Godfrey London Ltd

Proposed Residential Re-development, 39 Fitzjohn's Avenue, Camden, London

Air Quality Assessment

May 2019

Executive Park, Avalon Way, Anstey, Leicester, LE7 7GR
Tel: +44 (0)116 234 8143
Email: daniel.clamin@wyg.com

Document Control

Project:	Proposed Residential Re-development, 39 Fitzjohn's Avenue, Camden
Client:	Godfrey London Ltd
Job Number:	A113766
File Origin:	O:\Acoustics Air Quality and Noise\Active Projects

Document Checking:

Prepared by:	Rebecca Jeffs *Environmental Consultant*	Initialled: RJ
Checked by:	Daniel Clampin *Principal Environmental Consultant*	Initialled: DC
Verified by:	Nigel Mann *Director*	Initialled: NM
Person to Contact:	Daniel Clampin *Principal Environmental Consultant*	Tel: 0116 234 8143 Email: daniel.clampin@wyg.com

Issue	Date	Status
1	29th May 2019	First Issue

Contents Page

Figures

Appendices

Executive Summary

WYG have undertaken an Air Quality Assessment for the proposed re-development of 39 Fitzjohn's Avenue within the London Borough of Camden.

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 associated with traffic emissions;
- 'Air Quality Neutral Assessment' in line with Greater London Authority Guidance and,
- Identification of mitigation measures (as required).

Construction

The potential effects during the construction phase include fugitive dust emissions from site activities, such as demolition, earthworks, construction and trackout. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

During the construction phase, it is anticipated that dust sensitive receptors will potentially experience increased levels of dust and particulate matter before using any mitigation and control measures. However, these are predicted to be short-term and temporary impacts. Throughout this period, the potential impacts from construction on air quality will be managed through site-specific mitigation measures detailed within this assessment. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

Traffic Emissions

An assessment of the effect on vehicle emissions on the Proposed Development has been undertaken for the proposed opening year of 2021.

The assessment of the impact description of the effects associated with both the committed and proposed developments, during 2021 with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure, is determined to be 'negligible' for all existing receptors.

Greater London Authority 'Air Quality Neutral' Assessment

An Air Quality Neutral Assessment has been undertaken which shows that the emissions for both building and transport emissions are below the relevant benchmark. The development is therefore considered to be 'neutral'.

1. Introduction

Godfrey London Ltd commissioned WYG Environment Planning Transport (WYG) to prepare an air quality assessment for the proposed re-development at 39 Fitzjohn's Avenue, London Borough of Camden.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is approximately 526546, 184991. The site is bounded to the north by 43-45 Fitzjohn's Avenue, to the east by Fitzjohn's Avenue, to the south by Nuttery Terrace and to the west by 46 Maresfield Gardens. Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

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' in line with Greater London Authority Guidance 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 based on 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 10µm (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 Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK).

2. 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) February 2019;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, March 2014;
- The Air Quality Standards Regulations, 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG16, Defra, 2018;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, HA 207/07 - Air Quality, Highways Agency, 2007;
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, IAQM, October 2018;
- Monitoring Particulate Matter in Ambient Air around Waste Facilities: Technical Guidance note (Monitoring) M17, Environment Agency, July 2013;
- London Plan Supplementary Planning Guidance (SPG) 'The Control of Dust and Emissions during Construction and Demolition', July 2014;
- The London Plan, (Consolidated with Amendments since 2011) March 2016;
- Air Quality Neutral Planning Support Guidance, Greater London Authority, 2014;
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017; and,
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 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 Council (http://www.camden.gov.uk/).

Site Specific Reference Documents

- Annual Status Report 2018 for the London Borough of Camden; 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.

UK Legislation

The Air Quality Standards Regulations (Amendment 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 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 2.1 Air Quality Standards, Objectives, Limit 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	

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). For each AQMA, the LA is required to produce an Air Quality Action Plan (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Planning and Policy Guidance

National Policy

The National Planning Policy Framework (NPPF), revised February 2019, 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 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 or 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 or 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 launched by the Ministry for Housing, Communities and Local Government (MHCLG) on 6 March 2014 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance:

> *'When deciding whether air quality is relevant to a planning application, local planning authorities should consider whether the development would:*
>
> *Significantly affect traffic in the immediate vicinity of the proposed development site or further afield. This could be by generating or increasing traffic congestion; significantly changing traffic volumes, vehicle speed or both; or significantly altering the traffic composition on local roads. Other matters to consider include whether the proposal involves the development of a bus station, coach or lorry park; adds to turnover in a large car park; or result in construction sites that would generate large Heavy Goods Vehicle flows over a period of a year or more.*
>
> *Introduce new point sources of air pollution. This could include furnaces which require prior notification to local authorities; or extraction systems (including chimneys) which require approval under pollution control legislation or biomass boilers or biomass-fuelled CHP plant; centralised boilers or CHP plant burning other fuels within or close to an air quality management area or introduce relevant combustion within a Smoke Control Area.*

Expose people to existing sources of air pollutants. This could be by building new homes, workplaces or other development in places with poor air quality.

Give rise to potentially significant impact (such as dust) during construction for nearby sensitive locations.

Affect biodiversity. In particular, is it likely to result in deposition or concentration of pollutants that significantly affect a European-designated wildlife site and is not directly connected with or necessary to the management of the site, or does it otherwise affect biodiversity, particularly designated wildlife sites.'

Regional Policy

GLA, The London Plan

The London Borough of Camden (LBC) lies within the Greater London Authority (GLA) Area. The London Plan addresses the improvement of air quality. Policy 7.14 within the London Plan specifically relates to air quality improvement:

'Policy 7.14 Improving Air Quality

Strategic

A. *The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure that the spatial, climate change, transport and design policies of this plan support implementation of his Air Quality and Transport strategies to achieve reductions in pollutant emissions and minimise public exposure to pollution.*

Planning Decisions

A. *Development proposals should: minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality, such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see policy 6.3)*
B. *promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition'*
C. *be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs)*

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

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

GLA, The draft London Plan (2018)

The draft London Plan addresses the improvement of air quality. There are a number of policies highlighted below which specifically relate to air quality improvement.

"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 SI1 Improving air quality) and to address issues related to climate change and the urban heat island effect."

"Policy D1 London's Form and Characteristics;

Development Plans, area-based strategies and development proposals should address the following:

A. The form and layout of a place should:

…

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

"Policy D2 Delivering Good Design;

Initial Evaluation

A. To identify an area's capacity for growth and understand how to delivery it in a way which strengthens what is valued in a place, boroughs should undertake an evaluation, in preparing Development Plans and area-based strategies, which covers the following elements:

5) air quality and noise levels"

"Policy SI1 Improving Air Quality;

A. *London's air quality should be significantly improved and exposure to poor air quality, especially for vulnerable people, should be reduced:*
    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 with be achieved in areas that are currently in exceedance of legal limits*
        c) *reduce air quality benefits that results from the Mayor's or boroughs' activities to improve air quality*
        d) *create unacceptable risk of high levels of exposure to poor air quality.*
    2) *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. Particular care should be taken with developments that are 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.*
    3) *The development of large-scale redevelopment areas, such as Opportunity Areas and those subject to an Environmental Impact Assessment should propose methods of achieving an Air Quality Positive approach through the new development. All other developments should be at least Air Quality Neutral.*
    4) *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.*
    5) *Air Quality Assessments (AQAs) should be submitted with all major developments, unless they can demonstrate that transport and building emissions will be less than the previous or existing use.*
    6) *Development proposals should ensure that where emissions need to be reduced, this is done on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, off-site measures to improve local air quality may be acceptable, provided that equivalent air quality benefits can be demonstrated."*

"Policy SI3 Energy Infrastructure;

A. *Boroughs and developers should engage at an early stage with relevant energy companies and bodies to establish the future energy requirements and infrastructure arising from large-scale development proposals such as Opportunity Areas, Town Centres, other growth areas or clusters of significant new development*
B. *Energy masterplans should be developed for large-scale development locations which establish the most effective energy supply options. Energy masterplans should identify:*

