  - The extent of current and future population exposure to the impacts; and
  - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.
- 3.3.7. The EPUK/IAQM guidance states that for most road transport related emissions, long-term average concentrations are the most useful for evaluating the impacts. The guidance does not include criteria for determining the significance of the effect on hourly mean NO<sub>2</sub> concentrations or daily mean PM<sub>10</sub> concentrations. The significance of effects of hourly mean NO<sub>2</sub> and daily mean PM<sub>10</sub> concentrations arising from the operational phase have therefore been determined qualitatively using professional judgement and the principles described above.
- 3.3.8. The EPUK/IAQM guidance says that 'Where the air quality is such that an air quality objective at the building facade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means. For people working at new developments in this situation, the same will not be true as occupational exposure standards are different, although any assessment may wish to draw attention to the undesirability of the exposure.'
- 3.3.9. In addition to these criteria, the flow chart method for determining the significance of the predicted air quality impacts of a proposed development and published in the London Councils guidance for air quality assessments has been used. A summary of the flow chart for determining significance is shown below in Table 4.

**Table 4 - Summary of the London Councils flow chart method for assessing the significance of air quality impacts**

<b>Effect of Development</b>	<b>Outcome</b>
Will development interfere with or prevent implementation of measures in the AQAP	Air Quality is an overriding consideration.
Is development likely to cause a worsening of air quality or introduce new exposure into the AQMA?	Air Quality is a highly significant consideration.
Would the development contribute to air quality exceedances or lead to the designation of a new AQMA?	Air Quality is a highly significant consideration.
Is the development likely to increase emissions of or increase/introduce new exposure to PM <sub>10</sub>	Air Quality is a significant consideration.
None of the above.	Air Quality is not a significant consideration but mitigation measures may still need to be considered.

3.3.10. In determining both the significance of new exposure to air pollution and the levels of mitigation required within the Proposed Development Site, consideration was given to the Air Pollution Exposure Criteria (APEC) published in the London Councils guidance for air quality assessments and shown in Table 5.

**Table 5 - London Councils Air Pollution Exposure Criteria**

<b>APEC Level</b>	<b>Applicable Range Annual average NO<sub>2</sub></b>	<b>Applicable Range PM<sub>10</sub></b>	<b>Recommendation</b>
A	> 5% below national objective	Annual Mean > 5% below national objective 24 hour mean > 1 day less than the national objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
B	Between 5% below or above national objective	Annual Mean Between 5% below or above national objective 24 hour mean Between 1 day above or below	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g., maximise distance from pollution source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.

APEC Level	Applicable Range Annual average NO <sub>2</sub>	Applicable Range PM <sub>10</sub>	Recommendation
		the national objective	
C	> 5% above national objective	Annual Mean > 5% above national objective 24 hour mean > 1 day more than the 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.

### MAYOR OF LONDON'S AIR QUALITY NEUTRAL POLICY

- 3.3.11. The air quality neutral assessment has been undertaken using the Gross Internal Area (GIA) and anticipated development trip rates of each proposed use once operational to calculate the NO<sub>x</sub> and PM<sub>10</sub> emissions from the transport elements of the Proposed Development.
- 3.3.12. No combustion sources will be installed within the Proposed Development because the heating and energy arrangement will be supported by a heat pump system. Therefore, building emissions and associated benchmarks have not been considered further.
- 3.3.13. Data for the Proposed Development air quality neutral assessment, calculated from information provided by the Project Team, are presented in Table 6.

**Table 6 - Parameters used in the Air Quality Neutral Assessment**

Land Use Class	GIA (m <sup>2</sup> )	Annual two-way trips
Office - B1	175	1,895
Residential dwellings - C3	11,681	71,633

- 3.3.14. The results were compared to the benchmarks set out in the SPG, which are shown in Table 7 below.

