Sharpe Refinery Service (Hydro-Carbons) Ltd

ARLINGTON WORKS

Air Quality Assessment

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JULY 2018

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Sharpe Refinery Service (Hydro-Carbons) Ltd

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Air Quality Assessment

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WSP has been commissioned by Sharpe Refinery Service (Hydro-Carbons) Ltd to carry out an assessment of the potential air quality impacts arising from the proposed redevelopment of Arlington Works, hereafter referred to as the 'Site' or the 'Proposed Development'. The proposals are for the redevelopment of the Site to provide a mixed land-use scheme including residential and commercial uses.

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 assessment of construction phase impacts associated with fugitive dust and fine particulate matter (PM_{10} and $PM_{2.5}$) emissions has been undertaken in line with the relevant Institute of Air Quality Management (IAQM) guidance. This identified that there is a low to medium risk of dust soiling impacts and a negligible 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 particulate matter releases would be significantly reduced. The residual effects of the construction phase on air quality are considered to be **not significant**.

The Proposed Development is not predicted to result in a significant increase in traffic once operational as it is expected that all but one local road will experience a decrease in traffic because of the change in use. An increase of 24 daily movements is expected on A305 Bridge Street (south of Arlington Road) and therefore, no significant effects on air quality are anticipated at existing receptors.

An assessment of the potential for future users/residents of the Proposed Development to be exposed to poor air quality has also been undertaken. The Site lies within an area where air quality is mainly influenced by emissions associated with traffic using the local road network. Based on the London Atmospheric Emissions Inventory (LAEI) maps of pollution concentrations, the Site is considered to fall into Air Pollution Exposure Criteria (APEC) A. Therefore, no mitigation is required for this aspect of the Proposed Development.

The Air Quality Neutral Assessment calculations concluded that the Proposed Development is significantly below the Building Emission Benchmark (BEB) but that the transport emissions are above the relevant Transport Emission Benchmark (TEB), and so the Proposed Development is not considered air quality neutral, prior to mitigation. As such, the Proposed Development is required to provide mitigation to reduce the amount of transport emissions generated. Proposed measures include a two-year membership to a car club, cycle parking in line with London Plan (2016) standards and six parking bays with electric charging points. Additionally, this assessment includes the assumption that future residents will be prohibited from applying from local on-street parking permits through a S106 agreement.

1 INTRODUCTION

1.1.1 WSP has been commissioned by Sharpe Refinery Service (Hydro-Carbons) Ltd to carry out an assessment of the potential air quality impacts arising from the proposed redevelopment of Arlington Works, hereafter referred to as the 'Site' or the 'Proposed Development'.

1.1.2 The Site is located on Arlington Road, Twickenham within the London Borough of Richmond Upon Thames (LBRuT) and comprises a collection of industrial buildings including associated waste oil recycling, manufacturing, vehicle repair and storage and two Buildings of Townscape Merit (BTM). The Site is bound to the west by a railway line, to the south and east by film studios and by residential properties to the north. The location of the Site is shown in **Figure 1.**

1.1.3 The proposals are for the redevelopment of the Site to provide replacement employment space (610m^2 within 5 commercial/office units) and 24 residential units, with associated landscaping and car parking.

1.1.4 The air quality assessment has been undertaken to consider the potential air quality impacts arising during the construction and operation of the Proposed Development. 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 The potential exposure of future occupants of the Proposed Development to poor air quality has also been considered given the location of the Site within an Air Quality Management Area (AQMA).

1.1.6 A glossary of terms used in this report is provided in **Appendix A**.

2 LEGISLATION, POLICY AND GUIDANCE

2.1 AIR QUALITY LEGISLATION & POLICY

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

UK AIR QUALITY STRATEGY

2.1.1 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)[1]. The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union legislation.

2.1.2 The AQS also sets standards and objectives for nine key air pollutants to protect health, vegetation and ecosystems. These are benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs). The standards and objectives for the pollutants considered in this assessment are given in **Appendix B**.

2.1.3 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.

2.1.4 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.

2.1.5 For the pollutants considered in this assessment, there are both long-term (annual mean) and short-term standards. In the case of NO_2, the short-term standard is for a 1-hour averaging period, whereas for PM_{10} 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.

2.1.6 The AQS contains a framework for considering the effects of a finer group of particles known as '$PM_{2.5}$' as there is increasing evidence that this size of particles can be more closely associated with observed adverse health effects than PM_{10}. 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 $PM_{2.5}$ at this time.

AIR QUALITY REGULATIONS

2.1.7 Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000[2] and the Air Quality (England) (Amendment) Regulations 2002[3] for the purpose of Local Air Quality Management (LAQM).

2.1.8 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…"

2.1.9 The Air Quality Standards (Amendment) Regulations 2010[4] transpose the European Union Ambient Air Quality Directive (2008/50/EC) into law in England, with the Air Quality Standards (Amendment) Regulations 2016[5] constituting a minor amendment. This Directive sets legally binding limit values for concentrations in outdoor air of major air pollutants that impact public health such as PM_{10}, $PM_{2.5}$ and NO_2. The limit values for NO_2 and PM_{10} are the same concentration levels as the relevant. AQS objectives and the limit value for $PM_{2.5}$ is a concentration of 25µg/m^3.

[1] 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)
[2] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No.928
[3] The Air Quality (England) (Amendment) Regulations 2002- Statutory Instrument 2002 No.3043
[4] The Air Quality Standards (Amendment) Regulations 2010- Statutory Instrument 2010 No. 1001
[5] The Air Quality Standards (Amendment) Regulations 2016- Statutory Instrument 2016 No. 1186

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

2.1.10 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"

2.1.11 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.

2.1.12 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

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 Air Quality Management Area (AQMA). For each AQMA the local authority is 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.

2.2 PLANNING POLICY

2.2.1 A summary of the national, regional and local planning policy relevant to air quality and the Site 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[6]. The core underpinning principle of the Framework is the presumption in favour of sustainable development, defined as:

"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"

One of the 12 core planning principles in the NPPF is that planning should 'contribute to conserving and enhancing the natural environment and reducing pollution.'

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

- Paragraph 109, which states *"The planning system should contribute to and enhance the natural and local environment by:…preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water, or noise pollution..";*
- Paragraph 110, which states *"In preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Plans should allocate land with the least environmental or amenity values, where consistent with other policies in this Framework.";*
- Paragraph 124, which states *"Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan"; and*
  Paragraph 203, which states *"Local Planning authorities should consider where otherwise unacceptable development could be made acceptable though the use of conditions or planning obligations. Planning*

[6] Department for Communities and Local Government (2012). National Planning Policy Framework.

Obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

REGIONAL PLANNING POLICY

The Mayor's Air Quality Strategy for London

2.2.4 In 2010 the GLA/Mayor of London published the Mayor's Air Quality Strategy for London[7]. This Strategy is focused on improving London's air quality. It also explains the current air quality experienced across London and gives predictions of future levels of pollution. The sources of pollution are outlined and a comprehensive set of policies and proposals are set out that will improve air quality in the London Boroughs.

2.2.5 The Strategy sets out a framework for delivering improvements to London's air quality and includes measures aimed at reducing emissions from transport, homes, offices and new developments, promoting smarter more sustainable travel, as well as raising awareness of air quality issues.

2.2.6 The Strategy includes a policy which states: *"New developments in London shall as a minimum be 'air quality neutral' through the adoption of best practice in the management and mitigation of emissions".*

The London Plan: Spatial Development Strategy for Greater London (Consolidated with Alterations since 2011)

2.2.7 Policy 7.14 of the London Plan[8] 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."*

LOCAL PLANNING POLICY

Local Plan

2.2.8 The Richmond Borough Local Plan[9] l replaces both policies within the Core Strategy and Development Management Plan. Within the strategic objectives of the document it states:

'Reduce or mitigate environmental impacts and pollution levels (such as air, noise, light, odour, fumes water and soil) and encourage improvements in air quality, particularly along major roads and areas that already exceed acceptable air quality standards.'

2.2.9 There are a number of policies of relevance to local air quality including Policy LP8 – Amenity and Living Conditions which states:

"All development will be required to protect the amenity and living conditions for occupants of new, existing, adjoining and neighbouring properties. The Council will… ensure there is no harm to the reasonable enjoyment of the use of buildings, gardens and other spaces due to increases in traffic, servicing, parking, noise, light, disturbance, air pollution, odours or vibration or micro-climatic effects…"

2.2.10 Policy LP 10 – Local Environmental Impacts, Pollution and Land Contamination states that:

"The Council will seek to ensure that local environmental impacts of all development proposals do not lead to detrimental effects on the health, safety and amenity of existing and new users or occupiers of the development site, or the surrounding land. These potential impacts can include, but are not limited to, air pollution, noise and vibration, light pollution, odours and fumes, solar glare and solar dazzle as well as land contamination.