1) *major heat loads (including anchor heat loads, with particular reference to sites such as universities, hospitals and social housing)*
2) *heat loads from existing buildings that can be connected to future phases of a heat network*
3) *major heat supply plant*
4) *possible opportunities to utilise energy from waste*
5) *secondary heat sources*
6) *opportunities for low temperature heat networks*
7) *possible land for energy centres and/or energy storage*
8) *possible heating and cooling network routes*
9) *opportunities for futureproofing utility infrastructure networks to minimise the impact from road works*
10) *infrastructure and land requirements for electricity and gas supplies*
11) *implementation options for delivering feasible projects, considering issues of procurement, funding and risk, and the role of the public sector*

C. *Development Plans should:*
   1) *identify the need for, and suitable sites for, any necessary energy infrastructure requirements including upgrades to existing infrastructure*
   2) *identify existing heating and cooling networks and opportunities for expanding existing networks and establishing new networks.*

D. *Major development proposals within Heat Network Priority Areas should have a communal heating system*
   1) *the heat source for the communal heating system should be selected in accordance with the following heating hierarchy:*
      a) *connect to local existing or planned heat networks*
      b) *use available local secondary heat sources (in conjunction with heat pump, if required, and a lower temperature heating system)*
      c) *generate clean heat and/or power from zero-emission sources*
      d) *use fuel cells (if using natural gas in areas where legal air quality limits are exceeded all development proposals must provide evidence to show that any emissions related to energy generation will be equivalent or lower than those of an ultra-low NOx gas boiler)*
      e) *use low emission combined heat and power (CHP) (in areas where legal air quality limits are exceeded all development proposals must provide evidence to show that any emissions related to energy generation will be equivalent or lower than those of an ultra-low NOx gas boiler)*
      f) *use ultra-low NOx gas boilers.*

2) *CHP and ultra-low NOx gas boiler communal or district heating systems should be designed to ensure that there is no significant impact on local air quality.*
3) *Where a heat network is planned but not yet in existence the development should be designed for connection at a later date."*

Policy SI8 Waste Capacity and Net Waste Self-Sufficiency;

…

D. *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"*

Local Policy

The London Borough of Camden Local Plan 2017 has been reviewed for policies related to Air Quality. The following policy was deemed relevant to this assessment:

"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."

3. Assessment Methodology

The potential environmental effects of the operational phase of the proposed development are identified as far as current knowledge of the site and development allows. The significance of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017.

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 the Impact Magnitude of the Air Quality Effects

The impact magnitude 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 significance 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 impacts are provided as a percentage of the Air Quality Assessment Level (AQAL), which may be an AQO, EU limit or target value;
2. The absolute concentrations are also considered in terms of the AQAL 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 AQAL;
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 AQAL will have higher severity compared to a relatively large change at a receptor which is significantly below the AQAL;
4. The impacts can be adverse when pollutant concentrations increase or beneficial when concentration decrease as a result of development;
5. The judgement of overall significance 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 significance 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 AQAL.

Table 3.1 Impact Descriptors for Individual Receptors

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

4.1 Air Quality Review

This section provides a review of the existing air quality in the vicinity of the proposed development 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 proposed development site has been defined from a number of sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, LBC has conducted 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 a number of locations of relevant public exposure within LBC. LBC has designated one Air Quality Management Areas (AQMAs) that incorporates the entire borough. The Proposed Development is located within this AQMA.

Air Quality Monitoring

Monitoring of air quality within LBC is undertaken through continuous and non-continuous monitoring methods. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the proposed development site.

Continuous Monitoring

LBC operates a network of four automatic monitoring stations. The closest automatic monitoring station is located approximately 587 metres south of the site boundary. Reference should be made to Figure 1 for the locations of the diffusion tubes within the council's jurisdiction.

The most recently available automatic monitoring data is from 2017, which is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO_2 Concentrations at Diffusion Tubes

Site ID	Location	Site Type	Distance from Kerb (m)	2017 Annual Mean NO_2 Concentration ($\mu g/m^3$)
LB	London Bloomsbury	Urban Background	27.0	38.0
CD1	Swiss Cottage	Kerbside	1.5	53.0
CD9	Shaftesbury Avenue	Roadside	1.0	83.0

As indicated in Table 4.1, automatic monitoring stations CD1 and CD9 monitored NO_2 concentration in exceedances of the AQO (40 $\mu g/m^3$ annual mean) for 2017.

Automatic monitoring station CD1 is located within the main study area and is considered representative of the development site. Therefore, CD1 has been used as part of the model verification.

Non-Continuous Monitoring

LBC operated a network of 14 diffusion tubes during 2017. The closest diffusion tube (CA7) is located approximately 568 km north-north-west of the site boundary. Reference should be made to Figure 1 for the locations of the diffusion tubes within the council's jurisdiction.

The representative diffusion tube data is from 2017, which is presented in Table 4.2.

Table 4.2 Monitored Annual Mean NO_2 Concentrations at Diffusion Tubes

Site ID	Location	Site Type	Distance from Kerb (m)	2017 Annual Mean NO_2 Concentration ($\mu g/m^3$)
CA7	Frognal Way	Urban Background	30.0	32.26
CA25	Emmanuel Primary	Roadside	1.0	55.16

As indicated in Table 4.2, diffusion tube CA25 monitored NO_2 concentration in exceedances of the AQO (40 $\mu g/m^3$ annual mean) for 2017. Diffusion tube CA7 monitored NO_2 concentration below the AQO (40 $\mu g/m^3$ annual mean) for 2017.

All diffusion tubes in Table 4.2 lie within the main study area. Due to the distance from the roadside, only CD7 has been used as part of the model verification.

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 model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data. The 2017 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 development site, with all the complete parameters necessary for the ADMS model. Reference should be made to Figure 2 for an illustration of the prevalent wind conditions at London City Airport Meteorological Station site.

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 proposed development 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 1 for a graphical representation of the traffic data utilised within the ADMS Roads 4.1 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 4.3 and the spatial locations of all of the receptors are illustrated in Figure 1.

Table 4.3 Modelled Existing Sensitive Receptor Locations

Discrete Sensitive Receptor		Receptor Height (m)
R1	Flat 8 South, 43-45 Fizjohn's Avenue	1.5
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	1.5
R3	37c Fitzjohn's Avenue	1.5
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	1.5
R5	97 Avenue Road	1.5
R6	Flat 1, 115 Finchley Road	1.5
R7	199 Finchley Road	7.5
R8	Flat above Unit 1, 321 Finchley Road	5.5
R9	1 Ardwick Road	1.5
R10	118a Cholmley Gardens	1.5
R11	Ground Floor Flat, 97 West End Lane	1.5
R12	Flat c, 129 Belsize Road	1.5
R13	20e Hilgrove Road	1.5

16 proposed sensitive receptors have been assessed on the proposed development site. The locations of these receptors are identified on Figure 1.

It should be noted that the proposed receptor locations were positioned on the worst-case locations (i.e. closest to the road) to establish the predicted pollutant concentrations as shown in Figure 1.

4.5 Ecological Receptors

Air quality impacts associated with the proposed development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The Conservation of Habitats and Species Regulations (2017) require 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 1km radius of the site boundary, no ecological receptors were identified.

5. 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 is 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	Dust Emission Magnitude
Demolition	Small
Earthworks	Medium
Construction	Small
Trackout	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.

Table 5.2 Sensitivity of the Area

Source	Area Sensitivity		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	High	Low	N/A
Earthworks	High	Low	N/A
Construction	High	Low	N/A
Trackout	High	Low	N/A

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 description of dust emissions associated with the construction phase, without mitigation, is presented below.

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	Medium	Low	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 description of the construction phase is not predicted to be significant.

6. Assessment of Air Quality Impacts - Operational Phase

In the context of the proposed development, transportation is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at receptors.

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.

To correlate with the latest monitoring produced by the council, meteorological data and available baseline traffic data, a baseline year of 2017 has been assessed.

Additionally, in accordance with the provided traffic data, as contained within the supporting Traffic Statement (TS), the operational phase assessment has been undertaken with an assumed operational opening year of 2021. This is to allow for a two-year construction period from 2019. This is considered to be worst-case.

The assessment scenarios are therefore:

- 2017 Baseline = Baseline Flows;
- 2021 'Do Minimum' = Baseline Flows (TEMPro factored to 2021) + Committed Development; and,
- 2021 'Do Something' = Baseline Flows (TEMPro factored to 2021) + Committed Development + Proposed Development Flows.

6.1 Existing and Predicted Traffic Flows

Baseline 2017 data, projected 2021 'do minimum' and 'do something' traffic data has been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT).