**Table 7 - Emission Benchmarks**

Land Use Class	Benchmark Category	NO <sub>x</sub> (kg/year)	PM <sub>10</sub> (kg/year)
Office - B1	Transport Emission Benchmark (TEB) for outer London	12.0	2.0
Residential dwellings - C3		180.1	31.0
Total TEB		192.1	33.0

### 3.4. LIMITATIONS & ASSUMPTIONS

- 3.4.1. As suitable information for the construction phase of the Proposed Development was not available professional judgement has been used in the completion of this part of the assessment. For instance, the extent of demolition and earthworks were assumed using Google Earth and plans provided by the Project Architect respectively.
- 3.4.2. There are uncertainties associated with both measured and predicted concentrations. The model (ADMS-Roads) used in this assessment relies on input data (including predicted traffic flows), which also have uncertainties associated with them. The model itself simplifies complex physical systems into a range of algorithms. In addition, local micro-climatic conditions may affect the concentrations of pollutants that the ADMS-Roads model will not take into account.
- 3.4.3. To reduce the uncertainty associated with predicted concentrations, model verification has been carried out following guidance set out in LAQM.TG (16). As the model has been verified against local monitoring data and adjusted accordingly, there can be reasonable confidence in the predicted concentrations. In order to demonstrate the increase in certainty, the Root Mean Square Error (RMSE) was  $14.6\mu\text{g}/\text{m}^3$  and  $2.0\mu\text{g}/\text{m}^3$  before and after the verification process respectively.
- 3.4.4. The traffic data are obtained from both Automatic Traffic Counters (ATC) and Department for Transport (DfT)'s traffic count. Average speeds from the ATC and speed limits have been used in the assessment. The traffic flows for the future years were determined by using the TEMpro factors. The traffic data were provided by the Project Transport Consultant and it has assumed that the data are correct.

## 4. BASELINE CONDITIONS

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### 4.1. LBRT'S REVIEW & ASSESSMENT OF AIR QUALITY

- 4.1.1. The LBRT has designated a borough wide AQMA as a consequence of their Review and Assessment work. The Application Site lies within this AQMA designated due to exceedances of the AQS objectives for annual mean NO<sub>2</sub> and 24-hour mean PM<sub>10</sub> concentrations.
- 4.1.2. LBRT has a draft Air Quality Action Plan<sup>28</sup> (AQAP) published in 2017. It details a number of measures proposed to reduce concentrations of NO<sub>2</sub> and PM<sub>10</sub> in the AQMA. These measures include:
- Include air quality as a key standalone measure in the Borough's Local Plan<sup>29</sup>.
  - Adoption of AQ Supplementary Planning Guidance to ensure emissions from new development is minimised and effective mitigation is integrated in scheme design.
  - Promotion and increased use of Love Clean Air website (south London cluster).
  - Lobby for Cleaner buses in areas of poor air quality

### 4.2. LOCAL EMISSION SOURCES

- 4.2.1. The Application Site is located in an area where air quality is mainly influenced by emissions from road transport using Gould Road, May Road, Crane Road, Edwin Road and Norcutt Road.
- 4.2.2. Review of the Environment Agency's Public Register<sup>30</sup> indicates that there are no industrial pollution sources in the immediate vicinity of the site that will influence the local air quality.

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<sup>28</sup> London Borough of Richmond Upon Thames (2017) Air Quality Action Plan 2017-2022.

<sup>29</sup> London Borough of Richmond Upon Thames (2018). Adopted Local Plan.

<sup>30</sup> Environment Agency. Public Registers website. Available at <https://environment.data.gov.uk/public-register/view/index>.

### 4.3. DEFRA BACKGROUND AIR QUALITY DATA

**Table 8 – Defra Background Concentrations for 2017 and 2022 ( $\mu\text{g}/\text{m}^3$ )**

Grid Square (centre on O.S. Grid Reference)		2017			2022		
X	Y	CURED NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	CURED NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )
514500	172500	22.0	15.1	9.8	18.5	14.7	9.4
514500	173500	24.0	15.7	10.2	20.3	15.3	9.7
515500	172500	21.7	15.1	9.9	18.3	14.7	9.4
515500	173500	24.1	15.7	10.2	20.3	15.2	9.7
516500	173500	24.1	16.0	10.3	20.1	15.4	9.8

4.3.1. Table 8 summarises the background pollutant concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> for 2017 that were utilised in the assessment. All the annual mean background concentrations are well below the relevant objectives.

### 4.4. LOCAL AUTHORITY AIR QUALITY MONITORING DATA

#### Annual mean NO<sub>2</sub> Concentrations

4.4.1. Annual mean NO<sub>2</sub> concentrations measured at monitoring locations by LBRT within 1km of the Application Site are provided in Table 9 and shown in Figure 2.