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7 Mayor of London: Cleaning London's air, The Mayor's Air Quality Strategy (December 2010)
8 Mayor of London (March 2016) The London Plan: Spatial Development Strategy for Greater London Consolidated with alterations since 2011.
9 London Borough of Richmond upon Thames Local Plan (July 2018) .

Developers should follow any guidance provided by the Council on local environmental impacts and pollution as well as on noise generating and noise sensitive development. Where necessary, the Council will set planning conditions to reduce local environmental impacts on adjacent land uses to acceptable levels.

Air Quality

B. The Council promotes good air quality design and new technologies. Developers should commit to 'Emissions Neutral' development where practicable. 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 […]*

Odours and Fume Control

E. The Council will seek to ensure that any potential impacts relating to odour and fumes from commercial activities are adequately mitigated by requiring the following:

1. *an impact assessment where necessary;*
2. *the type and nature of filtration to be used;*
3. *the height and position of any chimney or outlet;*
4. *promotion and use of new abatement technologies…*

Construction and demolition

G. The Council will seek to manage and limit environmental disturbances during construction and demolition as well as during excavations and construction of basements and subterranean developments. To deliver this the Council requires the submission of Construction Management Statements (CMS) for the following types of development:

1. *all major developments;*
2. *any basement and subterranean developments;*
3. *developments of sites in confined locations or near sensitive receptors; or*
4. *if substantial demolition/excavation works are proposed."*

2.2.11 Policy LP 44 - Sustainable Transport Choices states:

"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, and maximise opportunities including for health benefits and providing access to services, facilities and employment…"

2.3 GUIDANCE

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

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[10]. This guidance, referred to in this document as LLAQM.TG(16), has been used where appropriate in the assessment presented herein.

[10] Mayor of London (May 2016) London Local Air Quality Management (LLAQM) Technical Guidance (LLAQM.TG(16))

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 in their review and assessment work[11]. This guidance, referred to in this document as LAQM.TG16, has been used where appropriate in the assessment presented herein.

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[12] 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[13] 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_{10} 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[14] 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 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[15] 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 the London area and provides a methodology to assist in determining the impacts of a development proposal on air quality. The main message of the document is, as above, that the factor of greatest importance will generally be 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[16] (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 Non-Road Mobile Machinery (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 then

[11] Defra (2018) Part IV The Environment Act 1995 and Environment (Northern Ireland) Order 2002 Part III, Local Air Quality Management Technical Guidance LAQM.TG16

[12] Environmental Protection UK and Institute of Air Quality Management (Version 1.2 Updated January 2017). Land Use Planning & Development Control: Planning for Air Quality

[13] Institute of Air Quality Management (Version 1.1 Updated June 2016). Guidance on the Assessment of Dust from Demolition and Construction

[14] Department of Communities and Local Government (DCLG) (March 2014). National Planning Practice Guidance

[15] London Councils (January 2007) Air Quality and Planning Guidance – Revised version

[16] Mayor of London (July 2014) The control of dust and emissions during construction and demolition – Supplementary Planning Guidance.

need to be set out, in draft, in an air quality assessment report submitted with the planning application, and 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, looks at how design and transport measures can be used to minimise emissions to air, and sets out emissions standards for combustion plant.

3 SCOPE AND METHODOLOGY

3.1 SCOPE

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

- Review of air quality data for the local area as published by the LBRuT[17], Defra[18] and the Greater London Authorities' (GLAs') London Atmospheric Emissions Inventory (LAEI)[19];
- Desk study to confirm the location of nearby existing receptors that may be sensitive to changes in local air quality due to emissions from the Proposed Development; and
- Review of the Masterplan for the Proposed Development to establish the location of future sensitive receptors within the Site.

3.1.2 The scope of the assessment includes consideration of the potential impacts on local air quality resulting from construction phase effects and the likely exposure of future occupants of the Proposed Development to poor air quality given the location of the Site within an AQMA.

3.1.3 The amount of traffic generated by the Proposed Development once operational is detailed in **Appendix C**, with a comparison to the current traffic generated by the current land use. Furthermore, Bluesky Ltd (the appointed Energy Consultant for the project) has confirmed that the boilers that will be installed within the proposed residential dwellings will meet the emission standards detailed within the GLA's Sustainable Design and Construction SPG. Given the size of development proposed and the specification of the boilers that will be installed, their impact on local air quality is considered to be not significant.

3.1.4 On the basis of the above, a detailed assessment (i.e. modelling) of emissions to air from vehicles and plant associated with the Proposed Development once operational has not been undertaken. However, in accordance with GLA requirements, an air quality neutral assessment has been undertaken. Further details regarding these calculations are provided below.

3.1.5 It should be noted that there is an existing boiler used to provide steam for heating the waste oils, heat for the building and other uses. Whilst no emissions data was available for this boiler at the time of assessment, its stack height suggests that the boiler (and associated emissions) is relatively sizeable. The removal of this boiler as part of the redevelopment of the Site and subsequent use of low NO_X boilers within the Proposed Development is likely to result in a beneficial effect on local air quality. Similarly, there is a blacksmith (and associated furnace), two car body repairs and a marble fire place company currently on-site which have emissions to air (mainly particulate matter but also vapours) that will cease to operate following the redevelopment of the Site.

3.2 METHODOLOGY

CONSTRUCTION PHASE

3.2.1 Dust comprises particles typically in the size range 1-75 micrometres (µm) in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials. The large dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited in close proximity to the source of emissions. Dust therefore, is unlikely to cause long-term or widespread change to local air quality; moreover, its deposition on property and cars can cause '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_{10}) and represent only a small proportion of total dust released; this includes a finer fraction, known as $PM_{2.5}$ (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_{10} and $PM_{2.5}$ are small enough to be drawn

[17] London Borough of Richmond upon Thames (May 2018). Air Quality Annual Status Report for 2017
[18] Defra Local Air Quality Management (LAQM) Support Pages. Available at: http://laqm.defra.gov.uk/. Accessed on 20/06/2018
[19] London Atmospheric Emissions Inventory (LAEI). Available at: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013. Accessed 20/06/2018.

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_{10} 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 and professional judgement, taking into account our experience of undertaking construction phase assessments for schemes of a similar size and nature.

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_{10} impacts from the following four sources: demolition; earthworks; general construction activities and track-out. It takes into account the nature and scale of the activities undertaken for each source and the sensitivity of the area to an increase in dust and PM_{10} 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 D**.

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 Site and in the vicinity of the Site itself. A qualitative assessment of their impact on local air quality has been undertaken 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 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.

3.2.6 The IAQM assessment is undertaken where there are: '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). 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

3.2.7 In order to consider the potential exposure of future occupants of the Site to poor air quality, air pollution mapping obtained from the LAEI for NO_2, PM_{10} and $PM_{2.5}$ has been reviewed for 2013 (to represent the existing baseline air quality conditions) and 2020 (a proxy for 2021, the anticipated opening year of the Proposed Development).

3.3 SIGNIFICANCE CRITERIA

CONSTRUCTION PHASE

3.3.1 The IAQM assessment methodology recommends that significance criteria is 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_2 and particulate matter, the significance of residual effects have been determined using professional judgement and the principles outlined in the EPUK/IAQM guidance.

OPERATIONAL PHASE

3.3.3 In determining the significance of the exposure of new residents to air pollution and the level of mitigation that may be required within the development, consideration was given to the Air Pollution Exposure Criteria (APEC) published in the London Councils guidance for air quality assessments and outlined in **Table 1**.

Table 1 - London Councils Air Pollution Exposure Criteria

APEC Level	Applicable Range Annual average NO_2	Applicable Range PM_{10}	Recommendation
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 the national objective	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.
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.

3.4 MAYOR OF LONDON'S AIR QUALITY NEUTRAL POLICY

3.4.1 The air quality neutral assessment has been undertaken using the Gross Floor Area (GFA) and anticipated development trip rates of each proposed use once operational to calculate the NO_x and PM_{10} emissions from the building and transport elements of the Proposed Development. The relevant figures for the Proposed Development calculated from information provided by the Project Team are presented in **Table 2.**

3.4.2 The Proposed Development includes two disabled parking spaces, a further 19 spaces for the proposed residential dwellings and two parking spaces for the commercial units.

3.4.3 The annual 2-way trip value has been provided by the project's Transport Consultant and it is estimated that on average there will be 58.6 two-way movements per day (which equates to 21,395 2-way trips per year) as a result of the Proposed Development.

3.4.4 Any changes will be, to a degree, offset by vehicle trips associated with the existing use of the Site. However, this overall net change due to the Proposed Development has not been considered within the air quality neutral calculations.