Baseline 2017 traffic data was sourced from the Department for Transport (DfT) website. To calculate the predicted 2021 'do minimum' traffic flows, a TEMPRO factor of 1.057 was applied to the baseline 2017 traffic flows.

The 2021 development traffic flows were supplied by Motion Transport Consultants. To calculate 'do something' traffic flows the development trips were added to the 'do minimum' traffic flows. At each major road junction development traffic flows were equally distributed around the road network.

Emission factors for the 2017 baseline and 2021 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 9.0 (2019).

Traffic speeds have been estimated based on site observations and national speed limits. A 50m 20km/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 1. Detailed traffic figures are provided in the Table 6.1.

Table 6.1 Traffic Data

Link	Speed (km/h)	2017		2021			
		AADT	HGV %	Do Minimum		Do Something	
				AADT	%HGV	AADT	%HGV
B511 Fitzjohns Avenue (North)	32	16126	1.68	17271	1.68	17295	1.67
B511 Fitzjohns Avenue (South)	32	16126	1.68	17271	1.68	17295	1.67
Nutley Terrace (East)	32	876	0.34	925	0.34	925	0.34
Nutley Terrace (West)	32	876	0.34	925	0.34	925	0.34
A41	48	49061	2.43	51789	2.43	51789	2.43
B510	32	8574	2.19	9051	2.19	9051	2.19
B507 (Abbey Road)	32	8574	2.19	9051	2.19	9051	2.19
Mill Lane	32	8000	2.11	9176	2.11	9176	2.11
Belsize Road	32	8574	2.19	9051	2.19	9051	2.19

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 method used by WYG seeks to determine the most representative background of real-world conditions at each monitoring and receptor location. To determine these values, a number of steps have been considered as outlined below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and 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 [40µg/m³ for NO_2].*"

Additionally, TG (16) states:

> "*Typically, only the process contributions from local sources are represented within and 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."

Defra Published Background Concentrations for 2017

The background concentrations shown in Table 6.2 below 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 development site. In May 2019, Defra issued revised 2017 based background maps for nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$.

Table 6.2 Defra Background Air Quality Levels (µg/m³)

Receptor Location	2017			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
Local Authority Monitoring				
CD1	32.73	56.50	18.61	12.55
CA25	28.31	46.15	17.89	12.19
Existing Sensitive Receptors				
R1	29.04	47.93	17.60	12.06
R2	32.73	56.50	18.61	12.55
R3	32.73	56.50	18.61	12.55
R4	32.73	56.50	18.61	12.55
R5	32.73	56.50	18.61	12.55
R6	32.73	56.50	18.61	12.55
R7	32.73	56.50	18.61	12.55
R8	29.04	47.93	17.60	12.06
R9	28.31	46.15	17.89	12.19
R10	28.31	46.15	17.89	12.19
R11	28.53	46.87	17.52	11.99
R12	31.55	54.15	18.66	12.56
R13	32.73	56.50	18.61	12.55
Proposed Sensitive Receptors				
Proposed Sensitive Receptors (P1 – P2, P14 – P16)	29.04	47.93	17.60	12.06
Proposed Sensitive Receptors (P3 – P13)	32.73	56.50	18.61	12.55

An analysis of the Defra background concentrations for 2017 show that the background levels are predicted to be below the relevant AQO across the wider site area.

The Defra predicted background concentrations outlined in Table 6.2 are underpredicting the NO_2 concentrations at some monitoring and sensitive receptor locations. A review of the potential background contributions in each area has been undertaken to determine the most appropriate background pollutant concentrations (accounting for the variation in monitored levels due to micro-siting and local non-modelled sources). For the purpose of the verification and the modelling assessment, the Defra background concentrations will not be used and an alternative source, such as, the Greater London Authority's London

Atmospheric Emission Inventory's (LAEI) Background Concentration Maps or roadside contribution, will be used.

However, for comparison, a model using only Defra Backgrounds has been undertaken and is shown in **Appendix C.**

Local Authority Monitoring Background

As the Environment Agency, Air Quality Modelling and Assessment Unit (AQMAU) Document states that the *Case Specific Scenarios* approach should be used within an assessment.

> "*Operators are asked to justify their use of percentages lower than 35%, for short-term and 70% for long-term in their application reports*."

For the long-term:

- NO_x to NO_2 = 70%
- NO_2/NO_x = 70%
- Therefore, $NO_x = NO_2/0.7 = 1.428$

A factor of 1.428 has been applied to the NO_2 to produce the NO_x value.

Table 6.3 Roadside Modelled Contribution at Tubes

Tube	Monitored NO_2 (µg/m³)	Modelled Traffic Contribution NO_2 (µg/m³)	Non-Modelled Contribution NO_2 (µg/m³)
CD1	53.00	18.96	34.04
CA25	55.16	7.13	48.03

Following a review of the LBC monitoring, by considering the likely apportionment of traffic vs background contributions at each of the monitoring locations (Table 6.3 above), it is considered that the background concentrations are high and result in unrepresentatively low road emissions and are therefore unrepresentative of the monitoring and sensitive receptor locations. Therefore, the LBC monitoring roadside contribution has not been used for the purpose of the verification or modelling assessment.

London Air

In 2016, The Greater London Authority's London Atmospheric Emission Inventory (LAEI) was published for 2020. A review of the LAEI's Background Concentration Maps is shown in Table 6.4 (overleaf).

Table 6.4 London Air Background Map Concentration 2020

Receptor location	Background Concentration Review			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
Diffusion Tube Monitoring Locations				
CD1	32.43	55.97	29.92	15.07
CA25	29.83	42.64	23.52	14.47

A review of the London Air LAEI 2020 background concentration maps show that the identified background concentrations in Table 6.4 are considered to be unrepresentative at one of the monitoring locations.

As the LBC conducts monitoring at 'Urban Background' locations this is considered to be the most representative background across the assessment area during 2017. The closest 'urban background' monitoring location to the Proposed Development site is CA7 and the monitored concentration has been used as the background at all monitoring and sensitive receptor locations as identified in Table 6.5 below.

Table 6.5 Background Concentrations Used (µg/m^3)

Receptor Location	2017		
	NO_2	NO_x	Source
Diffusion Tube Monitoring Locations			
CD1	32.26	46.07	CA7
CA25			
Existing Sensitive Receptors			
R1	32.26	46.07	CA7
R2			
R3			
R4			
R5			
R6			
R7			
R8			
R9			
R10			
R11			
R12			
R13			
Proposed Sensitive Receptors			
Proposed Sensitive Receptors	32.26	46.07	CA7

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 6.6 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6.6 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
CD1	53.00	58.05	9.53
CA25	55.16	42.77	-22.46

The final model produced data at the monitoring locations to within 25% of the monitoring results, as the requirement by TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 1.02[1]. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

6.4 Summary of Model Inputs

Table 6.7 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 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**
Latitude	Allows the location of the model area to be set	United Kingdom = **51.55**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Large Conurbations = **100m.**
Elevation of Road	Allows the height of the road link above ground level to be specified.	All 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

[1] This was achieved by applying a model correction factor of 2.23 to roadside predicted NO_X concentrations before converting to NO_2

Parameter	Description	Input Value
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.	**Urban (London - Inner)** settings were used for all links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a "street canyon".	A **13m** high canyon was modelled at the junction of the B511 (Fitzjohn's Avenue & A502 (Hampstead High Street). A **10m** high canyon was modelled along the entire length of Mill lane. No other canyons were used within the model.
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 **9.0 (2019)** dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	**2017** data for verification and baseline operational phase assessment **2021** data for the operational phase assessment.

6.5 ADMS Modelling Results

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.

Assessment Scenarios

For the operational year of 2021, an assessment of the effects of emissions from the proposed traffic associated with the scheme has been undertaken using the Emissions Factor Toolkit (EFT) 2017 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors;

- 2017 Baseline = Baseline Flows;
- 2021 'Do Minimum' = Baseline Flows + Committed Development; and,
- 2021 'Do Something' = Baseline Flows + Committed Development + Proposed Development Flows.

An additional theoretical scenario has also been undertaken using emission factors from 2017 for the 'do minimum' and 'do something' for the operational year of 2020, based on a recent appeal decision that favoured the uncertainty of emissions forecasts. It should be noted that this is a theoretical scenario which assumes that the government (Defra) predictions for reduction in emissions over the forthcoming years will not occur. However, this should be not be considered as a 'more correct' scenario in accordance with the 2010 note [http://laqm.defra.gov.uk/laqm-faqs/faq5.html] which confirms that: '*There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast. This disparity in the historical data highlights the uncertainty of future year*

projections of both NO_x and NO_2, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections'.