**Table 9 – LBRT Air Quality Monitoring Data for 2014-2018**

Site ID	Site Name	Site Type	Annual Mean NO <sub>2</sub> Concentration ( $\mu\text{g}/\text{m}^3$ )				
			2014	2015	2016	2017	2018
RHG	Mobile Air Quality Unit, Chertsey Rd, TW2	Automatic Roadside	42	-	-	37	34
9	Hampton Road	Kerbside	48	42	45	40	40
13	Whitton Road	Kerbside	47	42	42	40	39
14	Cross Deep	Kerbside	45	39	40	36	36
31	A316 (near Chudleigh Rd)	Roadside	<u>62</u>	54	54	52	49



Site ID	Site Name	Site Type	Annual Mean NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )				
			2014	2015	2016	2017	2018
32	Kings Street	Roadside	<u>73</u>	<u>62</u>	<u>64</u>	59	56
33	Heath Road	Roadside	<u>69</u>	<u>61</u>	<u>61</u>	53	52
58	London Road	Kerbside	50	46	50	47	43
59	Whitton Road	Kerbside	42	40	44	39	40
61	London Road	Roadside	54	48	49	45	43
65	York Street	Kerbside	-	-	<u>75</u>	<u>68</u>	55
Rut 01	Civic Centre, York St	Automatic Roadside	56	45	50	51	38

Note: Data in **bold** indicates exceedance of the NO<sub>2</sub> annual mean AQO of 40 µg/m<sup>3</sup>.  
 Data in **bold and underlined** indicates NO<sub>2</sub> annual means in excess of 60 µg/m<sup>3</sup>, indicating a potential exceedance of the NO<sub>2</sub> hourly mean AQS objective.  
 - indicates no data available  
 Source: London Borough of Richmond upon Thames ASR 2019.

4.4.2. The monitoring data above show that the majority of monitoring locations recorded exceedances of the annual mean NO<sub>2</sub> objective of 40µg/m<sup>3</sup> between 2014 and 2018. Sporadic compliance has been recorded at monitoring locations RHG, 14 and 59 in the past 5 years. As the majority of monitoring locations are located adjacent to heavily trafficked roads, these locations are not considered to be representative of the Application Site due to its urban background location.

4.4.3. Trend analysis indicates no clear pattern in annual mean NO<sub>2</sub> reduction for majority of the monitoring sites in LBRT. However, improvement in annual mean NO<sub>2</sub> is evident at site 13, 31, 32, 33 and 6.

### Hourly mean NO<sub>2</sub> concentrations

4.4.4. Monitoring location RHG recorded compliance for hourly mean NO<sub>2</sub> concentrations in the last 5 years, and is the nearest monitor with available information. Monitoring data for site Rut 01 are not available.

### PM<sub>10</sub> Concentrations

4.4.5. The nearest PM<sub>10</sub> monitoring is undertaken at location RHG, and compliance for annual mean and 24-hour mean PM<sub>10</sub> concentrations has been recorded from 2014 to 2018.

## 4.5. LAEI BACKGROUND AIR QUALITY DATA

- 4.5.1. The LAEI includes detailed map of annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations across London in 2013 and 2020. As 2022 is the opening year for the Proposed Development, it is reasonable to use the 2020 mapping data to provide a good indication of the potential future baseline pollutant levels in the vicinity of the Application Site.
- 4.5.2. There are no exceedances of the annual mean objectives for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> indicated by the 2020 LAEI data.
- 4.5.3. The 2020 LAEI maps for annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are presented in Figures 3 to 5.

## 5. ASSESSMENT OF IMPACTS

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### 5.1. CONSTRUCTION PHASE

#### DUST AND PM<sub>10</sub> ARISING FROM ON-SITE ACTIVITIES

- 5.1.1. Construction activities that have the potential to generate and/or re-suspend dust and PM<sub>10</sub> include:
- Site clearance and preparation including demolition activities;
  - Preparation of temporary access/egress to the Application Site and haulage routes;
  - Earthworks;
  - Materials handling, storage, stockpiling, spillage and disposal;
  - Movement of vehicles and construction traffic within the Application Site (including excavators and dumper trucks);
  - Use of crushing and screening equipment/plant;
  - Exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown;
  - Construction of buildings, roads and areas of hardstanding alongside fabrication processes;
  - Internal and external finishing and refurbishment; and
  - Site landscaping after completion.
- 5.1.2. The majority of the releases are likely to occur during the 'working week'. However, for some potential release sources (e.g. exposed soil produced from significant earthwork activities) in the absence of dust control mitigation measures, dust generation has the potential to occur 24 hours per day over the period during which such activities are to take place.

