105 Judd Street, Camden, London WC1H 9NE

Air Quality Assessment

784-B030322
4th March 2022

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DOCUMENT CONTROL

Document:	**Air Quality Assessment**
Project:	105 Judd Street, London
Client:	105 Judd Street Ltd
Job Number:	784-B030322
File Origin:	O:\Acoustics Air Quality and Noise\Fee Earning Projects

Issue:	**1**	**Status:**	**First Issue**
Date:	21st October 2021		
Prepared by: Donald Towler-Tinlin Environmental Scientist	**Checked by** Matthew Smith Principal Environmental Consultant	**Approved By:** Nigel Mann Director	

Issue:	**2**	**Status:**	**Second Issue**
Date:	9th November 2021		
Prepared by: Donald Towler-Tinlin Environmental Scientist	**Checked by** Matthew Smith Principal Environmental Consultant	**Approved By:** Nigel Mann Director	
Description of revision: Minor Amendments			

Issue:	**3**	**Status:**	**Third Issue**
Date:	4th March 2022		
Prepared by: Zayn Dubois Gafar Environmental Consultant	**Checked by** Matthew Smith Principal Environmental Consultant	**Approved By:** Nigel Mann Director	
Description of revision: Minor Amendments			

EXECUTIVE SUMMARY

This report presents the findings of an air quality assessment undertaken to assess road traffic emissions in relation to conversion to combined laboratory-enabled offices at the basement, ground, first, second, third and fourth floors and creation of additional set-back fifth & sixth floors at 105 Judd Street, Camden, WC1H 9NE.

Construction Phase

The potential effects during the demolition and construction phases include fugitive dust emissions from site activities, such as earthworks, construction and trackout.

During the construction phase, site specific mitigation measures detailed within this assessment will be implemented. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

Operational Phase

Detailed dispersion modelling of traffic pollutants has been undertaken for the proposed development. An operational year assessment for 2022 traffic emissions has been undertaken to assess the effects of the Proposed Development. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

The long-term (annual) assessment of the effects associated with the proposed development with respect to Nitrogen Dioxide (NO_2) is determined to be 'negligible'. With respect to PM_{10} and $PM_{2.5}$ exposure, the effect is determined to be 'negligible' at all identified existing sensitive receptor locations.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AADT	Annual Average Daily Traffic
ADMS	Atmospheric Dispersion Modelling Software
AQAL	the Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CHP	Combined Heat and Power
CL	Critical Level
CO	Carbon Monoxide
DEFRA	Department for Environment Food & Rural Affairs
EAL	Environmental Assessment Limits
EC	European Commission
EFT	The Emissions Factors Toolkit
EPUK	Environmental Protection UK
EU	European Union
EPAQS	The Expert Panel on Air Quality Standards
IAQM	The Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NGR	The United Kingdom National Grid Reference
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
PC	Process Contribution
MHCLG	the Ministry for Housing, Communities and Local Government
NPPF	The National Planning Policy Framework
OS	the UK Ordnance Survey
PEC	Predicted Environment Concentration
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
SAC	Special Areas of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
VOC	Volatile organic compounds
WHO	World Health Organization
UK	The United Kingdom

1.0 INTRODUCTION

This report presents the findings of an air quality assessment undertaken to assess road traffic emissions in relation to conversion combined laboratory-enabled offices at the basement, ground, first, second, third and fourth floors and creation of additional set-back fifth & sixth floors at 105 Judd Street, Camden, WC1H 9NE.

1.1 SITE LOCATION

The central Grid Reference is approximately 530128,182665. The application site is bounded in all directions by commercial and residential properties. Reference should be made to **Figure 1-1** for a map of the application site and surrounding area.

Figure 1-1. Satellite Image of Site and Surrounding Area

Google Imagery (2021)

1.2 CONTEXT

The primary source of the air quality associated with the proposed scheme is from vehicle movements, arriving and departing the proposed development. The traffic data generated by the development has been assessed at the surrounding sensitive receptors and proposed sensitive receptors.

The following assessment stages have been undertaken as part of this assessment:

- Baseline evaluation;
- Assessment of potential air quality impacts during the construction phase;
- Assessment of potential air quality impacts during the operational phase;
- Air Quality Neutral Assessment; and,

- Identification of mitigation measures (as required).

The results of the assessment are detailed in the following sections of this report.

The construction phase assessment considers the potential effects of dust and particulate emissions from site activities and materials movement using a qualitative risk assessment method based on the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' document, published in 2014.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}) and less than 2.5 µm ($PM_{2.5}$) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and impact description of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).

1.3 REPORT STRUCTURE

Following this introductory section, the remainder of this report is structured as follows:

- Section 2: Policy and Legislative Context
- Section 3: Assessment Methodology
- Section 4: Baseline Conditions
- Section 5: Assessment of Air Quality Impacts – Construction Phase
- Section 6: Assessment of Air Quality Impacts – Operational Phase
- Section 7: Air Quality Neutral Assessment
- Section 8: Mitigation
- Section 9: Conclusions

All technical Appendices are included at the end of this report for information.

2.0 POLICY AND LEGISLATIVE CONTEXT

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised July 2021;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Environment Act, 1995;
- The Environment Act, 2021;
- London Local Air Quality Management Technical Guidance LLAQM.TG19, Mayor of London, 2019;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, LA 105 Air quality, Highways England, November 2019;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.0), IAQM, May 2020;
- Ecological Assessment of Air Quality Impacts, CIEEM, January 2021.
- London Plan Supplementary Planning Guidance (SPG) ‘The Control of Dust and Emissions during Construction and Demolition’, July 2014;
- Greater London Authority (GLA) London Environment Strategy, May 2018;
- Greater London Authority (GLA) The London Plan, March 2021;
- Greater London Authority, Sustainable Design & Construction Supplementary Planning Guidance, April 2014; and,
- Air Quality Neutral Planning Support Guidance, Greater London Authority, 2014.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.go.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and,
- London Borough of Camden(https://www.camden.gov.uk/).

Site Specific Reference Documents

- London Borough of Camden, Air Quality CPG (January 2021);
- London Borough of Camden, Clean Air Action Plan 2019-2022 (February 2019);
- London Borough of Camden, Air Quality Annual Status Report for 2019; and,
- London Borough of Camden, Camden Local Plan (Adopted 2017).

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality 'Daughter' Directive – sets ambient air limit values for NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **Directive 2000/69/EC** – the Second Air Quality 'Daughter' Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality 'Daughter' Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments.

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1** and **Table 2-2** along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2-1. Air Quality Standards, Objectives, Limits and Target Values

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m^3 by end of 2004 (max 35 exceedances a year)	24-hour Mean	1st January 2005	50µg/m^3 by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40µg/m^3 by end of 2004	Annual Mean	1st January 2005	40µg/m^3	1st January 2005	
$PM_{2.5}$	UK	25µg/m^3	Annual Mean	31st December 2010	25µg/m^3	1st January 2010	Retain Existing
NO_2	UK	200µg/m^3 not to be exceeded more than 18 times a year	1-Hour Mean	31st December 2005	200µg/m^3 not to be exceeded more than 18 times a year	1st January 2010	Retain Existing
	UK	40µg/m^3	Annual Mean	31st December 2005	40µg/m^3	1st January 2010	

Table 2-2. Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as
NO_X	UK	30µg/m^3	Annual Mean

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA).

Environment Act 2021

The Environment Act (2021) introduces a commitment to create a legally binding duty on government to reduce the concentrations of fine particulate matter ($PM_{2.5}$) in ambient air, and to set a long-term target expected to be 10 µg/m^3, a reduction from the current Air Quality objective of 20 µg/m^3 set out within the Air Quality Standards Regulations (Amendment 2016). A draft of a statutory instrument (or drafts of statutory instruments) containing regulations setting the $PM_{2.5}$ air quality target must be laid before Parliament on or before 31st October 2022 and is expected to come into force thereafter.

2.3 PLANNING AND POLICY GUIDANCE

National Policy

The National Planning Policy Framework (NPPF), revised July 2021, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF (para. 186) states that:

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

The Planning Practice Guidance (PPG) web-based resource was updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide (NO_2).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- *fine particulate matter ($PM_{2.5}$);*
- *ammonia (NH_3);*
- *nitrogen oxides (NO_x);*
- *sulphur dioxide (SO_2); and*
- *non-methane volatile organic compounds (NMVOCs).*

As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

Regional Policy

The London Borough of Camden (LBoC) lies within the Greater London Authority (GLA) Area. The new London Plan addresses the improvement of air quality. Following a review of policies within the new Local Plan, the following were identified as being relevant to the proposed development from an air quality perspective:

"Policy SD4 The Central Activities Zone (CAZ)

D. Taking account of the dense nature of the CAZ, practical measures should be taken to improve air quality, using an air quality positive approach where possible (Policy SI 1 Improving air quality) and to address issues related to climate change and the urban heat island effect."

"Policy D1 London's form, character and capacity for growth

A. Boroughs should undertake area assessments to define the characteristics, qualities and value of different places within the plan area to develop an understanding of different areas' capacity for growth. Area assessments should cover the elements listed below:
5)air quality and noise levels."

"Policy D3 Optimising site capacity through the design-led approach

Experience

9) help prevent or mitigate the impacts of noise and poor air quality."

"Policy E5 Strategic Industrial Locations (SIL)

D. Development proposals within or adjacent to SILs should not compromise the integrity or effectiveness of these locations in accommodating industrial type activities and their ability to operate on a 24-hour basis. Residential development adjacent to SILs should be designed to ensure that existing or potential industrial activities in SIL are not compromised or curtailed. Particular attention should be given to layouts, access, *orientation, servicing, public realm, air quality, soundproofing and other design mitigation in the residential development."*

***"**Policy E7 Industrial intensification, co-location and substitution*

D. The processes set out in Parts B and C above must ensure that: f) air quality, including dust, odour and emissions and potential contamination."

***"**Policy SI1 Improving Air Quality*

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

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

1. Development proposals should not:

a) lead to further deterioration of existing poor air quality

b) create any new areas that exceed air quality limits, or delay the date at which compliance will be achieved in areas that are currently in exceedance of legal limits

c) create unacceptable risk of high levels of exposure to poor air quality.

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 retrofitted 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, should demonstrate that design measures have been used to minimise exposure.

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."

***"**<u>Policy SI8 Waste capacity and net waste self-sufficiency</u>*

E. Developments proposals for new waste sites or to increase the capacity of existing sites should be evaluated against the following criteria:4) the impact on amenity in surrounding areas (including but not limited to noise, odours, air quality and visual impact) – where a site is likely to produce significant air quality, dust or noise impacts, it should be fully enclosed."

***"**<u>Policy T6.2 Office Parking</u>*

D. Outer London boroughs wishing to adopt more generous standards are required to do so through an evidence-based policy in their Development Plan that identifies the parts of the borough in which the higher standards will be applied, and justifies those standards, including: 3) the impact on congestion and air quality locally and on neighboring boroughs and districts outside London as appropriate."