3.4.5 In terms of building emissions, the residential units will be individually served by Alpha Intec gas combination boilers (27mg NO_x/kWh), which comply with the emissions limits set out within the GLA's Sustainable Design and Construction SPG. The office/commercial units will be heated and cooled by air source heat pumps and as such, building emissions are not associated with the office/commercial space.

3.4.6 The project's Energy Consultant has estimated that the residential energy demand from the gas boilers will be 94,360kWh per year. PM_{10} emissions have not been considered given that all plant within the residential dwellings are to be fuelled by natural gas.

3.4.7 All benchmarks in **Table 2** have been calculated by their relative proportion of the total GIA.

Table 2 - Parameters used in the Air Quality Neutral Assessment

Land Use Class	Area Classification	GIA (m^2)	Annual two-way trips
B1	Outer London	610	2,789
C3		1,684	18,606

3.4.8 The results were compared to the benchmarks set out in the SPG, which are shown in **Table 3** below.

Table 3 - Emission Benchmarks (kg/Annum)

Land Use Class	Area Classification	NO_X Transport Benchmark ($kgNO_X$/annum)	PM_{10} Transport Benchmark ($kgNO_X$/annum)	NO_X Building Benchmark ($kgNO_X$/annum)
B1	Outer London	10.6	1.8	18.8
C3		74.9	12.9	44.1

3.4.9 If annual emissions do not exceed the total benchmarks, the development can be deemed to be air quality neutral. Conversely, if the total benchmarks are exceeded, the development is not air quality neutral and direct or indirect (offsetting) mitigation is required.

3.5 LIMITATIONS & ASSUMPTIONS

3.5.1 The assessment of construction phase effects has been based on professional judgement as no information specific to the construction phase was available at the time of assessment.

3.5.2 It has been assumed that all of the existing road sources and relevant emissions in the area surrounding the Site have been included in the LAEI mapping data.

3.5.3 The Air Quality Neutral Assessment has been based on emissions data for indicative combustion plant.

3.5.4 The Air Quality Neutral calculations assume that residents are prohibited from applying for local on-street parking as per the transport mitigation proposals.

4 BASELINE CONDITIONS

4.1 LBRuT'S REVIEW & ASSESSMENT OF AIR QUALITY

4.1.1 The whole of the LBRuT, including the Site, has been designated as an AQMA. The AQMA was declared in 2000 due to exceedances of the AQS objective for annual mean NO_2 concentrations as well as annual and 24-hour mean PM_{10} concentrations.

4.1.2 The LBRuT published their updated Air Quality Action Plan[20] (AQAP) in 2017. This report details a number of measures proposed to reduce concentrations of NO_2 and PM_{10} within the AQMA. These measures include:

- Emissions-based parking charges;
- Reducing pollution from new development through the planning system;
- Improving public realm for walking and cycling;
- Rolling out targeted measures at pollution hotspots; and
- Supporting infrastructure for fuelling zero emission vehicles.

4.1.3 Since 2010, the London Low Emission Zone (LEZ) has been implemented across a number of London Boroughs including the LBRuT in order to reduce PM_{10} concentrations throughout Greater London.

4.2 LOCAL EMISSION SOURCES

4.2.1 The Site is located in an area where air quality is largely influenced by emissions from road transport using the A3004 and A316.

4.2.2 There are no known industrial pollution sources in the immediate vicinity of the Site that would significantly influence the local air quality.

4.2.3 Sharpe's Recycle Oil Limited is located within the Site itself and is regulated by the Environment Agency through its Environmental Permit (although this contains no measures specific to regulating emissions to air). Operations at Sharpe's Recycle Oil Limited will cease prior to the construction of the Proposed Development and, therefore, the operation of the Sharpe's Recycle Oil will have no effect on future air quality within the vicinity of the Site.

4.3 BACKGROUND AIR QUALITY DATA

4.3.1 Background pollutant concentrations have been taken from the national maps provided on the Defra website, 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 future reduction in vehicle emissions and emissions from other sources.

4.3.2 **Table 4** shows the background concentrations of NO_2, NO_x, PM_{10} and $PM_{2.5}$ that are representative of the area in which the Site is located, for 2017.

Table 4 - 2017 Defra Background Pollutant Concentrations (µg/m^3)

Grid Square (Centre on O.S. Grid Reference	NO_2	PM_{10}	$PM_{2.5}$
517500,174500	23.8	16.3	10.5

4.3.3 **Table 4** shows that in 2017 background concentrations of all three pollutants are well below their relevant objectives. Furthermore, the background NO_2 concentration does not exceed 60µg/m^3, which is the Defra proxy value above which exceedances of the 1-hour mean NO_2 objective may occur.

[20] London Borough of Richmond (2017) Air Quality Action Plan 2017-2022.

4.4 LOCAL AUTHORITY AIR QUALITY MONITORING DATA

NO_2 Monitoring

4.4.1 The LBRuT undertakes air quality monitoring using a network of continuous (automatic) monitors and non-automatic (i.e. diffusion tubes) monitoring sites. Annual mean concentrations of NO_2 measured at diffusion tube monitoring locations in the vicinity of the Site for the last six calendar years for which data are available are provided in **Table 5**.

Table 5 - Local Monitoring Data for Annual Mean NO_2 Concentrations (µg/m^3)

Site ID	Site Type	X, Y	Distance to Site (km)	Valid data capture 2017 %*	2012	2013	2014	2015	2016	2017
15	Kerbside	517197 ,173939	0.5	100	**44**	**40**	**40**	37	**41**	38
16	Roadside	517558 ,174369	0.6	100	**45**	**44**	**43**	**41**	**42**	38
17	Kerbside	517822 ,174755	1	100	**70**	**68**	**68**	**63**	**69**	**60**
39	Roadside	517592 ,174404	0.7	100	**62**	**56**	**56**	**52**	**55**	**52**
43	Kerbside	517771 ,174701	0.9	100	**78**	**87**	**80**	**80**	**85**	**78**
56	Kerbside	516791 ,174521	0.2	92	**41**	**46**	38	37	**51**	**50**
Rut02	Kerbside	517917 ,174928	1.2	92	**95**	**94**	**88**	**88**	**96**	**82**

Notes:
* Data capture for the full calendar year.
** Annual data capture low -%age in brackets. Not annualised as reduce data capture due to intermittent maintenance issues.
Bold = exceedance

Source: LAQN website, LBRuT monitoring report

4.4.2 The results of the monitoring indicate that since 2012 annual mean NO_2 concentrations have exceeded or been close to exceeding the relevant AQS objective (40µg/m^3) at kerbside and roadside monitoring locations within the general vicinity of the Site. It should be noted that the Site itself is located away from major roads, at more of a background location, and as such exceedances in the vicinity of the Site are not anticipated. There has been no clear trend in annual mean NO_2 concentrations over the last six years. Whilst some sites experienced an overall decrease (Sites 15, 16, 17, 39 and Rut02) others showed fluctuating concentrations. The results also suggest that concentrations in 2016 were particularly high, potentially due to meteorological conditions in that year.

4.4.3 At a number of locations (Sites 17, 39, 43 and Rut02), monitored concentrations of annual mean NO_2 exceed 60µg/m^3 suggesting that exceedances of the hourly mean objective could occur within the general vicinity of the Site at roadside and (predominantly) kerbside locations.

PM_{10} and $PM_{2.5}$ Monitoring

4.4.4 The LBRuT does not undertake any PM_{10} or $PM_{2.5}$ monitoring within the vicinity of the Site. However, based on DEFRA's background concentrations (see **Table 4**) and annual mean PM_{10} and $PM_{2.5}$ concentrations monitored elsewhere in the Borough, the AQS objectives for these pollutants are considered unlikely to be exceeded at the Proposed Development Site.

4.5 SUMMARY

4.5.1 The data presented above indicates that background concentrations of NO_2, PM_{10} and $PM_{2.5}$ in the area in which the Site is located are below the relevant AQS objectives. Exceedances of the AQS objective for annual mean NO_2 concentrations are occurring at roadside and kerbside locations within the vicinity of the Site, principally adjacent to busy roads (e.g. A-Roads). Concentrations within the Site itself are not expected to be exceeding the AQS objective for annual mean NO_2 concentrations.

5 ASSESSMENT OF IMPACTS

5.1 CONSTRUCTION PHASE

DUST AND PM_{10} ARISING FROM ON-SITE ACTIVITIES

5.1.1 Construction activities that have the potential to generate and/or re-suspend dust and PM_{10} include:

- Site preparation including demolition activities;
- Earthworks;
- Materials handling, storage, stockpiling, spillage and disposal;
- Movement of vehicles within the Site (including excavators and dumper trucks);
- Exhaust emissions from site plant;
- 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_{10} 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 less than 20,000m^3, with construction material that has a low potential for releasing dust, and with demolition activities occurring <10m above ground level. Therefore, the potential dust emission magnitude is considered to be **small** for demolition activities.