#### ASSESSMENT OF POTENTIAL DUST EMISSION MAGNITUDE

- 5.1.3. The IAQM assessment methodology has been used to determine the potential dust emission magnitude for the following four different dust and PM<sub>10</sub> sources: demolition; earthworks; construction; and, trackout. The findings of the assessment are presented below.

##### Demolition

- 5.1.4. The total volume of buildings to be demolished on site is more than 50,000m<sup>3</sup>, with potentially dusty construction material (e.g. concrete), on-site crushing and screening, and with demolition activities occurring more than 20m above ground level. Therefore, the potential dust emission magnitude is considered to be large for demolition activities.

##### Earthworks

- 5.1.5. The total area of the Application Site is more than 10,000m<sup>2</sup>, the soil type is clay and therefore potentially dusty when moisture content is low, and the total material that will be moved is estimated to be more than 100,000 tonnes. It is also estimated that more than 10 heavy earth moving vehicles will be active at any one time, and that the formation of bunds higher than 8m will occur. Therefore, the potential dust emission magnitude is considered to be large for earthwork activities

##### Construction

- 5.1.6. The total volume of buildings to be constructed on the Application Site will be approximately 90,000m<sup>3</sup> (which lies between the IAQM range of 25,000m<sup>3</sup> and 100,000m<sup>3</sup>) with potentially dusty

construction materials being used. In addition, on site concrete batching will occur. Therefore, the potential dust emission magnitude is considered to be medium for construction activities.

### Trackout

- 5.1.7. In the absence of construction traffic data, it has been estimated that between 10 and 50 HDV (>3.5t) outward movements in any one day travelling on moderately dusty surface materials. Due to the size of the site, it is also assumed that the length of unpaved roads within Application Site will be between 50 and 100m. Therefore, the potential dust emission magnitude is considered to be medium for trackout.
- 5.1.8. Table 10 provides a summary of the potential dust emission magnitude determined for each construction activity considered.

**Table 10 - Potential Dust Emission Magnitude**

Activity	Dust Emission Magnitude
Demolition	Large
Earthworks	Large
Construction Activities	Medium
Trackout	Medium

### ASSESSMENT OF SENSITIVITY OF THE STUDY AREA

- 5.1.9. A windrose generated using the meteorological data used for the dispersion modelling of operational phases impacts is provided in Appendix F. This shows that the prevailing wind direction is from the west and south west. Therefore, receptors located on Norcutt Road (downwind locations east and north east of the Application Site) are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.
- 5.1.10. Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. Within 50m from the Application Site, there are 10 to 100 residential units located in the immediate boundary. The annual mean PM<sub>10</sub> background concentration in the vicinity of the Application site is 15.5µg/m<sup>3</sup><sup>31</sup>. As such, this area is of high sensitivity to dust soiling and human health effects due to increase in ambient PM<sub>10</sub> concentrations. Gould Road and Edwin Road are the main routes that construction vehicles will use, so residential receptors along these links are likely to be affected by dust trackout.
- 5.1.11. There are no designated ecological receptors near the Application Site.

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<sup>31</sup> 2019 Defra background obtained from grid square 515500, 173500.

5.1.12. Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes in dust and PM<sub>10</sub> has been derived for each of the construction activities considered. The results are shown in Table 11.

**Table 11 - Sensitivity of the Study Area**

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	High
Human Health	Low	Low	Low	Low

**Risk of Impacts**

5.1.13. The predicted dust emission magnitude has been combined with the defined sensitivity of the area to determine the risk of impacts during the construction phase, prior to mitigation. Table 12 below provides a summary of the risk of dust impacts for the Proposed Development. The risk category identified for each construction activity has been used to determine the level of mitigation required.