***"**<u>Policy T8 Aviation</u>*

B. The environmental and health impacts of aviation must be fully acknowledged and aviation-related development proposals should include mitigation measures that fully meet their external and environmental costs, particularly in respect of noise, air quality and climate change. Any airport expansion scheme must be appropriately assessed and if required demonstrate that there is an overriding public interest or no suitable alternative solution with fewer environmental impacts.

C. The Mayor will oppose the expansion of Heathrow Airport unless it can be shown that no additional noise or air quality harm would result, and that the benefits of future regulatory and technology improvements would be fairly shared with affected communities."

Local Policy

Following a review of the London Borough of Camden's Camden Local Plan (adopted 2017), the following policy concerning air quality was identified.

*"**Policy CC4: Air Quality;***

The Council will ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

The Council will take into account the impact of air quality when assessing development proposals, through the consideration of both the exposure of occupants to air pollution and the effect of the development on air quality. Consideration must be taken to the actions identified in the Council's Air Quality Action Plan.

Air Quality Assessments (AQAs) are required where development is likely to expose residents to high levels of air pollution. Where the AQA shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.

Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan."

Policy CC4 is supported by the Camden Planning Guidance for Air Quality (January 2021) which provides information on key air quality issues within the borough. The CPG states that:

- *"All proposals involving demolition and construction should adopt best practice measures to reduce and mitigate emissions.*
- *On-site monitoring may be required dependent on the scale of demolition and construction.*
- *Certain developments using Non Road Mobile Machinery (within the KW range) need to meet standards in the Mayor's Dust and emissions SPD.*
- *The impact of outdoor air pollution on indoor air quality in new developments needs to be taken into account at the earliest stages of building design.*
- *Development should take into consideration the location of amenity space and opportunities for appropriate planting 'greening'.*
- *Development should reduce emissions by being energy efficient (reducing emissions associated with the operation of the building).*
- *Development should prioritise more sustainable modes of transport and where applicable improve the walking and cycling environment."*

3.0 ASSESSMENT METHODOLOGY

The potential environmental effects of the operational phase of the proposed development have been identified as proposed vehicle movements. The significance of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*' and May 2020 '*A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*'.

The methodology used to determine the potential air quality effects of the construction phase of the proposed development has been derived from the IAQM '*Guidance on the Assessment of the Impacts of Dust from Demolition and Construction'* document and is summarised in Section 5.

3.1 DETERMINING IMPACT DESCRIPTION OF THE AIR QUALITY EFFECTS

The impact description of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
4. The effects can be adverse when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
5. The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,
6. Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 3-1. Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, the Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

4.0 BASELINE CONDITIONS

4.1 AIR QUALITY REVIEW

This section provides a review of the existing air quality in the vicinity of the application site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the application site has been defined from several sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, London Borough of Camden (LBoC) has undertaken an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO_2 are above the relevant AQOs at locations of relevant public exposure within the Borough. Therefore, LBoC has designated a boroughwide Air Quality Management Area (AQMA).

The assessments have indicated that concentrations of NO_2 are above the relevant AQOs at one location of relevant public exposure within LBoC that is shown below.

Table 4-1. Local Authority AQMA Details

AQMA	Description	Date Declared	Date Amended	Pollutants Declared
Camden AQMA	An area encompassing the whole borough.	20/09/2002	N/A	Nitrogen Dioxide NO_2 Particulate Matter PM_{10}

The proposed development site is situated within the Camden AQMA, therefore existing receptors within the AQMA have been included as part of the modelling assessment.

Air Quality Monitoring

Monitoring of air quality within LBoC has been undertaken through both automatic and non-automatic monitoring methods in 2019. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site. The most recent monitoring data within LBoC was undertaken during 2019.

<u>Automatic Monitoring</u>

LBoC undertook automatic pollution monitoring during 2019 at 4 different locations. The closest monitoring location is CD9, which is located at Euston Road, approximately 227 m west of the application site. The most recently available data is from 2019 which is presented in **Table 4-2**.

Table 4-2. Monitored Annual Mean NO_2 Concentrations at Automatic Monitoring Locations

Site ID	Location	Site Type	Distance from Kerb of Nearest Road (m)	Inlet Height (m)	2019 NO_2 Annual Mean Concentration ($\mu g/m^3$)	2019 PM_{10} Annual Mean Concentration ($\mu g/m^3$)	2019 $PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$)
CD9	Euston Road	Roadside	0.5	2.5	70.0	22.0	14.0

As outlined in **Table 4-2**, the monitoring location monitored annual average NO_2 concentrations above the AQO for NO_2 (40 $\mu g/m^3$ annual mean) during 2019.

<u>Non - Automatic Monitoring</u>

London Borough of Camden operates a network of 33 passive diffusion tubes. The closest diffusion tube is diffusion tube CA4A, which is located on Euston Road, approximately 107 m north of the application site. The most recently available diffusion tube data is from 2019 which is presented in **Table 4-3**.

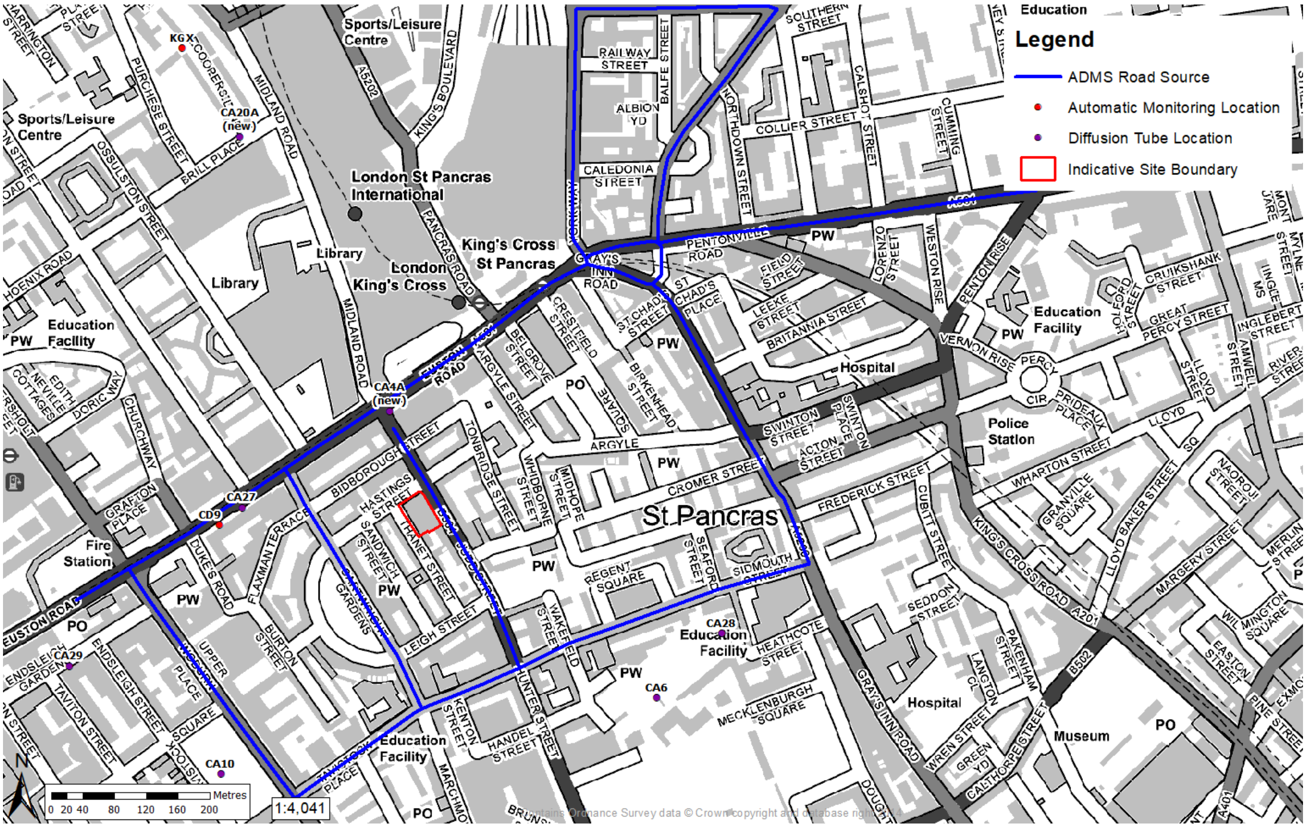
Table 4-3. Monitored Annual Mean NO_2 Concentrations at Diffusion Tubes

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	Monitored 2019 Annual Mean NO_2 Concentration (µg/m^3)
CA4A (new)	Euston Road	Kerbside	0.5	2.2	69.06
CA27	Euston Road LAQN colocation	Roadside	0.5	2.0	63.81
CA6	St. George's Gardens	Urban Background	30	1.8	24.65
CA28	St. George's Gardens East	Urban Background	29	1.5	27.67
CA10	Tavistock Gardens	Urban Background	25	2.5	33.13
CA29	Endsleigh Gardens	Roadside	0.5	2.0	48.34

As indicated in **Table 4-3**, three diffusion tubes located within the Air Quality Assessment area monitored annual average NO_2 concentrations above the AQO for NO_2 (40 µg/m^3 annual mean) during 2019.

It should be noted that as part of the model verification a review of diffusion tubes locations and monitoring heights was undertaken. As part of this process, the locations and monitoring heights were adjusted following desk-based review using Google Maps.