- 2021 'Do Minimum' = Baseline Flows + Committed Development (**using 2017 traffic emission factors**); and,
- 2021 'Do Something' = Baseline Flows + Committed Development + Proposed Development Flows (**using 2017 traffic emission factors**).

The additional theoretical scenario results are presented in Appendix B.

Nitrogen Dioxide

Table 6.8 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.8 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	35.60	34.66	34.66	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	38.39	36.72	36.73	0.01
R3	37c Fitzjohn's Avenue	36.36	35.22	35.23	0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	46.54	42.57	42.58	0.01
R5	97 Avenue Road	41.13	38.51	38.51	<0.01
R6	Flat 1, 115 Finchley Road	37.47	35.96	35.96	<0.01
R7	199 Finchley Road	37.64	36.03	36.03	<0.01
R8	Flat above Unit 1, 321 Finchley Road	41.00	38.41	38.41	<0.01
R9	1 Ardwick Road	37.93	36.22	36.22	<0.01
R10	118a Cholmley Gardens	37.80	36.54	36.54	<0.01
R11	Ground Floor Flat, 97 West End Lane	34.68	33.95	33.95	<0.01
R12	Flat c, 129 Belsize Road	35.37	34.44	34.44	<0.01
R13	20e Hilgrove Road	36.39	35.16	35.16	<0.01
P1	Proposed Development: East Façade	-	-	34.49	-
P2		-	-	34.57	-
P3		-	-	34.82	-
P4		-	-	34.89	-
P5		-	-	34.88	-
P6	Proposed Development: South Façade	-	-	34.81	-
P7		-	-	34.54	-
P8		-	-	34.35	-
P9		-	-	34.19	-
P10	Proposed Development: West Façade	-	-	34.13	-
P11		-	-	34.04	-

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
P12		-	-	34.06	-
P13		-	-	34.06	-
P14		-	-	34.04	-
P15		-	-	33.96	-
P16	Proposed Development: North Façade	-	-	34.25	-
Annual Mean AQO		**40 µg/m³**			

All modelled existing and proposed receptors, except R4, are predicted to be below the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios. It should be noted that all receptors are located within the borough wide AQMA and therefore experience high background pollutant concentrations prior to the Proposed Development. Despite this, the impact description of the effects as a result of the proposed development at all receptors is predicted to be 'negligible'.

As indicated in Table 6.8, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development, is 0.01 µg/m³ at Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue (R2), 37c Fitzjohn's Avenue (R3) and The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue (R4).

The maximum predicted exposure, at any proposed sensitive receptor is 34.89 µg/m³. All modelled proposed residential receptors are predicted to be below the AQO for NO_2, and therefore no additional mitigation will be required.

All proposed receptors predict NO_2 concentrations of below 60 µg/m³ in all scenarios. Therefore, it is unlikely for any exceedances of the short-term NO_2 AQO to occur as outlined in LAQM TG16 technical guidance.

The impact description of changes in traffic flow associated with the 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 6.9.

Table 6.9 Impact Description of Effects at Key Receptors (NO_2)

NO_2 Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R1	<0.01	0.00	0%	76-94% of AQAL	Negligible
R2	0.01	0.03	0%	76-94% of AQAL	Negligible
R3	0.01	0.03	0%	76-94% of AQAL	Negligible
R4	0.01	0.03	0%	103-109 of AQAL	Negligible
R5	<0.01	0.00	0%	95-102% of AQAL	Negligible
R6	<0.01	0.00	0%	76-94% of AQAL	Negligible
R7	<0.01	0.00	0%	76-94% of AQAL	Negligible
R8	<0.01	0.00	0%	95-102% of AQAL	Negligible

NO_2 Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R9	<0.01	0.00	0%	76-94% of AQAL	Negligible
R10	<0.01	0.00	0%	76-94% of AQAL	Negligible
R11	<0.01	0.00	0%	76-94% of AQAL	Negligible
R12	<0.01	0.00	0%	76-94% of AQAL	Negligible
R13	<0.01	0.00	0%	76-94% of AQAL	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 receptors, 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 confidence of the assessment is deemed to be 'high'.

Particulate Matter 10 (PM_{10})

Table 6.10 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 development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.10 Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	18.13	18.10	18.10	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	19.56	19.49	19.49	<0.01
R3	37c Fitzjohn's Avenue	19.24	19.19	19.19	<0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	20.85	20.68	20.68	<0.01
R5	97 Avenue Road	19.98	19.86	19.86	<0.01
R6	Flat 1, 115 Finchley Road	19.49	19.43	19.43	<0.01
R7	199 Finchley Road	19.41	19.34	19.34	<0.01
R8	Flat above Unit 1, 321 Finchley Road	18.93	18.82	18.82	<0.01
R9	1 Ardwick Road	18.73	18.66	18.66	<0.01
R10	118a Cholmley Gardens	18.61	18.58	18.58	<0.01
R11	Ground Floor Flat, 97 West End Lane	17.87	17.84	17.84	<0.01
R12	Flat c, 129 Belsize Road	19.12	19.08	19.08	<0.01
R13	20e Hilgrove Road	19.23	19.17	19.17	<0.01
P1	Proposed Development: East Façade	-	-	18.05	-
P2		-	-	18.06	-
P3		-	-	19.11	-
P4		-	-	19.13	-
P5		-	-	19.12	-
P6	Proposed Development: South Façade	-	-	19.11	-

Receptor		PM_{10} (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
P7		-	-	19.06	-
P8		-	-	19.02	-
P9		-	-	18.99	-
P10	Proposed Development: West Façade	-	-	18.98	-
P11		-	-	18.96	-
P12		-	-	18.97	-
P13		-	-	18.97	-
P14		-	-	17.96	-
P15		-	-	17.94	-
P16	Proposed Development: North Façade	-	-	18.00	-
Annual Mean AQO		**40 µg/m³**			

All modelled existing and proposed receptors are predicted to be below the AQO for PM_{10} in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.8, the maximum predicted increase in the annual average exposure to PM_{10} at any existing receptor, due to changes in traffic movements associated with the development, is <0.01 µg/m³ at all identified sensitive receptor locations.

The maximum predicted exposure, at any proposed sensitive receptor is 19.13 µg/m³.

The impact description of changes in traffic flow associated with the 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 6.11.

Table 6.11 Impact Description of Effects at Key Receptors (PM_{10})

PM_{10} Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R1	<0.01	0.00	0%	≤75% of AQAL	Negligible
R2	<0.01	0.01	0%	≤75% of AQAL	Negligible
R3	<0.01	0.00	0%	≤75% of AQAL	Negligible
R4	<0.01	0.01	0%	≤75% of AQAL	Negligible
R5	<0.01	0.00	0%	≤75% of AQAL	Negligible
R6	<0.01	0.00	0%	≤75% of AQAL	Negligible
R7	<0.01	0.00	0%	≤75% of AQAL	Negligible
R8	<0.01	0.00	0%	≤75% of AQAL	Negligible
R9	<0.01	0.00	0%	≤75% of AQAL	Negligible
R10	<0.01	0.00	0%	≤75% of AQAL	Negligible
R11	<0.01	0.00	0%	≤75% of AQAL	Negligible
R12	<0.01	0.00	0%	≤75% of AQAL	Negligible
R13	<0.01	0.00	0%	≤75% of AQAL	Negligible

PM_{10} Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
+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 PM_{10} exposure for existing receptors, including those within the AQMA, is determined to be 'negligible' at all receptors. This based on the methodology outlined in Section 3.