**Table 12 - Summary Dust Risk Table to Define Site Specific Mitigation**

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High Risk	High Risk	Medium Risk	Medium Risk
Human Health	Medium Risk	Low Risk	Low Risk	Low Risk

**CONSTRUCTION VEHICLES & PLANT**

- 5.1.14. The greatest impact on air quality due to emissions from vehicles and plant associated with the construction phase will be in the areas immediately adjacent to the site access. It is anticipated that construction traffic will access the site via Gould Road and Edwin Road. Due to the size of the Application Site, it is considered likely that the construction traffic will be low to medium risk of dust Trackout in comparison to the existing traffic flows on these roads.
- 5.1.15. Final details of the exact plant and equipment likely to be used will be determined by the appointed contractor, it is considered likely to comprise dump trucks, tracked excavators, diesel generators, asphalt spreaders, rollers, compressors and trucks. The number of plant and their location within the Application Site are likely to be variable over the construction period.
- 5.1.16. Based on the current local air quality in the area, the close proximity of sensitive receptors to the roads likely to be used by construction vehicles, and the likely numbers of construction vehicles and plant that will be used, the impacts are therefore considered to be of moderate to slight adverse significance according to the assessment significance criteria before the implementation of mitigation measures. This is determined following the criteria detailed in section 3.2.5.

## 5.2. OPERATIONAL PHASE

5.2.1. Full results of the dispersion modelling are presented in Appendix G and a summary is provided below.

### ANNUAL MEAN NO<sub>2</sub> CONCENTRATIONS

- 5.2.2. The AQS objective for annual mean NO<sub>2</sub> concentrations is 40µg/m<sup>3</sup>. In the 2017 baseline scenario, NO<sub>2</sub> concentrations at 6 out of 23 existing receptors exceed the AQS objective. The highest concentration is 47.2µg/m<sup>3</sup> predicted at Receptor E15 (first floor residential receptor on King Street).
- 5.2.3. In 2022, concentrations predicted at all existing receptors are below the AQS objective both without and with the Proposed Development. The highest concentration is predicted 35.8µg/m<sup>3</sup> predicted at Receptor E16 (ground floor residential receptor on Kings Street) when the Proposed Development is operational.
- 5.2.4. The greatest predicted change in annual mean NO<sub>2</sub> concentration in 2022 due to the Proposed Development is 0.2µg/m<sup>3</sup>, predicted at Receptor E11 (ground floor residential property on Meadway); and this is less than 1% of the relevant AQS objective. Therefore, in accordance with the EPUK/ IAQM guidance, the impacts on annual mean NO<sub>2</sub> concentrations are negligible at all existing receptors. The Proposed Development is also not predicted to cause any new exceedances of the AQS objective (even by taking the RMSE of 2µg/m<sup>3</sup> into consideration).
- 5.2.5. The results indicate that concentrations at the new exposure locations will meet the AQS objectives and are therefore classified as APEC Level A (no mitigation required).

### HOURLY MEAN NO<sub>2</sub> CONCENTRATIONS

- 5.2.6. The annual mean NO<sub>2</sub> concentrations at all receptors predicted by the model are all below 60µg/m<sup>3</sup>, and therefore hourly mean NO<sub>2</sub> concentrations are unlikely to cause a breach of the hourly mean AQS objective. The impact of the Proposed Development on hourly mean NO<sub>2</sub> concentrations at existing sensitive receptors is considered to be negligible.

### ANNUAL MEAN PM<sub>10</sub> CONCENTRATIONS

- 5.2.7. Predicted PM<sub>10</sub> concentrations are well below the annual mean objective of 40µg/m<sup>3</sup> at all existing receptors within all modelled scenarios.
- 5.2.8. The highest concentration is 19.4µg/m<sup>3</sup> predicted at Receptor E16 when the Proposed Development is operational. The greatest change in annual mean PM<sub>10</sub> is 0.04µg/m<sup>3</sup>, and this is less than 1% of the AQS objective. Therefore, the resulting impact is negligible at all existing receptors for annual mean PM<sub>10</sub> concentrations.
- 5.2.9. The predicted annual mean PM<sub>10</sub> concentrations at the new exposure locations are all well below the AQS objective and are therefore classified as APEC A (no mitigation required).