Figure 4-1. Local Authority Monitoring Locations

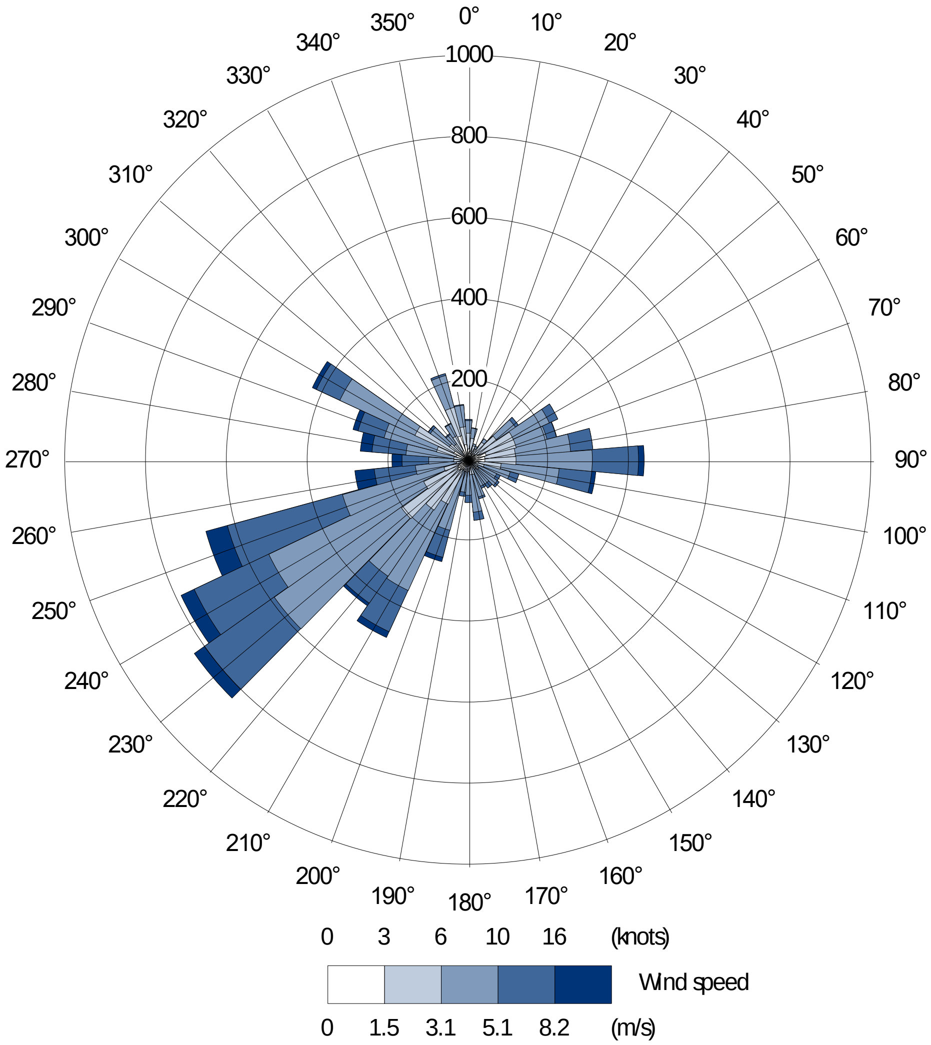


4.2 METEOROLOGY

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS (Atmospheric Dispersion Modelling System) model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data.

The 2019 meteorological data used in the assessment is derived from London City Airport Meteorological Station. This is the nearest meteorological station, which is considered representative of the application site, with all the complete parameters necessary for the ADMS model. Reference should be made to **Figure 4-2** for an illustration of the prevalent wind conditions at London City Airport Meteorological Station site.

Figure 4-2. London City Airport 2019 Wind Rose



4.3 EMISSION SOURCES

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO_2, PM_{10} and $PM_{2.5}$.

The assessment has therefore modelled all roads within the immediate vicinity of the application site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to **Figure A-1** for a graphical representation of the traffic data utilised within the ADMS Roads 5.0.0.1 model.

It should be noted that the pollutant contribution of minor roads and rail sources that are not included within the dispersion model is considered to be accounted for via the use of background air quality levels.

4.4 SENSITIVE RECEPTORS

Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

The existing receptor locations are summarised in **Table 4-4** and the spatial locations of all of the receptors are illustrated in **Figure 4-3**.

Table 4-4. Modelled Sensitive Receptor Locations

Existing Sensitive Receptor		X	Y	Receptor Height (m)
R1	161 Euston Road	529761	182571	4.0
R2	117 Euston Road	529862	182633	4.0
R3	9 Mabledon Place	529987	182650	4.0
R4	2 Tavistock Place	530005	182312	1.5
R5	101 Marchmont Street	530097	182469	1.5
R6	74 Marchmont Street	530147	182410	1.5
R7	103 Judd Street	530160	182646	1.5
R8	305 Judd Street	530243	182475	1.5
R9	Cambria House 37 Hunter Street	530251	182453	1.5
R10	Selsey Tavistock Place	530323	182511	1.5
R11	Premier Inn Kings Cross	530335	183106	4.0
R12	341 Gray's Inn Road	530356	182957	4.0
R13	2 Saint Chad's Street	530433	182931	4.0
R14	272 Pentonviille Road	530443	183017	4.0
R15	26b Caledonian Road	530448	183088	4.0
R16	44 Caledonian Road	530456	183109	4.0
R17	Travelodge Kings Cross	530473	182925	4.0
R18	Linfield Sidmouth Street	530571	182597	1.5
R19	200 Pentonville Road	530698	183054	4.0
Proposed Sensitive Receptor		**X**	**Y**	**Receptor Height (m)**
PR1	Proposed Receptor	530110	182672	1.5
PR2	Proposed Receptor	530134	182688	1.5
PR3	Proposed Receptor	530157	182649	1.5
PR4	Proposed Receptor	530132	182636	1.5

Four proposed receptors and nineteen existing sensitive receptors have been assessed to determine the effect of air quality, associated with the proposed development. The locations of the receptor are identified on **Figure 4-3**.

4.5 ECOLOGICAL RECEPTORS

Air quality impacts associated with the proposed re-development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on 'Air Quality Impacts on Designated Nature Conservation Sites' (2020) outlines the types of designated nature sites within 2 km of the proposed development which require air quality assessment. These are inclusive of:

- Sites of Special Scientific Interest (SSSIs);

- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar Sites;
- Areas of Special Scientific Interest (ASSIs);
- National Nature Reserves (NNRs);
- Local Nature Reserves (LNRs);
- Local Wildlife Sites (LWSs); and,
- Areas of Ancient Woodland (AW).

The Conservation of Habitats and Species Regulations (2019) additionally requires competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas).

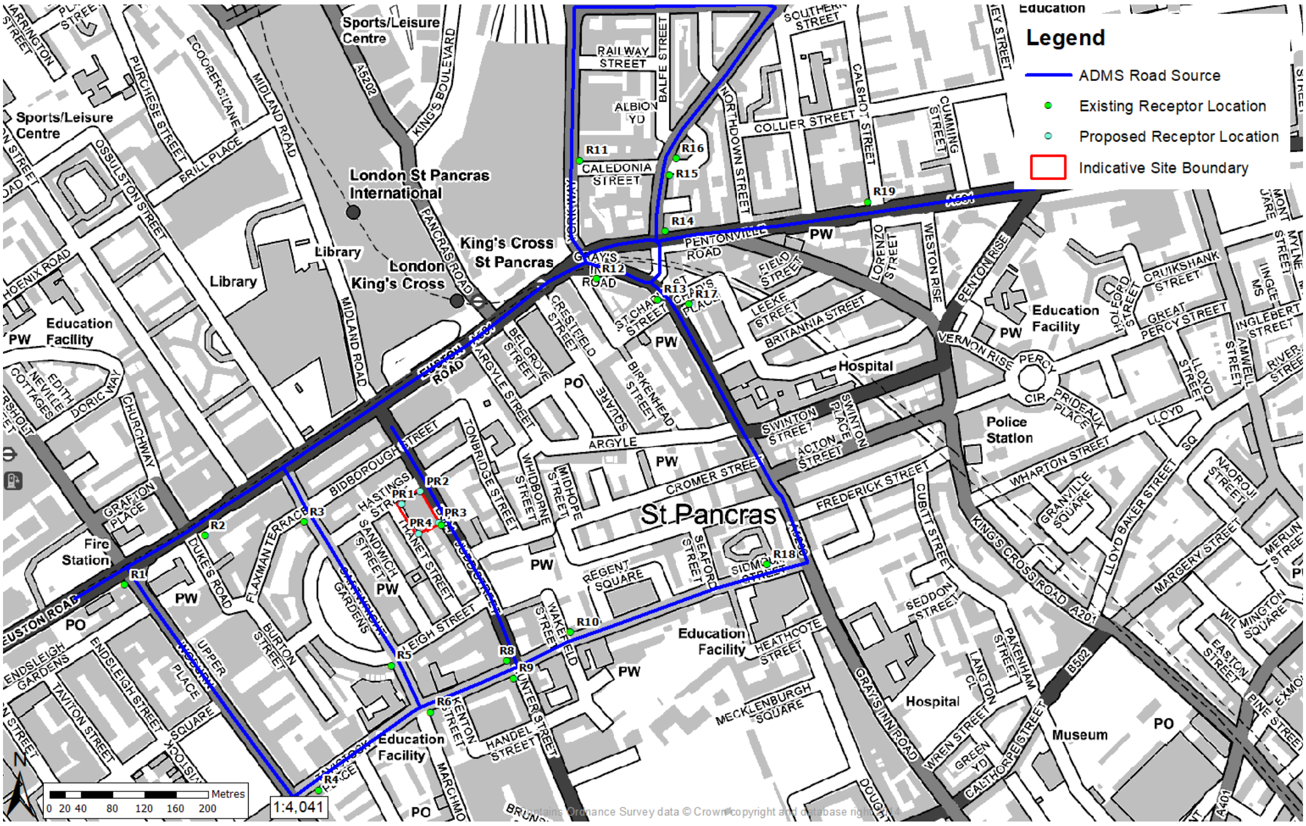
A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations. Following a search within a 2 km radius of the site boundary, the following ecological receptors were identified:

Table 4-5. Ecological Sensitive Receptor Locations

Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Nearest Affected Road (m)
			X	Y		
E1	Camley Street Nature Park	LNR	530013	183364	0.68	322
E2	Camley Street Nature Park	LNR	529926	183505	0.84	452

It should be noted that the IAQM Guidance only requires the assessment of ecological receptors which are located within 200 m of the affected road network. Therefore, all ecological receptors have been scoped out of this assessment.

Figure 4-3. Sensitive Receptor Locations



5.0 ASSESSMENT OF AIR QUALITY IMPACTS - CONSTRUCTION PHASE

5.1 POLLUTANT SOURCES

The main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months) or from construction materials. The main potential effects of dust and particulate matter are:

- Visual - dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Construction activities can give rise to short-term elevated dust/PM_{10} concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

5.2 PARTICULATE MATTER (PM_{10})

The UK Air Quality Standards seek to control the health implications of respirable PM_{10}. However, the majority of particles released from construction will be greater than this in size.

Construction works on site have the potential to elevate localised PM_{10} concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

5.3 DUST

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Although there are no formal standards or criteria for nuisance caused by deposited particles, the IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites' (October 2018) and the Environment Agency Technical Guidance Note (TGN) M17 states that dust is usually compared with a 'complaints likely' guideline of 200mg/m^2/day. Therefore, a deposition rate of 200mg/m^2/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures will be taken to minimise the emissions of dust as part of good site practice.

Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in the following sections.

5.4 METHODOLOGY

The construction phase assessment utilises the IAQM Guidance on the Assessment of Dust from Demolition and Construction document published in February 2014.

Four construction processes are considered; these are demolition, earthworks, construction and trackout. For each of these phases, the impact description of the potential dust impacts is derived following the determination of a dust emission magnitude and the distance of activities to the nearest sensitive receptor, therefore assessing worst case impacts. A full explanation of the methodology is contained in Appendix A.

5.5 ASSESSMENT RESULTS

Based on the methodology detailed in Appendix A, the scale of the anticipated works has determined the potential dust emission magnitude for each process, as presented in the **Table 5-1** below.