Particulate Matter 2.5 ($PM_{2.5}$)

Table 6.12 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 development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.12 Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{1.5}$ (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	12.40	12.35	12.35	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	13.16	13.07	13.07	<0.01
R3	37c Fitzjohn's Avenue	12.95	12.89	12.89	<0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	14.01	13.77	13.77	<0.01
R5	97 Avenue Road	13.43	13.29	13.29	<0.01
R6	Flat 1, 115 Finchley Road	13.10	13.02	13.02	<0.01
R7	199 Finchley Road	13.06	12.98	12.98	<0.01
R8	Flat above Unit 1, 321 Finchley Road	12.92	12.78	12.78	<0.01
R9	1 Ardwick Road	12.74	12.65	12.65	<0.01
R10	118a Cholmley Gardens	12.66	12.60	12.60	<0.01
R11	Ground Floor Flat, 97 West End Lane	12.22	12.19	12.19	<0.01
R12	Flat c, 129 Belsize Road	12.86	12.81	12.81	<0.01
R13	20e Hilgrove Road	12.95	12.88	12.88	<0.01
P1	Proposed Development: East Façade	-	-	12.32	-
P2		-	-	12.33	-
P3		-	-	12.84	-
P4		-	-	12.85	-
P5		-	-	12.85	-
P6	Proposed Development: South Façade	-	-	12.84	-
P7		-	-	12.81	-
P8		-	-	12.79	-
P9		-	-	12.77	-
P10	Proposed Development: West Façade	-	-	12.76	-
P11		-	-	12.75	-
P12		-	-	12.76	-
P13		-	-	12.76	-

Receptor		$PM_{1.5}$ (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
P14		-	-	12.27	-
P15		-	-	12.26	-
P16	Proposed Development: North Façade	-	-	12.30	-
Annual Mean AQO		**25 µg/m³**			

All modelled existing and proposed 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 6.12, the maximum predicted increase in the annual average exposure to $PM_{2.5}$ at any existing receptor, due to changes in traffic movements associated with the development, is <0.01 µg/m³ at all identified sensitive receptor locations.

The maximum predicted exposure, at any proposed sensitive receptor is 12.85 µg/m³.

The impact description of changes in traffic flow associated with the 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 6.13.

Table 6.13 Impact Description of Effects at Key Receptors ($PM_{2.5}$)

$PM_{2.5}$ Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R1	<0.01	0.00	0.00	0%	≤75% of AQAL
R2	<0.01	0.00	0.00	0%	≤75% of AQAL
R3	<0.01	0.00	0.00	0%	≤75% of AQAL
R4	<0.01	0.00	0.01	0%	≤75% of AQAL
R5	<0.01	0.00	0.00	0%	≤75% of AQAL
R6	<0.01	0.00	0.00	0%	≤75% of AQAL
R7	<0.01	0.00	0.00	0%	≤75% of AQAL
R8	<0.01	0.00	0.00	0%	≤75% of AQAL
R9	<0.01	0.00	0.00	0%	≤75% of AQAL
R10	<0.01	0.00	0.00	0%	≤75% of AQAL
R11	<0.01	0.00	0.00	0%	≤75% of AQAL
R12	<0.01	0.00	0.00	0%	≤75% of AQAL
R13	<0.01	0.00	0.00	0%	≤75% of AQAL
[+]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 $PM_{2.5}$ exposure for existing receptors, including those within the AQMA, is determined to be 'negligible' at all receptors. This based on the methodology outlined in Section 3.

7. Mitigation

7.1 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 7.1 and Table 7.2 below:

Table 7.1 Highly Recommended Construction Phase 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
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.

Table 7.2 Desirable Construction Phase Mitigation Measures

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)
Earthworks
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
Only remove the cover in small areas during work and not all at once
Construction
Avoid scabbling (roughening of concrete surfaces) if possible.
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
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.
Record all inspections of haul routes and any subsequent action in a site log book.
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
Trackout
Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).

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.

7.2 Non-Road Mobile Machinery (NRMM)

An inventory of all Non-Road Mobile Machinery (NRMM) will be kept on-site and registered on http://nrmm.London/ showing the emission limits for all equipment and will be made available to local authority offices if required. All NRMM of net power between 37kW and 560kW will be required to meet Stage IIIA of EU Directive 97/68/EC.

8. Air Quality Neutral Assessment

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 7.14 in the London Plan. The London Plan states: "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 of "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.

8.1 Benchmark Emissions

8.1.1 Building Emissions Benchmarks (BEB)

The GLA 80371 report has defined two Building Emission Benchmarks (BEBs), one for NO_x and one for PM_{10}, for a series of land-use classes. The benchmarks are expressed in terms of g/m^2/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 8.1.

Table 8.1 Building Emissions Benchmarks

Land Use Class	NO_x (g/m²)	PM_{10} (g/m²)
Class A1	22.6	1.29
Class A3- A5	75.2	4.32
Class A2 and Class B1	30.8	1.77
Class B2- B7	36.6	2.95
Class B8	23.6	1.90
Class C1	70.9	4.07
Class C2	68.5	5.97
Class C3	26.2	2.28
D1 (a)	43.0	2.47
D1 (b)	75.0	4.30
Class D1(c -h)	31.0	1.78
Class D2(a-d)	90.3	5.18
Class D2(e)	284	16.3

Note 1: These benchmarks have been calibrated for London.

8.1.2 Transport Emissions Benchmarks

The derived Transport Emission Benchmarks (TEB) for NO_x and PM_{10} Emissions are shown in Table 8.2.

Table 8.2 Transport Emissions Benchmarks

Land use	CAZ	Inner	Outer
NO_x (µg/m²/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NO_x (µg/m²/annum)			
Residential (C3)	234	558	1553
PM_{10} (µg/m²/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (µg/dwelling/annum)			
Residential (C3, C4)	40.7	100	267

8.2 Air Quality Neutral Calculation

8.2.1 Building Emissions

With reference to the Energy Statement (dated May 2018) each new flat will be installed with a highly efficient boiler to provide heating and domestic hot water. The flues for each boiler will be positioned within a dedicated cupboard and flue extract at the nearest external wall.

The Proposed Development is considered to be 'neutral'.

8.2.2 Transport Emissions

The transport assessment provides a summary of daily 2-way trip generation by the proposed development in comparison to the extant usage. These calculations are outlined below.

Additional Vehicle Trips

- Residential Daily vehicle trips = 24
- Total residential vehicle trips/annum = 24 x 365 = 8,760 trips

The average journey lengths for residential developments are presented in Table 8.3. The average emissions rates for cars, in g/veh-km, for CAZ, Inner and Outer London per vehicle-km are presented in Table 8.4.

Table 8.3 Average Distance Travelled by Car per Trip

Land Use Class	Distance (km)		
	CAZ	Inner	Outer
Residential (C3) (1)	4.3	3.7	11.4
(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 8.4 Emission Factors

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

NO_x Transport Benchmarks

The average distance travelled for class Residential C3 developments is 3.7 km per trip. The NO_x emission factor is 0.370 g/veh-km (for Inner London) and thus the development transport NO_x Emissions is:

- Vehicle trips (Residential, C3): 8,760 x 3.7 x 0.370 = 11.99 kg/annum
- Total NOx Emissions = 11.99 kg/annum

The total benchmarked building NO_x emissions are calculated from the land use categories and the TEBs and are shown in Table 8.5.

Table 8.5 Calculation of Benchmarked NO_x emissions Using Transport Emissions Benchmarks for Each Land-use Category

Land Use Class	GIA m^2	Transport Emissions Benchmarks (gNO_x/m^2/annum)	Benchmarked Emissions ($kgNO_x$/annum)
Residential (C3)	2,428	588	1,427.66
Total Benchmarked Transport Emissions			1,427.66

The total transport NO_x emission of 11.99 kg/annum may be compared with the total benchmarked transport NO_x emission of 1427.66 kg/annum. The results indicate that the transport NO_x emission of the proposed development is less than the benchmark and no mitigation measures need to be considered.

Particulate Matter Transport Benchmarks

The average distance travelled for class Residential C3 developments is 3.7 km per trip. The PM_{10} emission factor is 0.0665 g/veh-km (for Inner London) and thus the development transport PM_{10} Emissions are:

- Vehicle trips (Residential, C3): 8,760 x 3.7 x 0.0665 = 2.15 kg/annum
- Total PM10 Emissions = 2.15 kg/annum

The total benchmarked building PM_{10} emissions are calculated from the land use categories and the TEBs and are shown in Table 8.6.

Table 8.6 Calculation of Benchmarked PM_{10} emissions Using Transport Emissions Benchmarks for Each Land-use Category

Land Use Class	GIA m^2	Transport Emissions Benchmarks (gPM_{10}/m^2/annum)	Benchmarked Emissions ($kgNO_x$/annum)
Residential (C3)	2428	100	242.8
Total Benchmarked Transport Emissions			242.8

The total transport PM_{10} emission of 2.15 kg/annum may be compared with the total benchmarked transport PM_{10} emission of 242.8 kg/annum. The results indicate that the transport PM_{10} emission for the proposed development is less than the benchmark and no mitigation measures need to be considered.