Earthworks

5.1.5 The total area of the Application Site is approximately 2,965m^2, the soil type largely consists of made ground whilst the total amount of material that will be moved is estimated to be less than 20,000 tonnes. Therefore, the potential dust emission magnitude is considered to be **medium** for earthwork activities.

Construction

5.1.6 It is estimated that the total volume of buildings to be constructed on the Site will be less than 25,000m^3 with materials that will have a low potential for releasing dust used. Therefore, the potential dust emission magnitude is considered to be **small** for construction activities.

Trackout

5.1.7 It is estimated that there will be < 10 outward HDV movements in any one day given the size of the Site. It is considered that the potential dust emission is **small** for trackout.

ASSESSMENT OF THE SENSITIVITY OF THE STUDY AREA

5.1.8 A windrose generated using the 2017 meteorological data from the nearest meteorological observing station, at London City Airport, is presented in **Appendix E**. This shows that the prevailing wind direction is from the south west and north west, with a small component from the east. Therefore, receptors located to north east and west of the Site are more likely to be affected by dust and particulate matter emitted and re-suspended during the construction phase.

5.1.9 Under low wind speed conditions, it is likely that the majority of dust would be deposited in the area immediately surrounding the source. The majority of the surrounding area is comprised of residential properties and commercial units. Some of the residential properties are located above ground level.

5.1.10 Within 20m from the Site, it is estimated there are between 10 and 100 residential units (highly sensitive receptors) with a number of commercial units (medium sensitivity receptors) to the north of the Site. A school facility (St. Stephen's Church of England Junior School) is located approximately 350m to the north west of the Site.

5.1.11 The estimated annual mean PM_{10} concentration for 2017 obtained from DEFRA's background mapping is16.3µg/m^3 i.e. below 24µg/m^3.

5.1.12 Taking the above into account and following the IAQM assessment methodology, the sensitivity of the area to changes dust soiling effects has been considered to be **high**, and for human health impacts it is considered to be **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 6** below provides a summary of the risk of dust impacts for the Site. The risk category identified for each construction activity has been used to determine the level of mitigation required.

Table 6 - Summary Dust Risk Table to Define Site Specific Mitigation

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

CONSTRUCTION VEHICLES AND 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. The existing plan for HDV movements accessing/leaving the Site, as agreed with LBRuT, shows vehicles travelling to Site via the A316, Ellesmere Road and Ravensbourne Road. It is anticipated that construction traffic will access the Site via the same route as currently agreed for HDV movements to/from the Site. Due to the size of the Site, it is considered likely that the construction traffic will be low in comparison to the existing traffic flows on these roads, taking into account existing HDV movements from the Site.

5.1.15 Based on the current local air quality in the area, the 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 **negligible** according to the assessment significance criteria.

5.2 OPERATIONAL PHASE

LAEI MODELS FOR 2013 AND 2020

5.2.1 The LAEI includes detailed maps of ambient NO_2, PM_{10} and $PM_{2.5}$ concentrations across London for 2013 and 2020.

5.2.2 The LAEI map of annual mean NO_2 concentrations in 2013 (see **Figure 2**) shows that concentrations within the Site are 34.0µg/m^3 and below in this year. This is considerably below the AQS objective level of 40µg/m^3.

5.2.3 In 2020, concentrations of annual mean NO_2 concentrations are reduced from the 2013 baseline case due to anticipated future improvements in vehicle technology including the uptake of electric vehicles. The LAEI map indicates that annual mean NO_2 concentrations within the Site will be 29.0µg/m^3 and below in this year (see **Figure 3**).

5.2.4 The LAEI map of annual mean PM_{10} concentrations in 2013 (see **Figure 4**) shows that concentrations within the Site are 24.5µg/m^3 and below in this year. This is considerably below the AQS objective level of 40µg/m^3.

5.2.5 In 2020, concentrations are reduced from the 2013 baseline case and predicted concentrations within the Site are 23.0µg/m^3 and below in this year (see **Figure 5**).

5.2.6 The LAEI map of annual mean $PM_{2.5}$ concentrations in 2013 (see **Figure 6**) shows that concentrations within the Site are 15.7µg/m^3 and below in this year. This is considerably below the AQS objective level of 25µg/m^3.

5.2.7 In 2020, concentrations are reduced from the 2013 baseline case and predicted concentrations within the Site are 14.1µg/m^3 and below in this year (see **Figure 7**).

5.2.8 In summary, the LAEI maps for both 2013 and 2020 show that annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations will be considerably below the relevant AQS objectives. The concentrations for all pollutants

are classified as APEC Level A, which means that they are more than 5% below the objective and therefore there are no air quality grounds for refusal. However, mitigation of any emissions should be considered.

5.2.9 **Appendix F** outlines the expected changes in traffic flow following the redevelopment of the site. All but one local road will experience a decrease in traffic because of the change of use and redevelopment. An increase of 24 daily movements is expected on A305 Bridge Street (south of Arlington Road), but this is below the IAQM threshold for detailed assessment (within an AQMA) of 100 AADT.

AIR QUALITY NEUTRAL ASSESSMENT

5.2.10 The findings of the air quality neutral assessment are given in **Table 7**. The building emissions are significantly below the Building Emission Benchmark (BEB) values and as such, do not require mitigation. However, the transport emissions are above the Transport Emissions Benchmark (TEB) for both NO_x and PM_{10} and, as such, require mitigation.

Table 7 - Air Quality Neutral Assessment Summary

Category	Parameter	NO_x (kg/annum)	PM_{10} (kg/annum)
Transport Emissions	Benchmark	79.1	13.6
	Development	85.5	14.7
	Category Difference	6.4	1.1
	Air Quality Neutral?	No	No
Building Emissions	Benchmark	62.9	N/A
	Development	2.6	N/A
	Category Difference	-60.4	N/A
	Air Quality Neutral?	Yes	N/A

6 MITIGATION AND RESIDUAL EFFECTS

6.1 CONSTRUCTION PHASE

MITIGATION

6.1.1 The assessment results indicate the Proposed Development is a medium to negligible risk site for construction phase effects on local air quality, and therefore mitigation will be required. The mitigation measures that will be implemented are listed below.

General Communication

- 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.

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.

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.
- 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.

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.

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

- 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 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.
- 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 are covered when accessing and leaving the Site as appropriate to prevent escape of materials during transport.
- Implement a wheel washing system.
- Access gates to be located at least 10m from receptors if possible.

RESIDUAL EFFECTS

6.1.2 The residual effects of dust and PM_{10} generated by construction activities following the application of the mitigation measures described above and good site practice are considered to be **not significant**.

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

6.2 OPERATIONAL PHASE

MITIGATION

6.2.1 Based on the concentrations shown on the LAEI maps for the Site in 2020, no mitigation is considered to be necessary in order to reduce exposure of future occupants of the Proposed Development to poor air quality.

6.2.2 All but one local road will experience a decrease in traffic because of the change of use and redevelopment, where an increase of 24 daily movements is expected on A305 Bridge Street (south of Arlington Road).

6.2.3 The Air Quality Neutral Assessment calculations concluded that the Proposed Development is significantly below the BEB values and as such, no mitigation for building emissions is considered necessary. However,

the transport emissions are above the TEB and mitigation is therefore required to reduce the number of vehicle movements associated with the development.

6.2.4 The proposed mitigation measures include providing future occupants with a two-year membership to a car club, cycle parking in line with London Plan (2016) standards and the provision of six parking bays with electric charging points.. . Such measures would need to be agreed with the local authority during the planning process.

6.2.5 It should be noted, that the Air Quality Neutral Assessment is based on the traffic generation associated with the Proposed Development solely and did not account for the net change as a result of the redevelopment of the site, including existing traffic flows generated by the current use of the site. As such, the Air Quality Neutral Assessment is considered to be a robust representation of likely effects associated with the scheme.

RESIDUAL EFFECTS

6.2.6 The Proposed Development is expected to have a **not significant** residual effect on local air quality.

7 CONCLUSIONS

CONSTRUCTION PHASE

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 Site using the IAQM methodology. This identified that there is a medium risk of dust soiling during earthworks and low risk from demolition and construction activities and from trackout. The construction activities pose a negligible to low risk in terms of human health impacts from increased particulate matter emissions.

7.1.2 However, through good site practice and the implementation of suitable mitigation measures, the effect of dust and particulate releases would be significantly reduced. The residual effects due to dust and particulates generated by construction activities on air quality will not be significant. The residual effects due to emissions to air from construction vehicles and plant on local air quality are also considered to be not significant.

OPERATIONAL PHASE

7.1.3 According to the 2020 LAEI maps, future NO_2, PM_{10} and $PM_{2.5}$ concentrations will be below the relative air quality objectives at the Site. The 2020 LAEI model annual mean NO_2 concentrations are significantly below 60µg/m^3 and as such, exceedances of the 1-hour mean NO_2 objective are not expected.