Table 5-1. Dust Emission Magnitude

Construction Process	Site Criteria	Dust Emission Magnitude
Demolition	Total building volume <20,000 m^3	Small
Earthworks	No earthworks required	N/A
Construction	Total Building Volume <25,000 m^3	Small
Trackout	Assumed <10 HDV outward movements in any one day	Small

The sensitivity of the surrounding area to each construction process has been determined following stage 2B of the IAQM guidance. The assessment has determined the area sensitivities as shown in the **Table 5-2**.

The sensitivity of the ecological receptors is considered not applicable within the construction phase assessment due to the distance from the application site which is greater than 500m. This is in accordance with Table 4 of the IAQM Guidance.

Table 5-2. Sensitivity of the Area

Source	Area Sensitivity					
	Dust Soiling	Site Sensitivity Criteria	Health Effects of PM_{10}	Site Sensitivity Criteria	Ecological	Site Sensitivity Criteria
Demolition	High	>100 Highly Sensitive Receptors within 50m	Low	Annual Mean of <24 ug/m^3 for PM_{10} >100 Highly Sensitive Receptors within 50m	N/A	>50 m from site boundary
Earthworks	N/A	No eearthworks required	N/A	No earthworks required	N/A	No earthworks required
Construction	High	>100 Highly Sensitive Receptors within 50m	Low	Annual Mean of <24 ug/m^3 for PM_{10} >100 Highly Sensitive Receptors within 50m	N/A	>50 m from site boundary
Trackout	High	>100 Highly Sensitive	Low	Annual Mean of <24 ug/m^3 for	N/A	>50 m from roads within 500

		Receptors within 50m of roads within 500m of site		PM_{10} >100 Highly Sensitive Receptors within 50m of roads within 500m of site		m from site boundary

The dust emission magnitude determined in **Table 5-1** has been combined with the sensitivity of the area determined in **Table 5-2**, to determine the risk of impacts prior to the implementation of appropriate mitigation measures. The potential impact significance of dust emissions associated with the development, without mitigation, is presented in **Table 5-3**.

Table 5-3. Impact Description of Construction Activities without Mitigation

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	Medium	Negligible	N/A
Earthworks	N/A	N/A	N/A
Construction	Low	Negligible	N/A
Trackout	Low	Negligible	N/A

Appropriate mitigation measures are detailed and presented in Section 7. Following the adoption of these measures, the subsequent impact significance of the construction phase is not predicted to be significant.

6.0 ASSESSMENT OF AIR QUALITY IMPACTS - OPERATIONAL PHASE

In the context of the proposed development, road traffic is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at receptors. There are not expected to be any potential impacts on air quality as a result of the proposed lab-enabled office space within the proposed development.

The operational phase assessment therefore consists of the quantified predictions of the change in NO_2, PM_{10} and $PM_{2.5}$ for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads.

In accordance with the provided traffic data, the operational phase assessment has been undertaken with a worst-case operational opening year of 2022. The assessment scenarios are therefore:

- 2019 Baseline = Existing Baseline Conditions (2019);
- 2022 ‘Do Minimum’ = Baseline Conditions + Committed Development Flows (through local growth factor); and,
- 2022 ‘Do Something’ = Baseline Conditions + Committed Development (through local growth factor) + Proposed Development.

6.1 EXISTING AND PREDICTED TRAFFIC FLOWS

Baseline 2019 traffic data, projected 2022 ‘Do Minimum’ and ‘Do Something’ traffic data, and average vehicle speeds have been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT). Worst-case development traffic flows have been provided by Velocity Transport Planning.

Baseline 2019 traffic data was downloaded from the Department for Transport (DfT) website. The proposed development opening year is assumed to be a worst-case year of 2022. To determine the traffic flows for the 2022 ‘Do Minimum’ traffic flows, a TEMPro factor of 1.0369 has been applied to the 2019 Baseline traffic data.

Predicted development flows have been combined with 2022 ‘Do Minimum’ traffic flows to determine the ‘Do Something’ 2022 scenario traffic flows.

To calculate the 2022 ‘Do Something’ operational year traffic flows, the proposed development traffic flows have been distributed across the model area and have been added onto the 2022 ‘Do Minimum’ scenario flows.

Emission factors for the 2019 baseline and 2022 projected ‘Do Minimum’ and ‘Do Something’ scenarios have been calculated using the Emission Factor Toolkit (EFT) Version 10.1 (August 2020).

It is assumed the average vehicle speeds on the local road network in an opening year of 2022 will be broadly the same as the ones in 2019. A 50 m 20 km/hr slow down phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in **Figure A-1**. Detailed traffic figures are provided in the **Table 6-1**.

Table 6-1. Traffic Data

Link	Speed (km/h)	2019 Baseline		2022 Do Minimum		2022 Do Something	
		AADT	HGV %	AADT	%HGV	AADT	%HGV
York Way (South of Caledonia Street)	32	11,280	4.2	11696	4.2	11,700	4.2
York Way (North of Caledonia Street)	32	11,280	4.2	11696	4.2	11,696	4.2
Wharfdale Road	32	7,309	4.0	7579	4.0	7,579	4.0
Caledonian Road (South of Caledonia Street)	32	8,820	3.4	9145	3.4	9,149	3.5
Caledonian Road (North of Caledonia	32	8,820	3.4	9145	3.4	9,145	3.4
Pentonville Road	32	23,793	3.2	24671	3.2	24,675	3.2
Euston Road	48	51,573	3.5	53476	3.5	53,480	3.5
A501 Grays Inn Road	32	12,959	2.5	13437	2.5	13,437	2.5
Judd Street	32	11,761	5.6	12195	5.6	12,210	5.7
Cartwright Gardens	32	2,047	2.2	2123	2.2	2,126	2.4
Tavistock Place	32	8,052	3.9	8349	3.9	8,357	4.0
Sidmouth Street	32	10,354	7.1	10736	7.1	10,744	7.1
Gray's Inn Road	32	12,959	2.5	13437	2.5	13,441	2.5
Upper Woburn Place / Tavistock Square	32	14,516	6.3	15052	6.3	15,054	6.3

6.2 BACKGROUND CONCENTRATIONS

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and Technical Guidance (TG) (16).

The IAQM Guidance states:

> "*A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO.*"

Additionally, TG (16) states:

> "*Typically, only the process contributions from local sources are represented within an output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations.*"

<u>Defra Published Background Concentrations for 2019</u>

The background concentrations shown in **Table 6-2** were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the application site. In August 2020, Defra issued revised 2018 based background maps for nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$.

Table 6-2. Published Background Air Quality Levels (µg/m³)

Receptor Location	2019			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
Local Authority Monitoring				
CD9	70.65	39.56	20.17	12.90
CA4A	69.50	39.26	20.34	12.92
CA27	70.65	39.56	20.17	12.90
Existing Sensitive Receptors				
R1	70.65	39.56	20.17	12.90
R2	70.65	39.56	20.17	12.90
R3	70.65	39.56	20.17	12.90
R4	69.50	39.26	20.34	12.92
R5	69.50	39.26	20.34	12.92
R6	69.50	39.26	20.34	12.92
R7	69.50	39.26	20.34	12.92
R8	69.50	39.26	20.34	12.92
R9	69.50	39.26	20.34	12.92
R10	69.50	39.26	20.34	12.92
R11	56.37	33.72	20.14	12.85
R12	69.50	39.26	20.34	12.92
R13	69.50	39.26	20.34	12.92
R14	56.37	33.72	20.14	12.85
R15	56.37	33.72	20.14	12.85
R16	56.37	33.72	20.14	12.85
R17	69.50	39.26	20.34	12.92
R18	69.50	39.26	20.34	12.92
R19	56.37	33.72	20.14	12.85
Proposed Sensitive Receptors				
PR1 – PR4	69.50	39.26	20.34	12.92

All the Defra background concentrations detailed in **Table 6-2** for 2019, show that the background levels are predicted to be below the relevant AQO within the study area.

A breakdown of the background source apportionment of NO_X concentrations at each monitoring location and receptor is shown in **Table 6-3**.

Table 6-3. Pollutant Source Apportionment of NO_X (µg/m³)

Receptor Location	2019						
	Total NO_x	% of NO_x from Road Sources	% of NO_x from Industrial Sources	% of NO_x from Domestic Sources	% of NO_x from Aircraft Sources	% of NO_x from Rail Sources	% of NO_x from Other Sources
Local Authority Monitoring							
CD9	70.65	37.58	7.01	33.68	0.01	1.12	20.59
CA4A	69.50	31.91	8.78	39.37	0.01	1.00	18.93
CA27	70.65	37.58	7.01	33.68	0.01	1.12	20.59
Existing Sensitive Receptors							
R1	70.65	37.58	7.01	33.68	0.01	1.12	20.59

R2	70.65	37.58	7.01	33.68	0.01	1.12	20.59
R3	70.65	37.58	7.01	33.68	0.01	1.12	20.59
R4	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R5	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R6	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R7	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R8	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R9	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R10	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R11	56.37	36.38	7.39	33.00	0.02	2.55	20.67
R12	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R13	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R14	56.37	36.38	7.39	33.00	0.02	2.55	20.67
R15	56.37	36.38	7.39	33.00	0.02	2.55	20.67
R16	56.37	36.38	7.39	33.00	0.02	2.55	20.67
R17	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R18	69.50	31.91	8.78	39.37	0.01	1.00	18.93
R19	56.37	36.38	7.39	33.00	0.02	2.55	20.67
Proposed Sensitive Receptors							
PR1 – PR4	69.50	31.91	8.78	39.37	0.01	1.00	18.93

Table 6-3 shows that the major background source of NO_X at the monitoring, sensitive receptor locations where sources have been identified are mainly comprised of road sources.

A review of the Defra background site has determined that they are in line with the Local Authority monitoring within LBoC.

Table 6-4 shows the background concentrations utilised within the assessment.