In conclusion, the proposed development meets the London policy requirements to be at least air quality neutral for the transport emissions.

8.3 Summary

The development is considered to be 'neutral' in terms of Air Quality for both building and transport emissions and no further mitigation will be required.

9. Conclusions

WYG have undertaken an Air Quality Assessment to support an application for the proposed re-development of 39 Fitzjohn's Avenue within the London Borough of Camden, in accordance with the methodology and parameters described within this report.

Construction Phase Assessment

Prior to the implementation of appropriate mitigation measures, the potential impact description of dust emissions associated with the construction phase of the proposed development has potential as 'medium' at some worst affected receptors without mitigation. However, appropriate site-specific mitigation measures have been recommended 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 emissions from the construction phase will not be significant.

Operational Traffic Assessment

The 2021 assessment of the effects of emissions from the proposed traffic associated with the scheme, has determined the maximum predicted increase in the annual average exposure to NO_2 at any existing receptors is 0.01 µg/m^3 at Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue (R2), 37c Fitzjohn's Avenue (R3) and The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue (R4).

At the majority of the existing receptor, the AQO is not predicted to be exceeded during the 'do minimum' and 'do something' scenarios. It should be noted that all receptors are located within the borough wide AQMA and therefore experience high background pollutant concentrations prior to the Proposed Development. Despite this, the impact description of the effects as a result of the proposed development at all receptors is predicted to be 'negligible'.

All proposed sensitive receptor locations are predicted to be below the AQO during the 'do something' scenario and therefore no further mitigation would be required. Also, all proposed receptors predict NO_2 concentrations of below 60 µg/m^3 in all scenarios. Therefore, it is unlikely for any exceedances of the short-term NO_2 AQO to occur as outlined in LAQM TG16 technical guidance.

For PM_{10}, the maximum predicted increase in the annual average exposure to PM_{10} and $PM_{2.5}$ at any existing receptors, due to changes in traffic movements associated with the development, is <0.01 µg/m^3 at all identified sensitive receptor locations.

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 for existing receptors, including those within the AQMA, is determined to be 'negligible'. This based on the methodology outlined in Section 3.

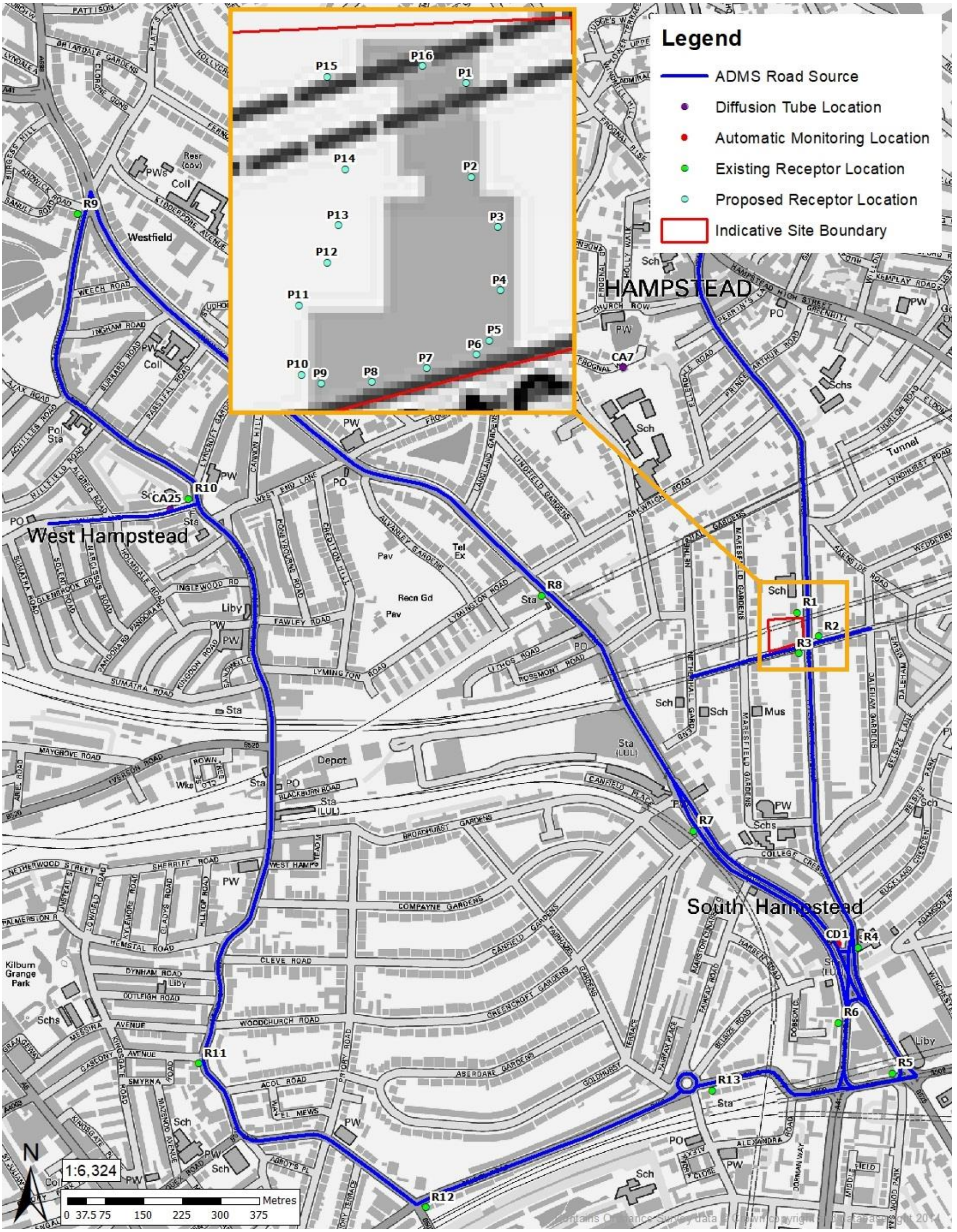
Greater London Authority 'Air Quality Neutral' Assessment

The development is considered to be 'neutral' in terms of Air Quality for both building and transport emissions and no further mitigation will be required.

In conclusion, following the adoption of the recommended mitigation measures, the proposed development is not considered to be contrary to any of the national and local planning policies.