7.1.4 In terms of the potential exposure of future occupants of the Proposed Development to poor air quality, based on the LAEI maps of pollution concentrations, the Site is considered to fall into APEC A. Therefore, no mitigation is required for this aspect of the Proposed Development.

7.1.5 The Air Quality Neutral Assessment calculations concluded that the Proposed Development is significantly below the BEB but that the transport emissions are above the relevant TEB, and so the Proposed Development is not considered air quality neutral, prior to mitigation. As such, the Proposed Development is required to provide mitigation to reduce the amount of transport emissions generated which would include car club membership (for a period of two years) and on-site electric vehicle charging provision

FIGURES

Figure 1 - Site Boundary

Figure 2 - 2013 LAEI Map for NO_2

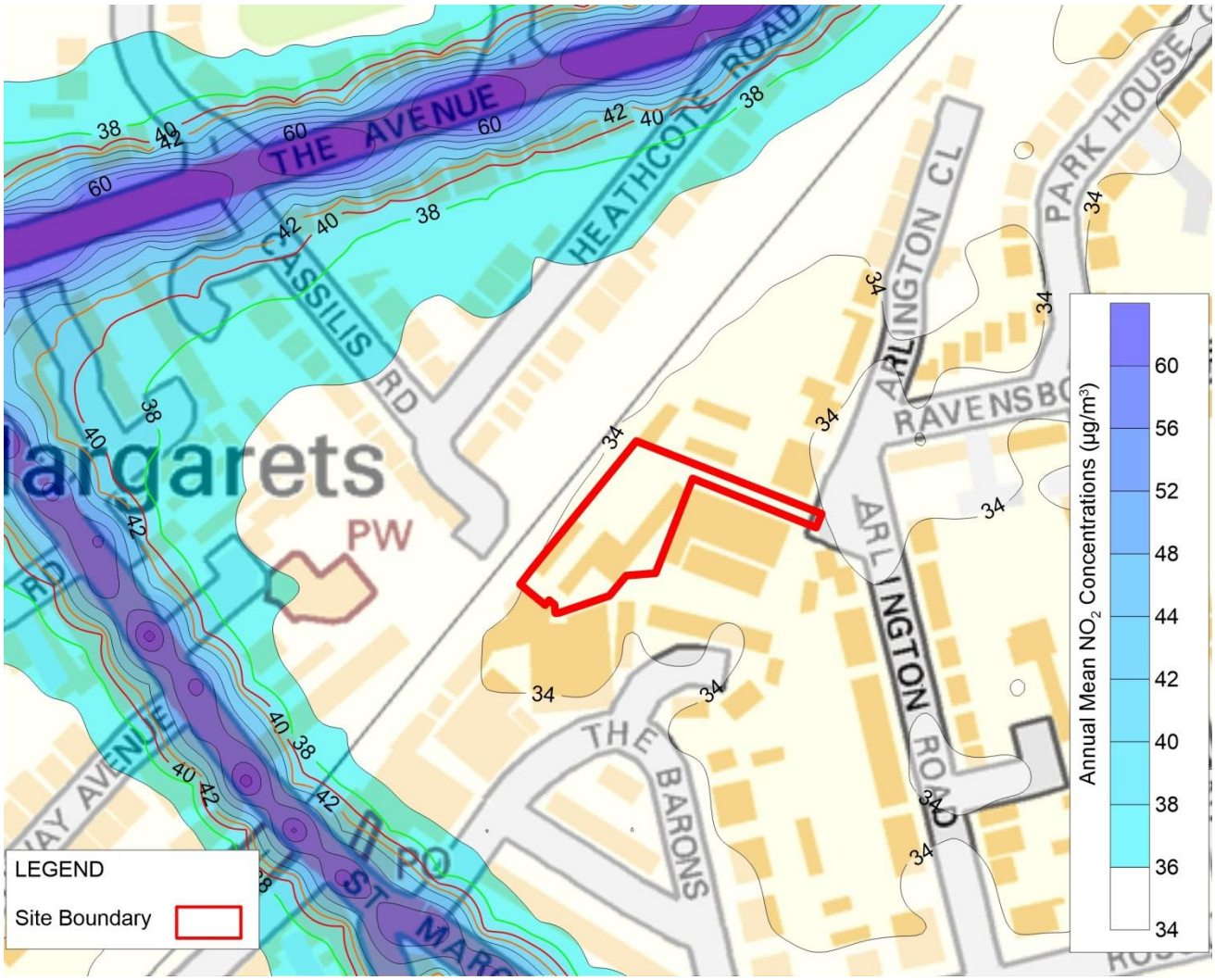


Figure 3 - 2020 LAEI Map for NO_2