Table 6-4. Utilised Background Concentrations (µg/m^3)

Receptor Location	2019		Source
	NO_x	NO_2	
Local Authority Monitoring			
CD9	70.65	39.56	Defra Background Maps
CA4A	69.50	39.26	
CA27	70.65	39.56	
Existing Sensitive Receptors			
R1*	70.65	39.56	Defra Background Maps
R2*	70.65	39.56	
R3*	70.65	39.56	
R4*	69.50	39.26	
R5*	69.50	39.26	
R6*	69.50	39.26	
R7*	69.50	39.26	
R8*	69.50	39.26	
R9*	69.50	39.26	
R10*	69.50	39.26	
R11*	56.37	33.72	

R12**	69.50	39.26	
R13*	69.50	39.26	
R14*	56.37	33.72	
R15*	56.37	33.72	
R16*	56.37	33.72	
R17*	69.50	39.26	
R18*	69.50	39.26	
R19*	56.37	33.72	
Proposed Sensitive Receptors			
PR1 – PR4	69.50	39.26	Defra Background Maps

6.3 MODEL VERIFICATION

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Section 7 of the TG16 guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_X at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_X emissions. These are converted into predicted roadside contribution NO_2 exposure at the relevant receptor locations based on the updated approach to deriving NO_2 from NO_X for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_X to NO_2 worksheet in the online LAQM tools website hosted by Defra. **Table 6-5** summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6-5. Comparison of Roadside Modelling & Monitoring Results for NO_2

Monitoring Site	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
CD9	70.00	71.69	2.41
CA4A	69.06	66.41	-3.84
CA27	63.81	64.53	1.13

The final model produced data at the monitoring locations to within 10% / 25% of the monitoring results at all of the verification points, as recommended by TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 1.00. This was achieved by applying a model correction factor of 1.64 to roadside predicted NO_X concentrations before converting to NO_2. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

6.4 ADMS-ROADS MODEL INPUTS

Table 6-6. Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), NO_2, Ozone (O_3) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	**London City Airport 2019 Meteorological Station**, hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	**1.5m** representing a typical surface roughness for **Large Urban Areas** was used for the Site and the met. Measurement site.
Latitude	Allows the location of the model area to be set	United Kingdom = **51.53**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Cities and Large Towns= **30m** was used for the Site Small Towns = 1**0m** was used for the met. Measurement site.
Elevation of Road	Allows the height of the road link above ground level to be specified.	All other road links were set at ground level = **0m**.
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	**London - Inner** settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EFT database of traffic emission factors.	The **EFT** Version **10.1 (2020)** dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	**2019** data for verification and baseline Operational Phase Assessment. **2022** data for the Operational Phase Traffic Assessment.

6.5 ADMS MODELLING RESULTS

6.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

6.5.2 Assessment Scenarios

For the operational year of 2022, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2022 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors:

- 2019 Baseline = Existing Baseline conditions;
- 2022 ‘Do Minimum’ = 2022 Baseline + Committed Development Flows (through local growth factor); and,

- 2022 ‘Do Something’ = 2022 Baseline + Committed Development Flows (through local growth factor) + Development Traffic Flows.

6.5.3 Operational Traffic Assessment

Nitrogen Dioxide

Table 6-7 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled ‘Do Minimum’ and ‘Do Something’ scenarios.

Table 6-7. Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 ($\mu g/m^3$)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1	161 Euston Road	70.97	62.97	62.98	0.01
R2	117 Euston Road	48.36	45.89	45.89	<0.01
R3	9 Mabledon Place	42.41	41.59	41.59	<0.01
R4	2 Tavistock Place	45.85	43.93	43.94	0.01
R5	101 Marchmont Street	40.76	40.33	40.33	<0.01
R6	74 Marchmont Street	46.91	44.71	44.72	0.01
R7	103 Judd Street	47.53	45.11	45.13	0.02
R8	305 Judd Street	49.34	46.39	46.41	0.02
R9	Cambria House 37 Hunter Street	47.48	45.09	45.11	0.02
R10	Selsey Tavistock Place	42.88	41.76	41.76	<0.01
R11	Premier Inn Kings Cross	37.32	36.29	36.29	<0.01
R12	341 Gray's Inn Road	46.56	44.49	44.49	<0.01
R13	2 Saint Chad's Street	44.06	42.71	42.71	<0.01
R14	272 Pentonviille Road	42.73	40.22	40.22	<0.01
R15	26b Caledonian Road	37.75	36.61	36.61	<0.01
R16	44 Caledonian Road	37.17	36.19	36.19	<0.01
R17	Travelodge Kings Cross	42.99	41.94	41.94	<0.01
R18	Linfield Sidmouth Street	42.76	41.67	41.67	<0.01
R19	200 Pentonville Road	38.20	36.97	36.97	<0.01
PR1	Proposed Receptor	-	-	40.86	-
PR2	Proposed Receptor	-	-	42.42	-
PR3	Proposed Receptor	-	-	45.12	-
PR4	Proposed Receptor	-	-	40.63	-
Annual Mean AQO		**40 $\mu g/m^3$**			

As indicated in **Table 6-7**, the maximum predicted increase in annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the proposed development is likely to be 0.02 $\mu g/m^3$ at 103 Judd Street (R7), 305 Judd Street (R8), and Cambria House 37 Hunter Street (R9).

The maximum predicted annual average exposure to NO_2 at any proposed receptor at the ground floor is 45.12 $\mu g/m^3$. All modelled proposed residential receptors are predicted to be below the annual average AQO for NO_2.

The predicted long-term NO_2 concentrations at all proposed receptors are well below 60 $\mu g/m^3$ in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO_2 AQO at all modelled receptors as outlined in LAQM TG16 technical guidance.

Figure 6-1, **Figure 6-2** and **Figure 6-3** below, illustrate the Total Long Term Annual Average Nitrogen Dioxide (NO_2) Contribution and Concentration at the Proposed Development (µg/m^3).

Figure 6-1. Annual Average Long-Term Nitrogen Dioxide (NO_2) Contribution from Proposed Development (µg/m³)

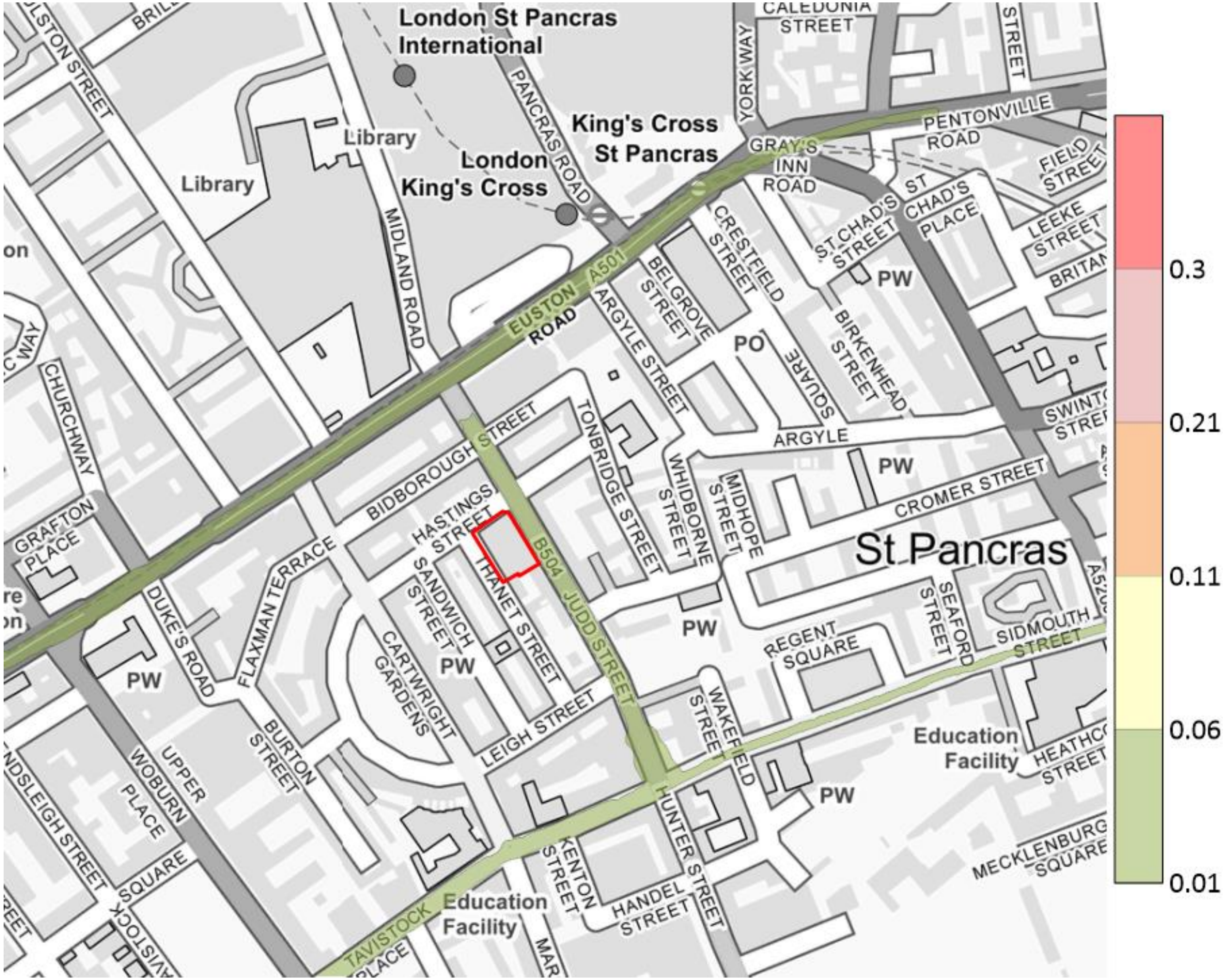


Figure 6-2. Total Long Term Annual Average Nitrogen Dioxide (NO_2) Concentration at Proposed Development (µg/m³)