### DAILY MEAN PM<sub>10</sub> CONCENTRATIONS

- 5.2.10. The AQS objective for daily mean PM<sub>10</sub> concentrations is 50µg/m<sup>3</sup> to be exceeded no more than 35 times a year. The results indicate that both existing and future receptors will not be exposed to daily mean PM<sub>10</sub> concentrations which are in breach of this objective. The impacts on daily mean PM<sub>10</sub> concentrations at all existing receptors are negligible.

## ANNUAL MEAN PM<sub>2.5</sub> CONCENTRATIONS

- 5.2.11. Predicted annual mean concentrations of PM<sub>2.5</sub> are all well below AQS objective of 25µg/m<sup>3</sup> in all modelled scenarios.
- 5.2.12. In 2022, the greatest predicted change in annual mean PM<sub>2.5</sub> concentrations due to the Proposed Development is less than 0.02µg/m<sup>3</sup> across all existing receptors. The impacts on annual mean PM<sub>2.5</sub> concentration for all existing receptors are negligible in accordance to the EPUK/ IAQM guidance.

## AIR QUALITY NEUTRAL ASSESSMENT

- 5.2.13. A summary of the findings of the air quality neutral assessment is presented in Table 13.

**Table 13 - Summary of Air Quality Neutral Assessments**

Category	Parameter	NO <sub>x</sub> (kg/annum)	PM <sub>10</sub> (kg/annum)
Transport Emissions	Benchmark	192.1	33.0
	Development	295.5	50.7
	Category Difference	103.4	17.7
	<i>Air Quality neutral?</i>	<b>No</b>	<b>No</b>

- 5.2.14. The transport emissions for NO<sub>x</sub> and PM<sub>10</sub> are above the benchmark values and as such, the Proposed Development is not air quality neutral and mitigation measures will be required to address these. Further details on these are given in Section 6.2.

## 6. MITIGATION & RESIDUAL EFFECTS

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### 6.1. CONSTRUCTION PHASE

6.1.1. Based on the assessment results, in which high dust risks have been identified for construction phase activities associated with the Proposed Development, recommended mitigation measures are given below.

#### General Communication

- A stakeholder communications plan that includes community engagement before work commences on site should be developed and implemented.
- The name and contact details of person(s) accountable for air quality and dust issues should be displayed on the site boundary. This may be the environment manager/engineer or the site manager. The head or regional office contact information should also be displayed.

#### General Dust Management

- A Dust Management Plan (DMP), which may include measures to control other emissions, in addition to the dust and PM<sub>10</sub> mitigation measures given in this report, should be developed and implemented, and approved by the Local Authority. In London, additional measures may be required to ensure compliance with the Mayor of London's guidance. The DMP may include a requirement for monitoring of dust deposition, dust flux, real-time PM<sub>10</sub> continuous monitoring and/or visual inspections.

#### Site Management

- All dust and air quality complaints should be recorded and causes identified. Appropriate remedial action should be taken in a timely manner with a record kept of actions taken including of any additional measures put in-place to avoid reoccurrence
- The complaints log should be made available to the local authority on request.
- Any exceptional incidents that cause dust and/or air emissions, either on- or offsite should be recorded, and then the action taken to resolve the situation recorded in the log book.
- Regular liaison meetings with other high-risk construction sites within 500m of the site boundary should be held, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.

#### Monitoring

- Daily on-site and off-site inspections should be undertaken, where receptors (including roads) are nearby to monitor dust. The inspection results should be recorded and made available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
- Regular site inspections to monitor compliance with the DMP should be carried out, inspection results recorded, and an inspection log made available to the local authority when asked.
- The frequency of site inspections should be increased when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.



- Dust deposition, dust flux, or real-time PM<sub>10</sub> continuous monitoring locations should be agreed with the Local Authority. Where possible baseline monitoring should start at least three months before work commences on site or, if it a large site, before work on a phase commences.

### **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 practicable.
- Where practicable, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
- Where practicable, 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 appropriately.
- Where practicable, cover, seed or fence stockpiles to prevent wind whipping.

### **Operating vehicle/machinery and sustainable travel**

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
- Ensure all vehicle operators 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.
- A maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas should be imposed (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).
- A Construction Logistics Plan should be produced to manage the sustainable delivery of goods and materials.
- A Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing) should be considered.