Figures

Figure 1 Air Quality Assessment Area



Contains OS data © Crown copyright and database right 2014

Figure 2 London City Airport 2017 Meteorological Station Wind Rose

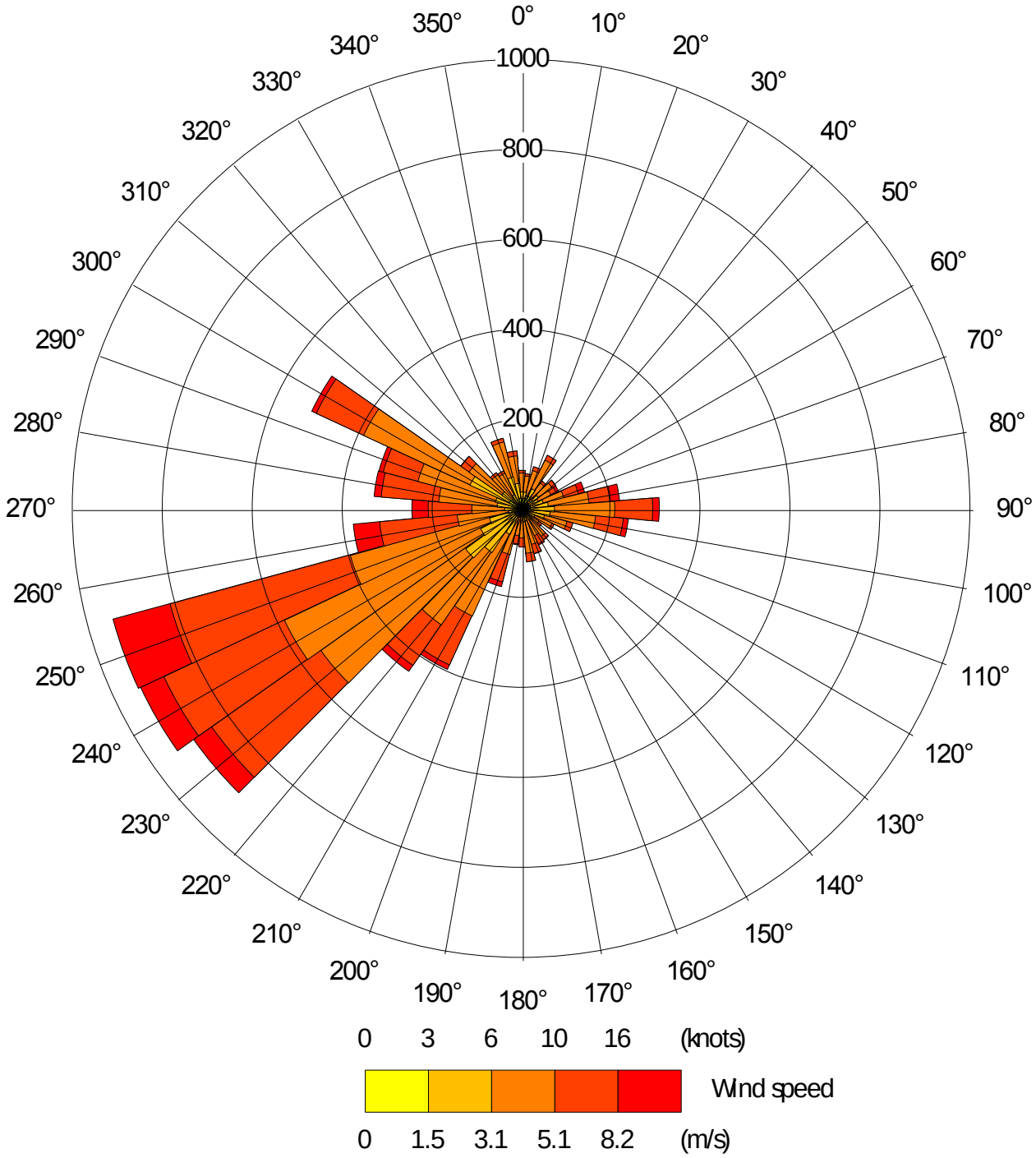


Figure 3 NO_2 Concentration Contour Plot – Development Contribution

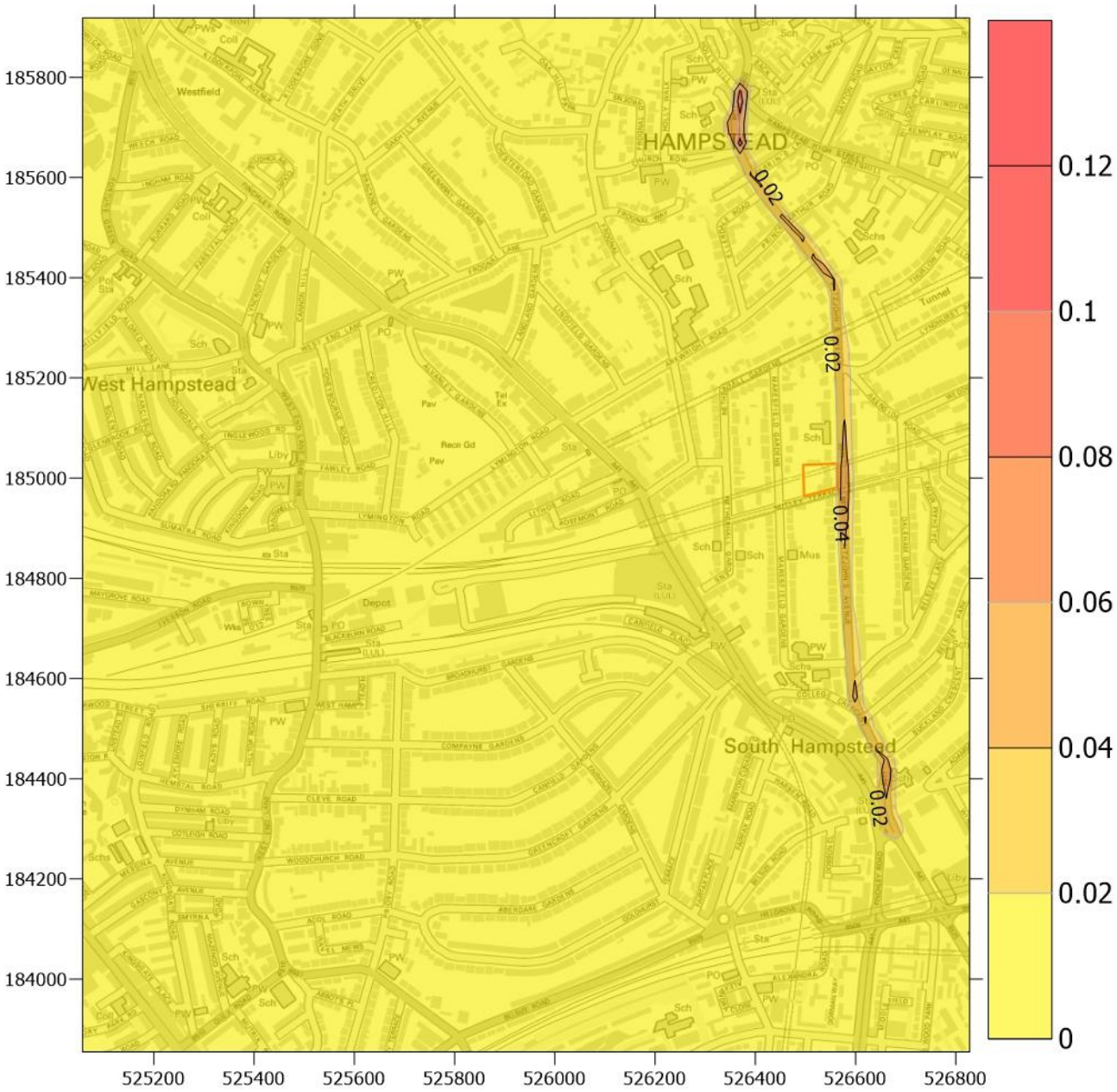
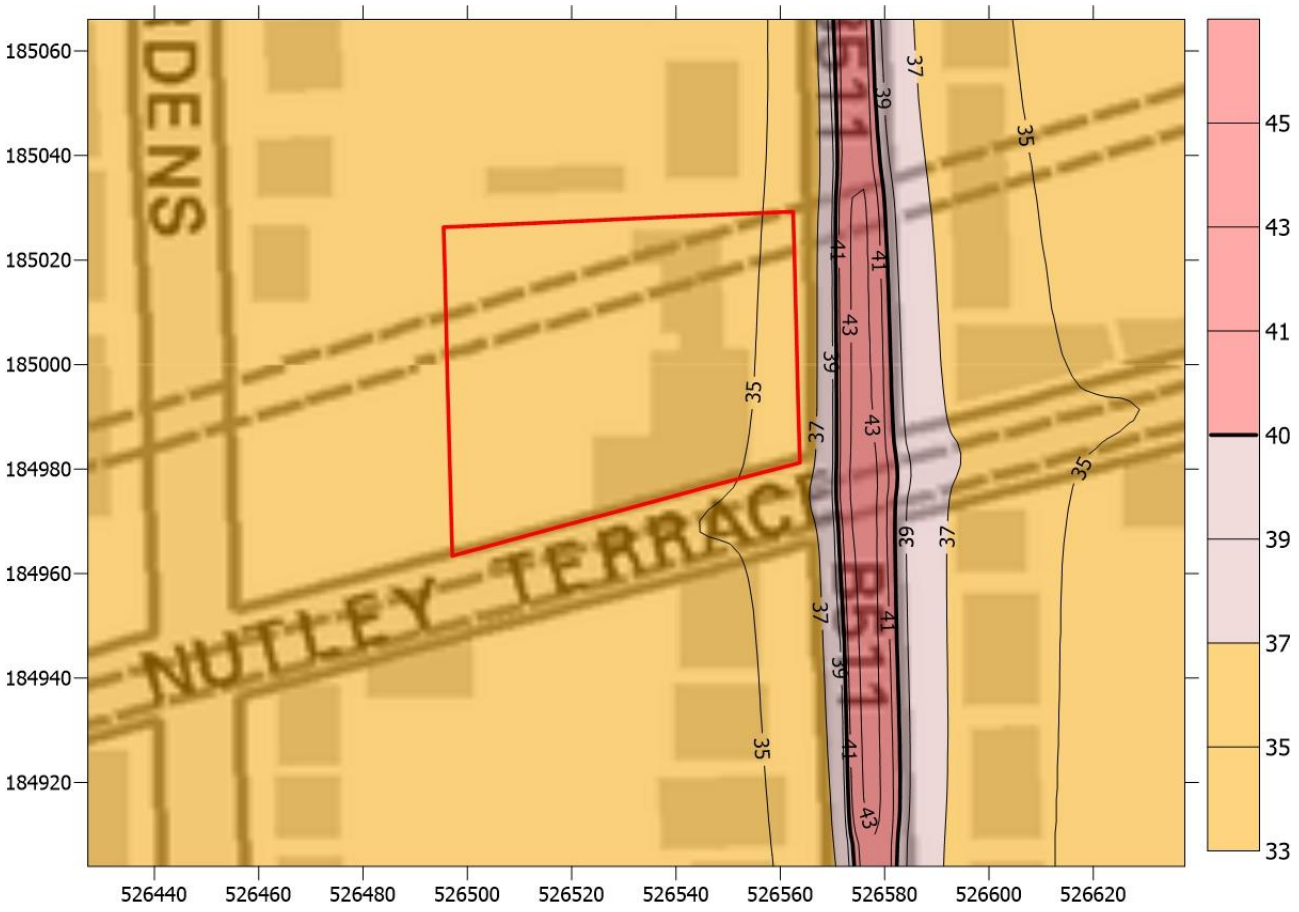