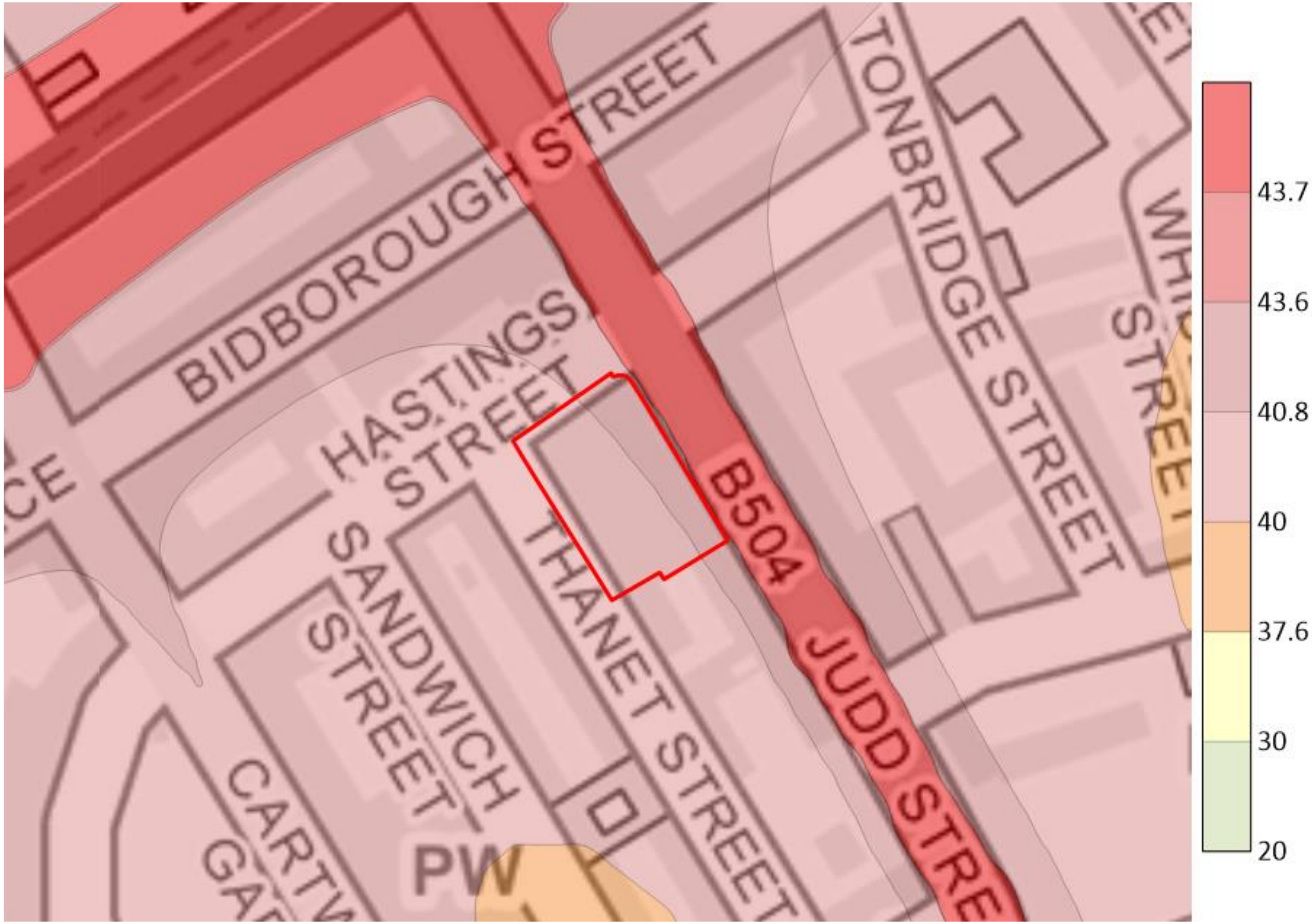
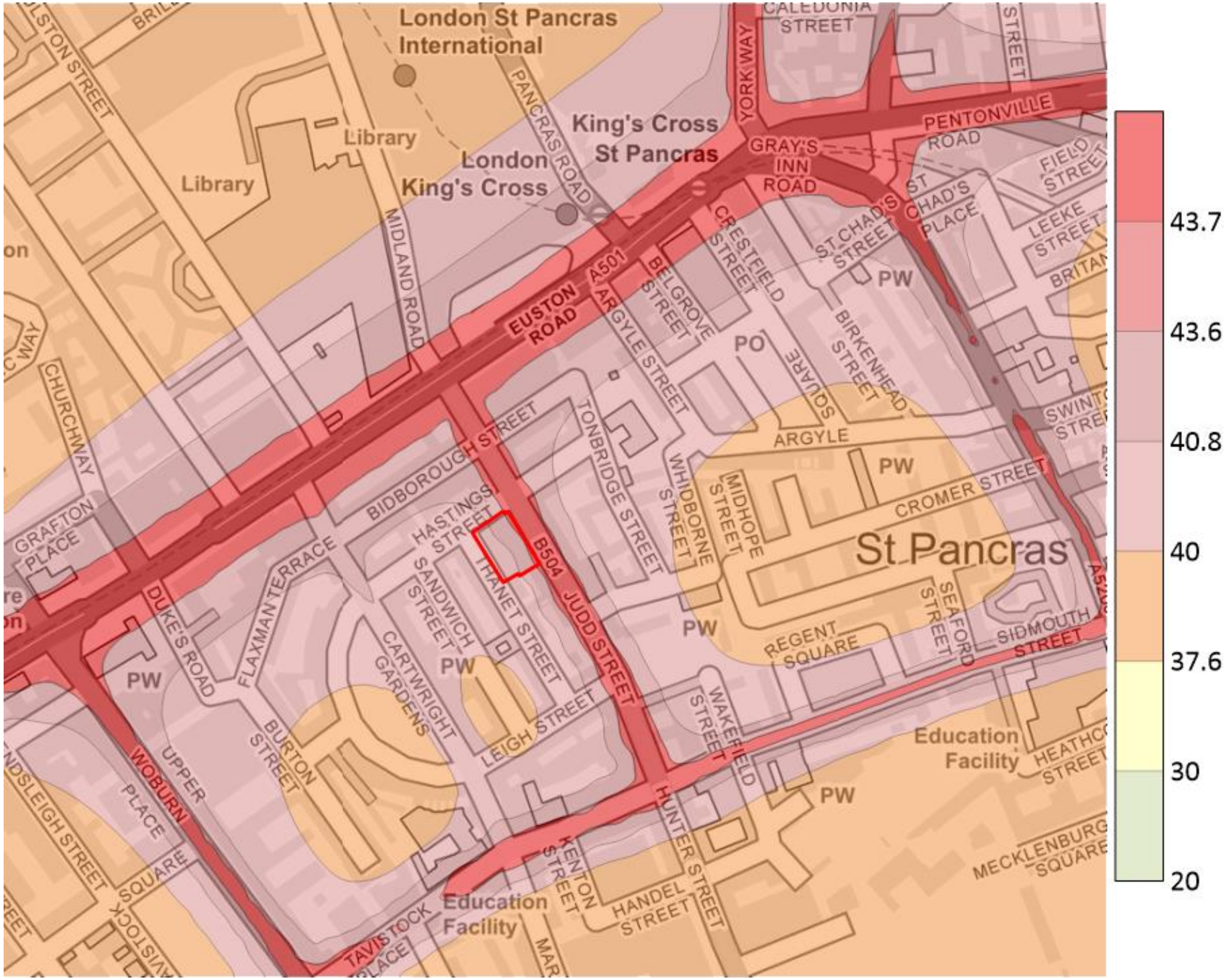


Figure 6-3. Total Long Term Annual Average Nitrogen Dioxide (NO_2) Concentration Across the Study Area (µg/m³)



The impact description of changes in traffic flow associated with the proposed development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-8**.

Table 6-8. Impact Description of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	0.01	0.03	0%	≥110 of AQO	Negligible
R2	<0.01	<0.01	0%	≥110 of AQO	Negligible
R3	<0.01	<0.01	0%	103-109 of AQO	Negligible
R4	0.01	0.03	0%	≥110 of AQO	Negligible
R5	<0.01	<0.01	0%	95-102% of AQO	Negligible
R6	0.01	0.03	0%	≥110 of AQO	Negligible
R7	0.02	0.05	0%	≥110 of AQO	Negligible
R8	0.02	0.05	0%	≥110 of AQO	Negligible
R9	0.02	0.05	0%	≥110 of AQO	Negligible
R10	<0.01	<0.01	0%	103-109 of AQO	Negligible
R11	<0.01	<0.01	0%	76-94% of AQO	Negligible
R12	<0.01	<0.01	0%	≥110 of AQO	Negligible
R13	<0.01	<0.01	0%	103-109 of AQO	Negligible
R14	<0.01	<0.01	0%	95-102% of AQO	Negligible
R15	<0.01	<0.01	0%	76-94% of AQO	Negligible
R16	<0.01	<0.01	0%	76-94% of AQO	Negligible
R17	<0.01	<0.01	0%	103-109 of AQO	Negligible
R18	<0.01	<0.01	0%	103-109 of AQO	Negligible
R19	<0.01	<0.01	0%	76-94% of AQO	Negligible

+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Particulate Matter (PM_{10})

Table 6-9 presents a summary of the predicted change in annual mean PM_{10} concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-9. Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		2019 Baseline	**2022 Do Minimum**	**2022 Do Something**	**Development Contribution**
R1	161 Euston Road	26.76	26.53	26.53	<0.01
R2	117 Euston Road	21.80	21.74	21.74	<0.01
R3	9 Mabledon Place	20.71	20.69	20.69	<0.01

R4	2 Tavistock Place	21.52	21.48	21.48	<0.01
R5	101 Marchmont Street	20.63	20.62	20.62	<0.01
R6	74 Marchmont Street	21.72	21.67	21.67	<0.01
R7	103 Judd Street	22.07	22.02	22.02	<0.01
R8	305 Judd Street	22.17	22.10	22.11	0.01
R9	Cambria House 37 Hunter Street	21.83	21.77	21.77	<0.01
R10	Selsey Tavistock Place	21.04	21.02	21.02	<0.01
R11	Premier Inn Kings Cross	20.83	20.81	20.81	<0.01
R12	341 Gray's Inn Road	21.75	21.70	21.70	<0.01
R13	2 Saint Chad's Street	21.26	21.23	21.23	<0.01
R14	272 Pentonviille Road	21.84	21.79	21.79	<0.01
R15	26b Caledonian Road	20.91	20.89	20.89	<0.01
R16	44 Caledonian Road	20.80	20.78	20.78	<0.01
R17	Travelodge Kings Cross	21.06	21.03	21.03	<0.01
R18	Linfield Sidmouth Street	20.99	20.97	20.97	<0.01
R19	200 Pentonville Road	21.03	21.00	21.01	0.01
PR1	Proposed Receptor	-	-	20.76	-
PR2	Proposed Receptor	-	-	21.21	-
PR3	Proposed Receptor	-	-	22.02	-
PR4	Proposed Receptor	-	-	20.71	-
Annual Mean AQO		**40 µg/m^3**			

All modelled existing receptors are predicted to be below the AQO for PM_{10} in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-9**, the maximum predicted increase in annual average exposure to PM_{10} at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.01 µg/m^3 at 305 Judd Street (R8) and 200 Pentonville Road (R19).

The maximum predicted annual average exposure to PM_{10} at any proposed receptor at the ground floor is 22.02 µg/m^3. All modelled proposed residential receptors are predicted to be below the annual average AQO for PM_{10}.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-10**.

Table 6-10. Impact Description of Effects at Key Receptors (PM_{10})

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	0.01	0%	≤75% of AQO	Negligible
R5	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6	<0.01	0.01	0%	≤75% of AQO	Negligible
R7	<0.01	0.01	0%	≤75% of AQO	Negligible
R8	0.01	0.01	0%	≤75% of AQO	Negligible

R9	<0.01	0.01	0%	≤75% of AQO	Negligible
R10	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	<0.01	<0.01	0%	≤75% of AQO	Negligible
R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	<0.01	<0.01	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	<0.01	<0.01	0%	≤75% of AQO	Negligible
R18	<0.01	<0.01	0%	≤75% of AQO	Negligible
R19	0.01	<0.01	0%	≤75% of AQO	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

<u>Particulate Matter ($PM_{2.5}$)</u>

Table 6-11 presents a summary of the predicted change in annual mean $PM_{2.5}$ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled 'Do Minimum' and 'Do Something' scenarios.