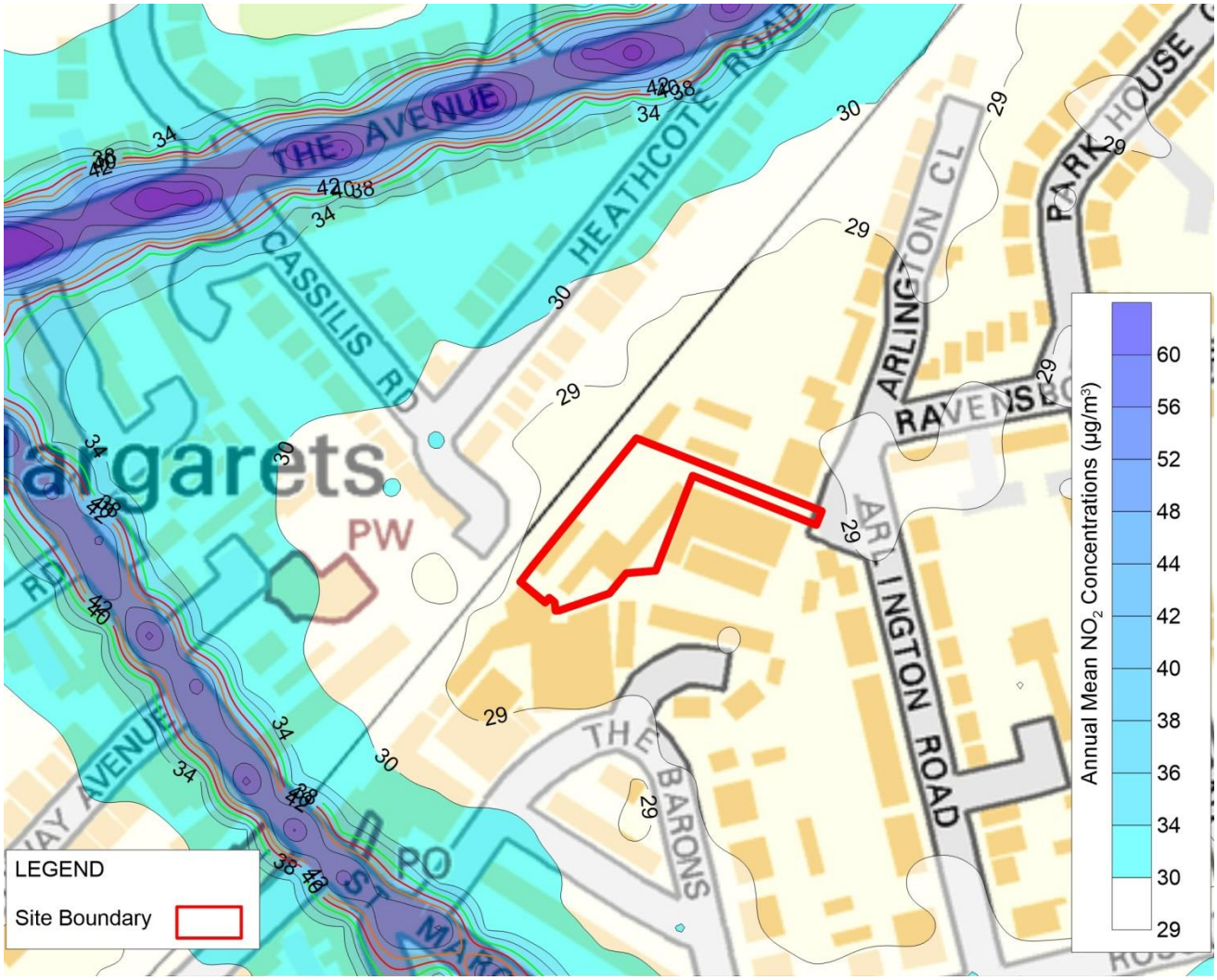


Figure 4 - 2013 LAEI Map for PM_{10}

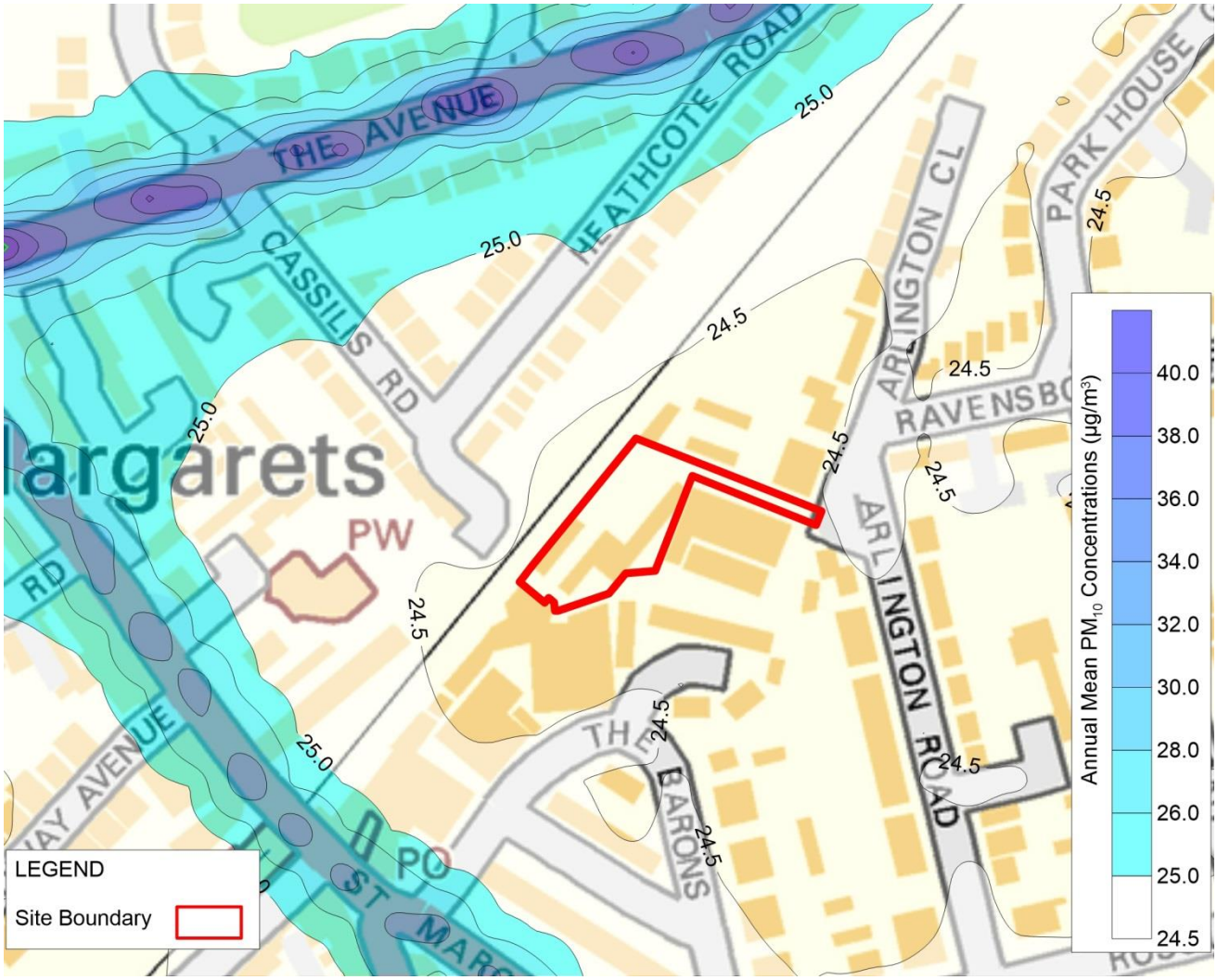


Figure 5 - 2020 LAEI Map for PM_{10}

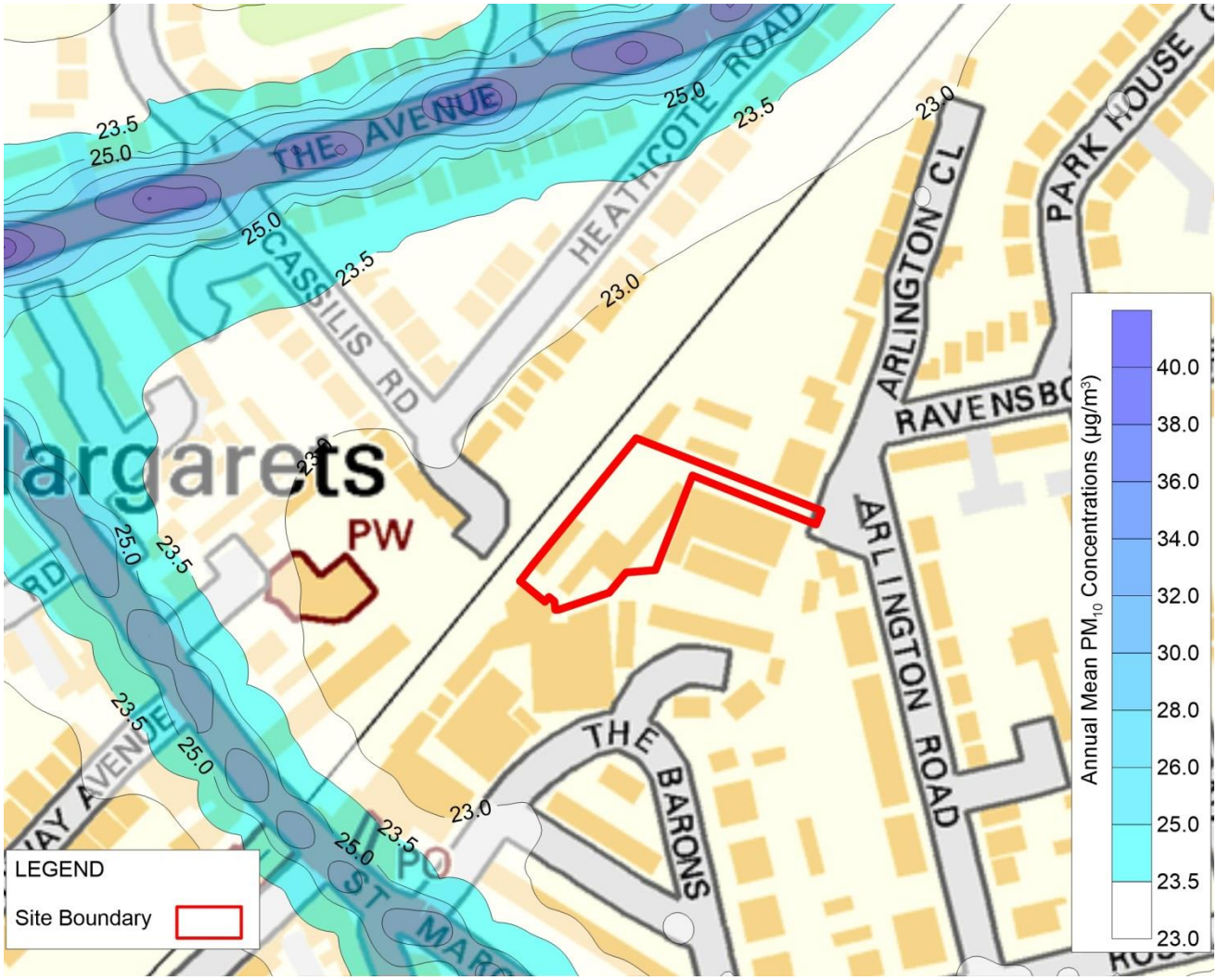


Figure 6 - 2013 LAEI Map for $PM_{2.5}$

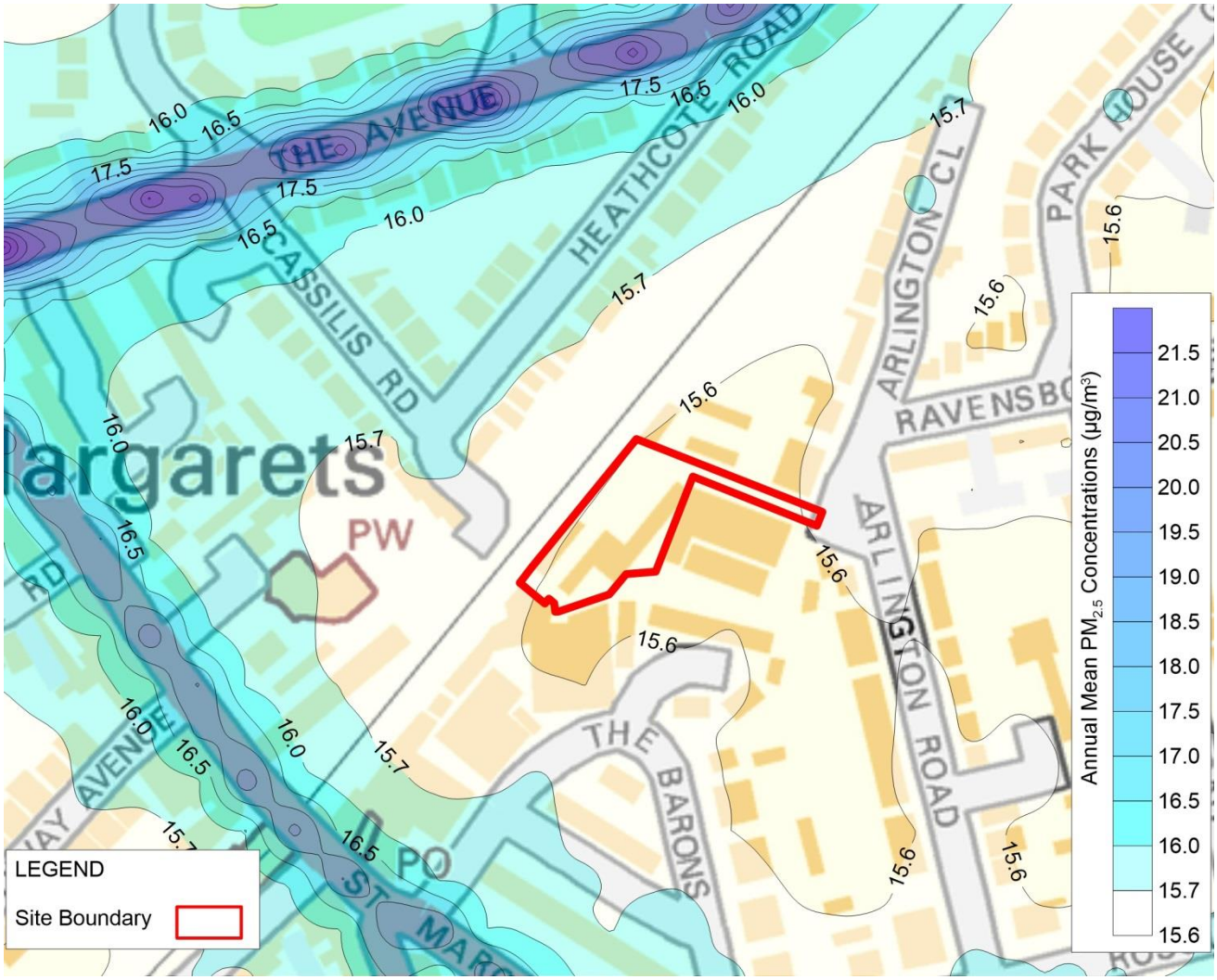
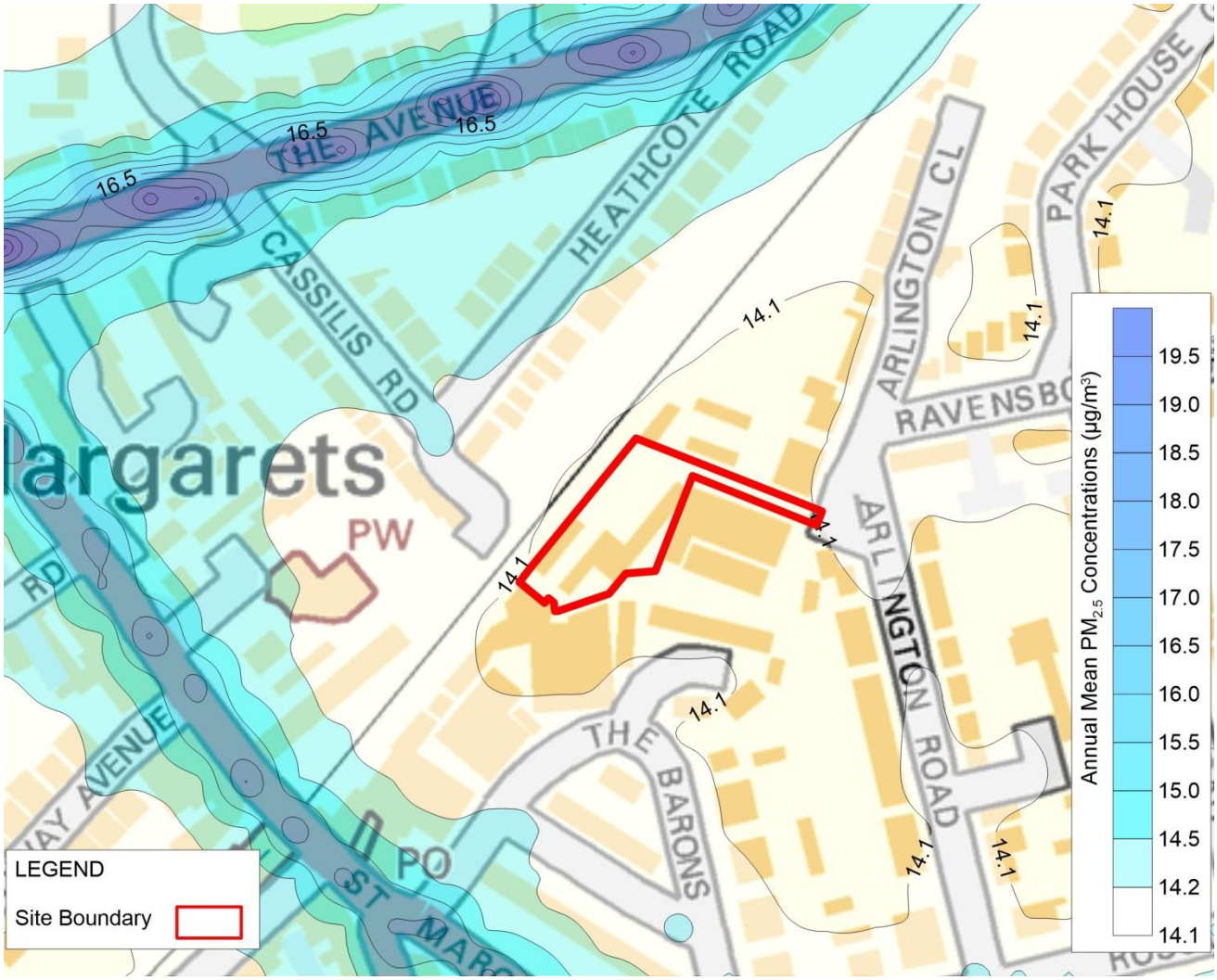


Figure 7 - 2020 LAEI Map for $PM_{2.5}$



Appendix A

GLOSSARY

GLOSSARY

Term	Definition
AADT Annual Average Daily Traffic	A daily total traffic flow (24hrs), expressed as a mean daily flow across all 365 days of the year.
Air quality objective	Policy target generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedances within a specific timescale (see also air quality standard).
Air quality standard	The concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects of each pollutant on human health including the effects on sensitive sub groups (see also air quality objective).
Ambient air	Outdoor air in the troposphere, excluding workplace air.
Annual mean	The average (mean) of the concentrations measured for each pollutant for one year.
AQMA	Air Quality Management Area.
AQO	Air Quality Objective
Defra	Department for Environment, Food and Rural Affairs.
EPUK	Environmental Protection (UK)
Exceedance	A period of time where the concentrations of a pollutant is greater than the appropriate air quality standard.
HDV/HGV	Heavy Duty Vehicle/Heavy Goods Vehicle.
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management.
LBRuT	London Borough of Richmond upon Thames
NO_2	Nitrogen dioxide.
NO_x	Nitrogen oxides.
PM_{10}	Particulate matter with an aerodynamic diameter of less than 10 micrometres.
$PM_{2.5}$	Particulate matter with an aerodynamic diameter of less than 2.5 micrometres.
$\mu g/m^3$ microgram per cubic metre	A measure of concentration in terms of mass per unit volume. A concentration of $1\mu g/m^3$ means that one cubic metre of air contains one microgram (millionth of a gram) of pollutant.