### **Operations**

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

### **Waste management**

- 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 effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- 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 tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
- Where practicable, only remove the cover in small areas during work and not all at once.
- Stockpile surface areas should be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Where practicable, windbreak netting/screening should be positioned around material stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations, to provide a physical barrier between the Application Site and the surroundings.
- Where practicable, stockpiles of soils and materials should be located as far as possible from sensitive properties, taking account of the prevailing wind direction.
- During dry or windy weather, material stockpiles and exposed surfaces should be dampened down using a water spray to minimise the potential for wind pick-up.

### Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- 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.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust (*desirable*).
- All construction plant and equipment should be maintained in good working order and not left running when not in use.

### Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being in frequent use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.

- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Where practicable, hard surfaced haul routes should be installed, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10m from receptors where possible.

6.1.2. Detailed mitigation measures to control construction traffic should be discussed with LBRT to establish the most suitable access and haul routes for the site traffic. The most effective mitigation will be achieved by ensuring that construction traffic does not pass along sensitive roads (for example residential roads such as Crane Road, Edwin Road and May Road, congested roads, or via unsuitable junctions, etc.) where possible, and that vehicles are kept clean (through the use of wheel washers, etc.) and sheeted when on public highways. Timing of large-scale vehicle movements to avoid peak hours on the local road network will also be beneficial.

## **RESIDUAL EFFECTS**

6.1.3. The residual effects of dust and PM<sub>10</sub> generated by construction activities following the application of the mitigation measures described above and good site practice is considered to be negligible.

6.1.4. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be not significant.

## **6.2. OPERATIONAL PHASE**

### **MITIGATION**

6.2.1. The change in pollutant concentrations attributable to traffic emissions during the operational phase of the Proposed Development (i.e. impacts on local air quality) are negligible for all pollutants, and therefore, no mitigation is required.

6.2.2. Predicted annual NO<sub>2</sub> and PM<sub>10</sub> concentrations at all the new exposure locations are classified as APEC A. Compliance for annual mean PM<sub>2.5</sub> has also been predicted at all new receptors. As such, mitigation will not be required.

6.2.3. The Proposed Development is not air quality neutral in terms of transport emissions, as such mitigation will be required to offset the emissions. The following mitigation strategy has been proposed by the Project Transport Consultant:

- Electric car charging outlets for a minimum of 20% of the parking spaces with the potential to provide 100% (electric vehicle) EV chargers for all the parking spaces at a later stage if required;
- The applicant will be providing a contribution to a new car club on Edwin Road; and
- Provision of travel plan incentives such as free car club membership for the future residents.

## RESIDUAL EFFECTS

- 6.2.4. The Proposed Development is predicted to cause a very marginal increase in NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations and the new receptors will comply with the relevant objectives. On this basis, the residual effects of the Proposed Development on all relevant pollutants are not significant.

## 7. CONCLUSIONS

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- 7.1.1. A qualitative assessment of the potential impacts on local air quality from construction activities has been carried out for this phase of the Proposed Development using the IAQM methodology. This assessment identified high to medium risk of dust soiling impacts and medium to low risk of increases in particulate matter concentrations due to construction activities. However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and PM<sub>10</sub> releases would be significantly reduced. The residual effects of dust and PM<sub>10</sub> generated by construction activities on air quality are therefore considered to be negligible. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be not significant.
- 7.1.2. A quantitative assessment of the potential impacts during the operational phase was undertaken using ADMS-Roads to predict the changes in NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations that would occur due to traffic generated by the Proposed Development. The assessment was undertaken with a conservative approach, and to increase confidence in the results, measures were taken to minimise uncertainty in the modelling process. The impacts of the operational phase on local air quality were predicted to be negligible for all pollutants and the residual effect was assessed as not significant.
- 7.1.3. Predicted annual NO<sub>2</sub> and PM<sub>10</sub> concentrations at all the new exposure locations are classified as APEC A in accordance with the London Councils Air Pollution Exposure Criteria. Compliance for annual mean PM<sub>2.5</sub> has also been predicted at all new receptors. As such, mitigation will not be required.
- 7.1.4. The Proposed Development is not air quality neutral for transport emissions, as such mitigation will therefore be required. A mitigation strategy has been proposed by the Project Transport Consultant which would offset emissions.
- 7.1.5. It is considered that the development proposals will comply with national, regional and local policy for air quality with the application of appropriate mitigation.