Table 6-11. Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{2.5}$ (µg/m^3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1	161 Euston Road	16.96	16.61	16.61	<0.01
R2	117 Euston Road	13.90	13.81	13.81	<0.01
R3	9 Mabledon Place	13.22	13.20	13.20	<0.01
R4	2 Tavistock Place	13.65	13.58	13.58	<0.01
R5	101 Marchmont Street	13.09	13.08	13.08	<0.01
R6	74 Marchmont Street	13.77	13.69	13.70	0.01
R7	103 Judd Street	13.96	13.88	13.88	<0.01
R8	305 Judd Street	14.04	13.95	13.95	<0.01
R9	Cambria House 37 Hunter Street	13.83	13.75	13.75	<0.01
R10	Selsey Tavistock Place	13.34	13.31	13.31	<0.01
R11	Premier Inn Kings Cross	13.27	13.24	13.24	<0.01
R12	341 Gray's Inn Road	13.78	13.71	13.71	<0.01
R13	2 Saint Chad's Street	13.48	13.43	13.43	<0.01
R14	272 Pentonviille Road	13.89	13.80	13.80	<0.01
R15	26b Caledonian Road	13.32	13.28	13.28	<0.01
R16	44 Caledonian Road	13.25	13.22	13.22	<0.01
R17	Travelodge Kings Cross	13.36	13.32	13.32	<0.01
R18	Linfield Sidmouth Street	13.31	13.28	13.28	<0.01
R19	200 Pentonville Road	13.39	13.35	13.35	<0.01
PR1	Proposed Receptor	-	-	13.16	-
PR2	Proposed Receptor	-	-	13.42	-

PR3	Proposed Receptor	-	-	13.88	-
PR4	Proposed Receptor	-	-	13.13	-
Annual Mean AQO		**25 µg/m³**			

All modelled existing receptors are predicted to be below the AQO for $PM_{2.5}$ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table 6-11**, the maximum predicted increase in annual average exposure to $PM_{2.5}$ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.01 µg/m³ at 74 Marchmont Street (R6).

The maximum predicted annual average exposure to NO_2 at any proposed receptor at the ground floor is 13.88 µg/m³. All modelled proposed residential receptors are predicted to be below the annual average AQO for $PM_{2.5}$.

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean $PM_{2.5}$ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-12**.

Table 6-12. Impact Description of Effects at Key Receptors ($PM_{2.5}$)

Impact Description of $PM_{2.5}$ Effects at Key Receptors					
Receptor	**Change Due to Development (DS-DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	0.01	0%	≤75% of AQO	Negligible
R5	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6	0.01	0.01	0%	≤75% of AQO	Negligible
R7	<0.01	0.01	0%	≤75% of AQO	Negligible
R8	<0.01	0.01	0%	≤75% of AQO	Negligible
R9	<0.01	0.01	0%	≤75% of AQO	Negligible
R10	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	<0.01	<0.01	0%	≤75% of AQO	Negligible
R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	<0.01	<0.01	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	<0.01	<0.01	0%	≤75% of AQO	Negligible
R18	<0.01	<0.01	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

7.0 AIR QUALITY NEUTRAL

This Air Quality Neutral assessment considers the emissions of atmospheric pollutants from the development at source (i.e. from vehicles and building services plant) and compares the emissions with the benchmark levels that define neutrality.

The requirement for this Air Quality Neutral report is driven by:

- Policy SI 1 in the London Plan. The London Plan states that, "development proposals should be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality"; and
- The Mayor's Air Quality Strategy (MAQS). The MAQS includes a policy which states that, "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 'air quality neutral' policy is designed to address the problem of multiple new developments that individually add only a small increment to pollution at the point of human exposure (i.e. ambient concentrations), but cumulatively lead to baseline pollution levels creeping up. The policy requires Developers to design their schemes so that they are at least Air Quality Neutral in terms of emissions at source.

The Greater London Authority (GLA) Sustainable Design and Construction Supplementary Planning Guidance (SPG), published in April 2014, provides a formal definition for the term 'air quality neutral' and allows a transparent and consistent approach to demonstrating whether a development is 'air quality neutral'. This Air Quality Neutral assessment determines whether the proposed development is air quality neutral using the GLA SPG calculation method that separately quantifies building emissions (from heating and power plant) and transport emissions.

The GLA published a report titled 'Air Quality Neutral Planning support update (GLA 80371)' in April 2014. This updated report provided a guidance note on the application of the air quality neutral policy.

7.1 BENCHMARK EMISSIONS

Buildings Emissions Benchmark (BEB)

The GLA 80371 report has defined two Building Emission Benchmarks (BEB), one for NO_X and one for PM_{10}, for a series of land-use classes. The benchmarks are expressed in terms of g/m2/annum. The gross floor area (GFA) is used to define the area.

The derived BEBs for NO_X and PM_{10} Emissions are shown in **Table 7-1**.

Table 7-1. Building Emissions Benchmarks

Land Use	NO_x (g/m^2)	PM_{10} (g/m^2)
E(a) – Formerly Class A1	22.6	1.29
E(b) – Formerly Class A3- A5	75.2	4.32
E(c) – Formerly Class A2 and Class B1	30.8	1.77
Class B2- B7	36.6	2.95
Class B8	23.6	1.90
Class C1	70.9	4.07

Class C2	68.5	5.97
Class C3	26.2	2.28
E(e) – Formerly D1 (a)	43.0	2.47
E(f) – Formerly D1 (b)	75.0	4.30
F1 - Formerly Class D1(c -h)	31.0	1.78
Sui Generis – Formerly Class D2(a-d)	90.3	5.18

Note 1: These benchmarks have been calibrated for London.

7.2 TRANSPORT EMISSIONS BENCHMARKS

The derived Transport Emission Benchmarks (TEB) for NO_x and PM_{10} Emissions are shown in **Table 7-2**.

Table 7-2. Transport Emissions Benchmarks

Land use	CAZ	Inner	Outer
	NO_x (g/m²/annum)		
Retail (E(a))	169	219	249
Office & Commercial (E(c))	1.27	11.4	68.5
	NO_x (g/m²/annum)		
Residential (C3)	234	558	1553
	PM_{10} (g/m²/annum)		
Retail (E(a))	29.3	39.3	42.9
Office & Commercial (E(c))	0.22	2.05	11.8
	PM_{10} (g/dwelling/annum)		
Residential (C3, C4)	40.7	100	267

7.3 EMISSIONS BENCHMARKS

Building Emissions

It is assumed that any plant is installed in line with the Mayor of London's Supplementary Planning Guidance, 'Sustainable Design and Construction' as detailed below in **Table 7-3**.

Table 7-3. Emission Standards for Solid Biomass Boilers and CHP Plant in the Thermal Input Range 50kWth to less than 20MWth for development in Band A

Combustion Appliance	Combustion Appliance	Pollutant/ Parameter Emission Standard at Reference O2 (mg Nm-3)	Equivalent Concentration at 0% O2 (mg Nm-3)	Likely Technique Required to Meet Emission Standard
Spark ignition engine (natural gas/biogas)	NO_x	250	329	Advanced lean burn operation (lean burn engines) NSCR (rich burn engines)
Compression ignition engine (diesel/biodiesel)	NO_x	400	526	SCR
Gas turbine	NO_x	50	177	None above standard technology for modern turbines
Solid biomass boiler (including those involved in CHP applications)	NO_x	275	386	Modern boiler with staged combustion and automatic control
	PM	25	35	Modern boiler with staged combustion and automatic control

				including cyclone/ multicyclone
All (stack heat release less than 1MW)	Stack discharge velocity	10 ms-1	N/A	Appropriate design of stack discharge diameter to achieve required velocity
All (stack heat release greater than or equal to 1MW)	Stack discharge velocity	15 ms-1	N/A	Appropriate design of stack discharge diameter to achieve required velocity

Assuming compliance with the above guidance, there will be no exceedance of the building emissions benchmarks and the development will be 'neutral'.

Transport Emissions

The transport assessment provides a summary of daily 2-way trips generation by the proposed development:

Vehicle Trips

Velocity Transport Planning have provided worst-case development trips associated with the development purpose of the Air Quality Neutral assessment of transport emissions.

Table 7-4. Transport Emissions Land Use Class and Development Trips

Land Use / Area	Land Use	Area	Traffic				Floor Area (sqm) (GIA)
			Light Vehicles	HGVs	Total	Annual Trips	
Office & Commercial	E(c)	Inner	0	15	15	5,475	8,781

The average journey lengths for residential, office and retail developments are presented in **Table 7-5**. The average emissions rates for cars, in g/veh-km, for CAZ, Inner and Outer London per vehicle-km are presented in **Table 7-5**.

Table 7-5. Average Distance Travelled by Car per Trip

Land Use Class	Distance (km)		
	CAZ	Inner	Outer
Residential (C3) (1)	4.3	3.7	11.4
Office & Commercial (E(c))*	3.0	7.7	10.8
Retail (E(a))	9.3	5.9	5.4

(1) Based on the LTDS destination.
Note these distances are based on the straight line between the origin and destination of a trip not the actual trip lengths.

Table 7-6. Emission Factors

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

Transport Emissions

The average distance travelled for Office & Commercial use (E(c)) is 7.7 km per trip. The NO_x emission factor is 0.370 g/veh-km (for Inner London) and 0.0353 g/veh-km for PM_{10} and thus the development transport emissions are as follows.

Vehicle Trips

The total benchmarked building NO_x and PM_{10} emissions are calculated from the land use categories and the TEBs and are shown in **Table 7-7**. Where no benchmark has been defined, a worst-case benchmark has been used.

Table 7-7. Calculation of Benchmarked NO_x emissions Using Transport Emissions Benchmarks for Each Land-use Category

Land Use Class	GIA m^2	NO_x Transport Emissions Benchmarks (gNO_x/dwelling/annum)	PM_{10} Transport Emissions Benchmarks (gNO_x/dwelling/annum)	NO_x Benchmarked Emissions ($kgNO_x$/annum)	PM_{10} Benchmarked Emissions ($kgNO_x$/annum)
Office & Commercial (E(c))	8,781	11.4	2.05	100.10	18.00
Total Benchmarked Transport Emissions				**100.10**	**18.00**

Table 7-8. Calculation of Air Quality Neutral Transport Emissions

Land Use / Area	Land Use Class	Annual Trips	NO_x Emission Factor (g/vehicle-km)	PM_{10} Emission Factor (g/vehicle-km)	Average Distance Travelled (km)	NO_x Transport Emissions (kg/annum)	PM_{10} Transport Emissions (kg/annum)
Office & Commercial	E(c)	5,475	0.370	0.0665	7.7	15.60	2.80
Total Calculated Transport Emissions (kg/annum)						**15.60**	**2.80**

The total transport emission of 15.60 kg/annum for NOx and 2.80 kg/annum for PM_{10} may be compared with the total benchmarked transport NO_x emission of 100.10 kg/annum and the total benchmarked transport PM_{10} emission of 18.00 kg/annum respectively. The results indicate that the transport emission of NO_x and PM_{10} are below the benchmark criteria in **Table 7-8** and can therefore be considered air quality neutral.

7.4 SUMMARY OF AIR QUALITY NEUTRAL ASSESSMENT

The proposed development is to be installed with plant, in accordance with the Mayor of London's Supplementary Planning Guidance and can therefore be considered air quality neutral. Both transport NO_x emissions and transport PM_{10} emissions are below the transport emission benchmark and the development can be considered Air Quality Neutral.