Appendix B

RELEVANT UK AIR QUALITY STRATEGY OBJECTIVES

RELEVANT UK AIR QUALITY STRATEGY OBJECTIVES

Table B1 Relevant UK Air Quality Strategy Objectives

National Air Quality Objectives and European Directive Limit Values for the Protection of Human Health						
Nitrogen dioxide (NO_2)	UK	40µg/m^3	annual mean	31.12.2005	40µg/m^3	01.01.2010
	UK	200µg/m^3 not to be exceeded more than 18 times a year	1 hour mean	31.12.2005	200µg/m^3 not to be exceeded more than 18 times a year	01.01.2010
Particulate Matter (PM_{10}) (gravimetric)[A]	UK	40µg/m^3	annual mean	31.12.2005	40µg/m^3	01.01.2010
	UK (except Scotland)	40µg/m^3	annual mean	31.12.2004	40µg/m^3	01.01.2005
Particulate Matter ($PM_{2.5}$)	UK (except Scotland)	50µg/m^3 not to be exceeded more than 35 times a year	24 hour mean	31.12.2004	50µg/m^3 not to be exceeded more than 35 times a year	01.01.2005
	UK (except Scotland)	25µg/m^3	annual mean	2020	Target value 25µg/m^3	2010

[A] Measured using the European gravimetric transfer sampler or equivalent

µg/m^3 = microgram per cubic metre

Appendix C

TRAFFIC DATA

TRAFFIC DATA PROVIDED BY THE PROJECT'S TRANSPORT CONSULTANT

Road Name	2021 Without Development			2021 With Development			Change		
	AADT	HDV	HDV %	AADT	HDV	HDV %	AADT	LDV	HDV
A3004 St Margaret's Road (north of the A3004 Crown Road)	19932	658	3.3	19916	657	3.3	-16	-15	1
A3004 St Margaret's Road (north of Arlington Road)	14818	400	2.7	14784	384	2.6	-34	-18	16
A3004 St Margaret's Road (north of the A316)	13976	293	2.1	13961	293	2.1	-15	-15	0
A305 Bridge Street (south of Arlington Road)	47971	3790	7.9	47995	3792	7.9	24	22	-2
A316 Chelsea Road (west of the A3044)	46555	1210	2.6	46547	1210	2.6	-8	-8	0
A316 The Avenue/Twickenham Road (east of the A3004)	47971	1199	2.5	47968	1199	2.5	-3	-3	0
A3004 Crown Road (south of the A3004 St Margaret's Road)	5653	85	1.5	5617	84	1.5	-36	-35	1
Site Access	75	5	6.8	64	6	9.4	-11	-12	-1
Arlington Road	765	56	7.3	756	66	8.7	-9	-19	-10
Ellesmere Road	548	27	5	541	19	3.6	-7	1	8
Rosslyn Road (west of Arlington Road)	2145	124	5.8	2091	119	5.7	-54	-49	5

Appendix D

IAQM CONSTRUCTION ASSESSMENT METHODOLOGY

IAQM CONSTRUCTION ASSESSMENT METHODOLOGY

STEP 1 – SCREENING THE NEED FOR A DETAILED ASSESSMENT

An assessment will normally be required where there are:

- '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).

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible'.

STEP 2A – DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The following are examples of how the potential dust emission magnitude for different activities can be defined. (Note that not all the criteria need to be met for a particular class). Other criteria may be used if justified in the assessment.

Table C1 - Examples of Human Receptor Sensitivity to Construction Phase Impacts

Dust Emission Magnitude	Activity
Large	**Demolition** >50,000m^3 building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m^2 site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty surface material (e.g. clay), >100m unpaved roads
Medium	**Demolition** 20,000 - 50,000m^3 building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m^2 site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 -100,000 tonnes material moved
	Construction 25,000 - 100,000m^3 building volume, dusty material e.g. concrete, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material (e.g. clay), 50 -100m unpaved roads
Small	**Demolition** <20,000m^3 building demolished, non-dusty material (e.g metal cladding), <10m above

Dust Emission Magnitude	Activity
	ground level, work during wetter months
	Earthworks <2,500m^2 site area, soil with large grain size (e.g. sand), <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved, earthworks during wetter months
	Construction <25,000m^3, non-dusty material (e.g. metal cladding or timber)
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

STEP 2B – DEFINE THE SENSITIVITY OF THE AREA

The tables below present the IAQM assessment methodology to determine the sensitivity of the area to dust soiling, human health and ecological impacts respectively. The IAQM guidance provides guidance to allow the sensitivity of individual receptors to dust soiling and health effects to assist in the assessment of the overall sensitivity of the study area.

Table C2- Sensitivity of the Area to Dust Soiling Effects

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

Table C3 - Sensitivity of the Area to Human Health Impacts

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

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

Table C4 - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance From The Sources (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

STEP 2C – DEFINE THE RISK OF IMPACTS

The dust emissions magnitude determined at Step 2A should be combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts without mitigation applied. For those cases where the risk category is 'negligible' no mitigation measures beyond those required by legislation will be required.

Table C5 - Risk of Dust Impacts

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

STEP 3 – SITE SPECIFIC MITIGATION

Having determined the risk categories for each of the four activities it is possible to determine the site-specific measures to be adopted. These measures will be related to whether the site is considered to be a low, medium or high risk site. The IAQM guidance details the mitigation measures required for high, medium and low risk sites as determined in Step 2C.

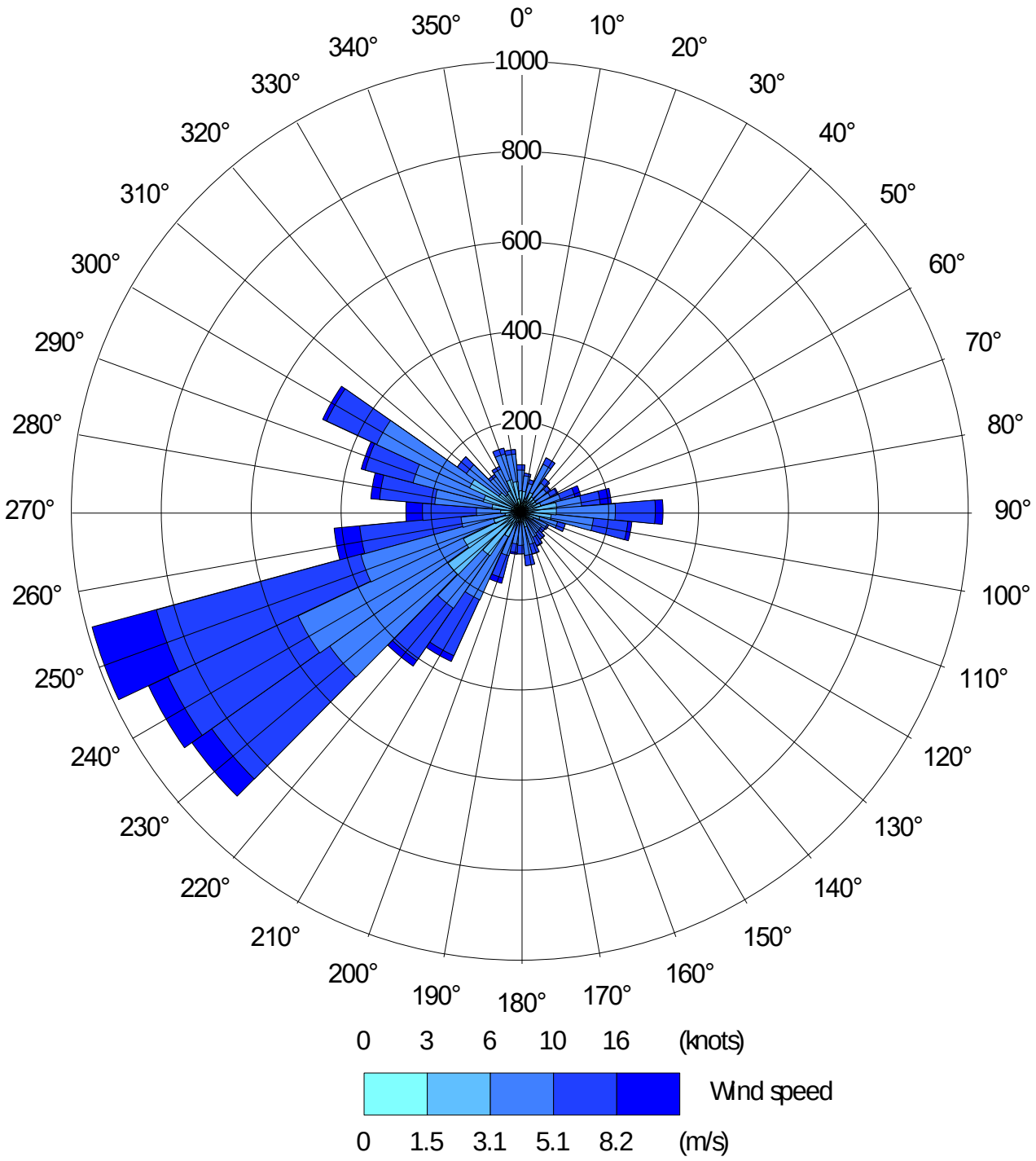
STEP 4 – DETERMINE SIGNIFICANT EFFECTS

Once the risk of dust impacts has been determined in Step 2C and the appropriate dust mitigation measures identified in Step 3, the final step is to determine whether there are significant effects arising from the construction phase. 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.

Appendix E

WIND ROSE

WIND ROSE FOR LONDON CITY AIRPORT 2017



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