8.0 MITIGATION

8.1 CONSTRUCTION PHASE

The dust risk categories have been determined in Section 5 for each of the four construction activities. The assessment has determined that the potential impact description of dust emissions associated with the construction phase of the proposed development is ‘medium risk’ at the worst affected receptors.

Using the methodology described in Appendix A, appropriate site-specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the ‘IAQM Guidance on the Assessment of Dust from Demolition and Construction’.

The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout. They are categorised into ‘highly recommended’ and ‘desirable’ measures.

The mitigation measures for the proposed development are detailed in **Table 8-1** and **Table 8-2**.

Table 8-1. IAQM Guidance on the Assessment of Dust from Demolition and Construction ‘Highly Recommended’ Mitigation Measures

Communications
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information.
Dust Management
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site. In London additional measures may be required to ensure compliance with the Mayor of London’s guidance. The DMP may include monitoring of dust deposition, dust flux, real time PM_{10} continuous monitoring and/or visual inspections.
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
Make the complaints log available to the local authority when asked.
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
Avoid site runoff of water or mud.
Keep site fencing, barriers and scaffolding clean using wet methods.
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
Cover, seed or fence stockpiles to prevent wind whipping.
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.
Ensure all vehicles switch off engines when stationary - no idling vehicles.

Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
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.
Avoid bonfires and burning of waste materials.
Demolition
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.
Construction
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
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 continuously in 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.
Install hard surfaced haul routes, 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.

Table 8-2. IAQM Guidance on the Assessment of Dust from Demolition and Construction 'Desirable' Mitigation Measures

Communications
No Action Required.
Dust Management
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log 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.
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
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).
Construction
Avoid scabbling (roughening of concrete surfaces) if possible.
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 power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Trackout
No Action Required.

Following the implementation of the mitigation measures detailed in the tables above, the impact description of the construction phase is not considered to be significant.

9.0 CONCLUSIONS

Tetra Tech have undertaken an Air Quality Assessment in relation to conversion to combined laboratory-enabled offices at the basement, ground, first, second, third and fourth floors and creation of additional set-back fifth & sixth floors at 105 Judd Street, Camden, WC1H 9NE.

Construction Phase

Prior to the implementation of appropriate mitigation measures, the potential impact description of dust emissions associated with the construction phase of the proposed development is 'medium risk' at the worst affected receptors without mitigation. However, appropriate site-specific mitigation measures have been proposed based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to dust emissions from the construction phase will not be significant.

Operational Assessment

The 2022 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor is likely to be 0.02 µg/m^3 at 103 Judd Street (R7), 305 Judd Street (R8), and Cambria House 37 Hunter Street (R9).

The predicted long-term NO_2 concentrations at all proposed receptors are well below 60 µg/m^3 in all scenarios. Therefore, it is unlikely there will be any exceedances for the short-term NO_2 AQO at all proposed receptors as outlined in LAQM TG16 technical guidance, and therefore no additional mitigation is required.

For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be 0.01 µg/m^3 at 305 Judd Street (R8) and 200 Pentonville Road (R19). For $PM_{2.5}$, the maximum predicted increase in the annual average exposure is likely to be 0.01 µg/m^3 at 74 Marchmont Street (R6).

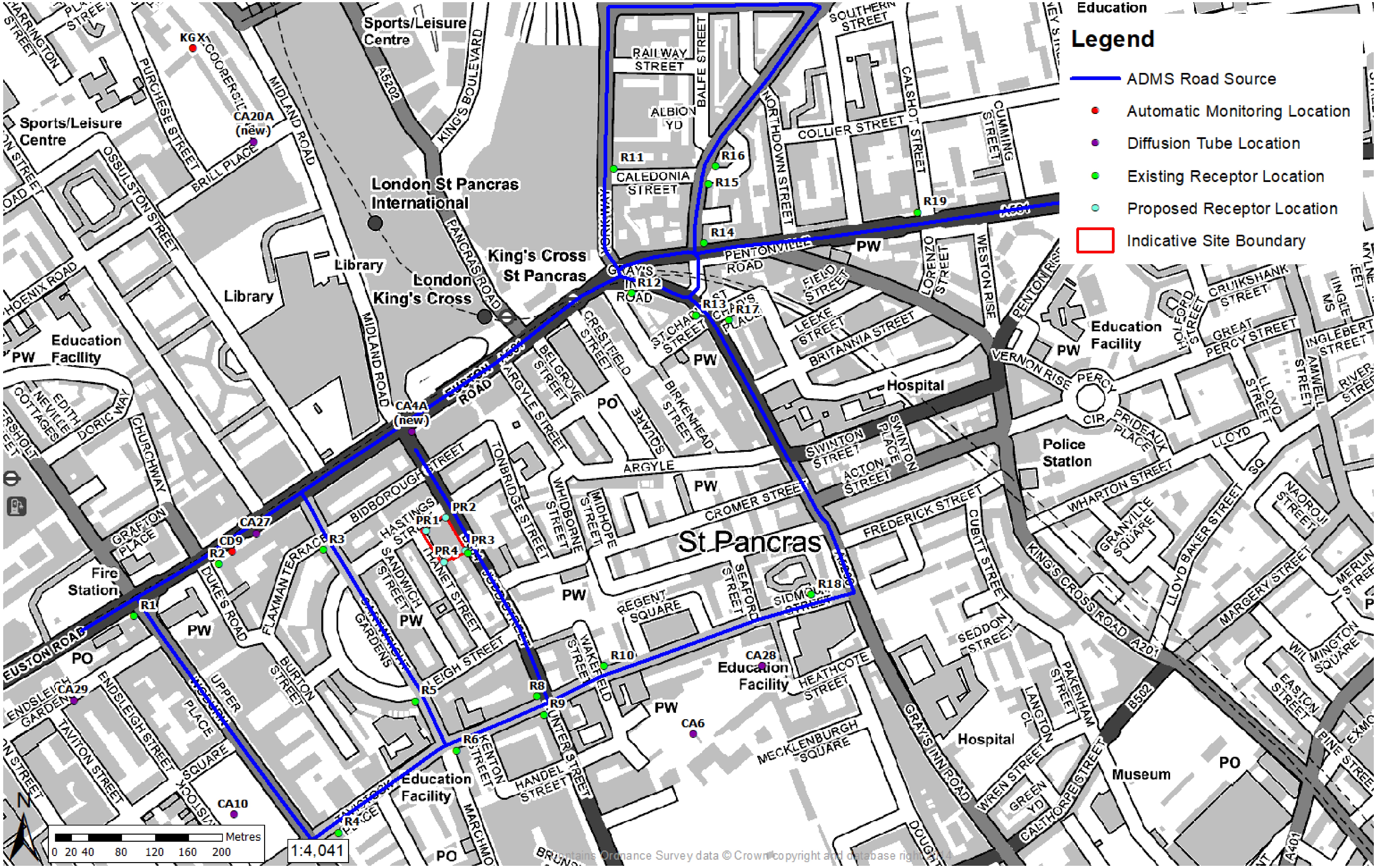
The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure, is determined to be 'negligible' at all existing receptors.

Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

In conclusion, the development is not considered to be contrary to any of the national and local planning policies regarding air quality.

APPENDIX A - FIGURES

Figure A-1 Air Quality Assessment Area



APPENDIX B - CONSTRUCTION PHASE ASSESSMENT METHODOLOGY

The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance[1].

Step 1 – Screen the Requirement for a more Detailed Assessment

An assessment is required if there are sensitive receptors within 350m of the site boundary, within 50m of the route(s) used by construction vehicles on the surrounding road network, or within 500m from the site entrance. A detailed assessment is also required if there is an ecological receptor within 50m of the site boundary.

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude for the demolition phase has been determined based on the below criteria:

- *Large*: Total building volume >50 000m^3, potentially dusty construction (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;
- *Medium*: Total building volume 20 000m^3 – 50 000m^3, potentially dusty construction material, demolition activities 10-20m above ground level; and,
- *Small*: Total building volume <20 000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude for the planned earthworks has been determined based on the below criteria:

- *Large:* Total site area >10 000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100 000 tonnes;
- *Medium*: Total site area 2 500m^2 – 10 000m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m-8m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
- *Small:* Total site area <2 500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude for the construction phase has been determined based on the below criteria:

- *Large:* Total building volume >100 000m^3, on site concrete batching; sandblasting
- *Medium:* Total building volume 25 000m^3 – 100 000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and,
- *Small:* Total building volume <25 000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

The dust emission magnitude for trackout has been determined based on the below criteria:

- *Large:* >50 HGV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- *Medium:* 10-50 HGV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and,
- *Small:* <10 HGV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B - Defining the Sensitivity of the Area

Sensitivities of People to Dust Soiling Effects

- *High:*
  - Users can reasonably expect an enjoyment of a high level of amenity;
  - The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably expect to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; and,
  - Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks

[1] Institute of Air Quality Management 2014. *Guidance on the Assessment of dust from demolition and construction.*

and car showrooms.

- *Medium:*
  - Users can reasonably expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
  - The appearance, aesthetics or value of their property could be diminished by soiling;
  - The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land; and,
  - Indicative examples include parks and places of work.
- *Low:*
  - The enjoyment of amenity would not reasonably be expected;
  - Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling;
  - There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land; and,
  - Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table B-1. Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of People to the Health Effects of PM_{10}

- *High:*
  - Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);
  - Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- *Medium:*
  - Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day); and,
  - Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
- *Low:*
  - Locations where human exposure is transient; and,
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table B-2. Sensitivity of the Area to Human Health Impacts

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of Receptors to Ecological Effects

- *High:*
  - Locations with an international or national designation and the designated features may be affected by dust soiling;
  - Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain; and,
  - Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
- *Medium:*
  - Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;
  - Locations with a national designation where the features may be affected by dust deposition; and,
  - Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
- *Low:*
  - Locations with a local designation where the features may be affected by dust deposition; and,
  - Indicative example is a local Nature Reserve with dust sensitive features.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table B-3. Sensitivity of the Area to Ecological Impacts

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Step 2C - Defining the Risk of Impacts

The risk of impacts with no mitigation is determined by combining the dust emission magnitude determined in Step 2A and the sensitivity of the area determined in Step 2B.

The following tables provide a method of assigning the level of risk for each activity.

Demolition

Table B-4. Risk of Dust Impacts, Demolition

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

Earthworks

Table B-5. Risk of Dust Impacts, Earthworks

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

Construction

Table B-6. Risk of Dust Impacts, Construction

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

Trackout

Table B-7. Risk of Dust Impacts, Trackout

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

Step 3 – Site Specific Mitigation

The dust risk categories for each of the four activities determined in Step 2C should be used to define the appropriate, site-specific mitigation measures to be adopted.

These mitigation measures are contained within section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction.

APPENDIX C - REPORT TERMS & CONDITIONS

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