Figure 4 NO_2 Concentration Contour Plot – 'Do Something Scenario'



Appendix A 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[2].

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 a 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

[2] 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 A1– 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 A2 - 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/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 – 28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>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 A3 - 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 A4 - 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 A5 - 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 A6 - 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 A7 - 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 B Theoretical Scenario Results

Table B1 Theoretical Scenario NO_2 Results

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	35.60	35.81	35.81	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	38.39	38.81	38.81	<0.01
R3	37c Fitzjohn's Avenue	36.36	36.63	36.63	<0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	46.54	47.35	47.37	0.02
R5	97 Avenue Road	41.13	41.63	41.63	<0.01
R6	Flat 1, 115 Finchley Road	37.47	37.75	37.76	0.01
R7	199 Finchley Road	37.64	37.92	37.92	<0.01
R8	Flat above Unit 1, 321 Finchley Road	41.00	41.46	41.46	<0.01
R9	1 Ardwick Road	37.93	38.23	38.23	<0.01
R10	118a Cholmley Gardens	37.80	38.39	38.39	<0.01
R11	Ground Floor Flat, 97 West End Lane	34.68	34.80	34.80	<0.01
R12	Flat c, 129 Belsize Road	35.37	35.55	35.55	<0.01
R13	20e Hilgrove Road	36.39	36.61	36.61	<0.01
P1	Proposed Development: East Façade	-	-	35.56	-
P2		-	-	35.69	-
P3		-	-	36.04	-
P4		-	-	36.15	-
P5		-	-	36.12	-
P6	Proposed Development: South Façade	-	-	36.02	-
P7		-	-	35.63	-
P8		-	-	35.34	-
P9		-	-	35.14	-
P10	Proposed Development: West Façade	-	-	35.04	-
P11		-	-	34.90	-
P12		-	-	34.94	-
P13		-	-	34.94	-
P14		-	-	34.92	-
P15		-	-	34.79	-
P16	Proposed Development: North Façade	-	-	35.21	-
Annual Mean AQO		**40 µg/m³**			

Table B2 Impact Description of Effects at Key Receptors (NO_2)

NO_2 Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R1	<0.01	0.00	0%	76-94% of AQAL	Negligible
R2	<0.01	0.00	0%	95-102% of AQAL	Negligible
R3	<0.01	0.00	0%	76-94% of AQAL	Negligible
R4	0.02	0.05	0%	≥110 of AQAL	Negligible
R5	<0.01	0.00	0%	103-109 of AQAL	Negligible

NO_2 Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R6	0.01	0.03	0%	76-94% of AQAL	Negligible
R7	<0.01	0.00	0%	95-102% of AQAL	Negligible
R8	<0.01	0.00	0%	103-109 of AQAL	Negligible
R9	<0.01	0.00	0%	95-102% of AQAL	Negligible
R10	<0.01	0.00	0%	95-102% of AQAL	Negligible
R11	<0.01	0.00	0%	76-94% of AQAL	Negligible
R12	<0.01	0.00	0%	76-94% of AQAL	Negligible
R13	<0.01	0.00	0%	76-94% of AQAL	Negligible
+0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

Table B3 Theoretical Scenario PM_{10} Results

Receptor		PM_{10} (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	18.13	18.17	18.17	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	19.56	19.62	19.63	0.01
R3	37c Fitzjohn's Avenue	19.24	19.28	19.28	<0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	20.85	21.00	21.00	0.01
R5	97 Avenue Road	19.98	20.05	20.05	<0.01
R6	Flat 1, 115 Finchley Road	19.49	19.54	19.54	<0.01
R7	199 Finchley Road	19.41	19.45	19.45	<0.01
R8	Flat above Unit 1, 321 Finchley Road	18.93	19.01	19.01	<0.01
R9	1 Ardwick Road	18.73	18.78	18.78	<0.01
R10	118a Cholmley Gardens	18.61	18.69	18.69	<0.01
R11	Ground Floor Flat, 97 West End Lane	17.87	17.89	17.89	<0.01
R12	Flat c, 129 Belsize Road	19.12	19.14	19.14	<0.01
R13	20e Hilgrove Road	19.23	19.26	19.26	<0.01
P1	Proposed Development: East Façade	-	-	18.11	-
P2		-	-	18.13	-
P3		-	-	19.19	-
P4		-	-	19.21	-
P5		-	-	19.20	-
P6	Proposed Development: South Façade	-	-	19.19	-
P7		-	-	19.13	-
P8		-	-	19.08	-
P9		-	-	19.05	-
P10	Proposed Development: West Façade	-	-	19.04	-
P11		-	-	19.01	-
P12		-	-	19.02	-
P13		-	-	19.02	-
P14		-	-	18.01	-
P15		-	-	17.99	-
P16	Proposed Development: North Façade	-	-	18.06	-

Receptor		PM_{10} (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
Annual Mean AQO		**40 µg/m³**			

Table B4 Theoretical Scenario $PM_{2.5}$ Results

Receptor		$PM_{1.5}$ (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	12.40	12.42	12.43	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	13.16	13.20	13.20	<0.01
R3	37c Fitzjohn's Avenue	12.95	12.98	12.98	<0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	14.01	14.10	14.10	<0.01
R5	97 Avenue Road	13.43	13.48	13.48	<0.01
R6	Flat 1, 115 Finchley Road	13.10	13.14	13.14	<0.01
R7	199 Finchley Road	13.06	13.09	13.09	<0.01
R8	Flat above Unit 1, 321 Finchley Road	12.92	12.97	12.97	<0.01
R9	1 Ardwick Road	12.74	12.77	12.77	<0.01
R10	118a Cholmley Gardens	12.66	12.71	12.71	<0.01
R11	Ground Floor Flat, 97 West End Lane	12.22	12.24	12.24	<0.01
R12	Flat c, 129 Belsize Road	12.86	12.87	12.87	<0.01
R13	20e Hilgrove Road	12.95	12.97	12.97	<0.01
P1	Proposed Development: East Façade	-	-	12.39	-
P2		-	-	12.40	-
P3		-	-	12.92	-
P4		-	-	12.93	-
P5		-	-	12.93	-
P6	Proposed Development: South Façade	-	-	12.92	-
P7		-	-	12.88	-
P8		-	-	12.85	-
P9		-	-	12.83	-
P10	Proposed Development: West Façade	-	-	12.82	-
P11		-	-	12.81	-
P12		-	-	12.81	-
P13		-	-	12.81	-
P14		-	-	12.32	-
P15		-	-	12.31	-
P16	Proposed Development: North Façade	-	-	12.36	-
Annual Mean AQO		**25 µg/m³**			

For Scenario 2 using the Theoretical 2017 emissions factor for 2021 operation, all modelled existing and proposed receptors, except R4, R5 and R8, are predicted to be below the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios. It should be noted that all receptors are located within the borough wide AQMA and therefore experience high background pollutant concentrations prior to the Proposed Development. Despite this, the impact description of the effects as a result of the proposed development at all receptors is predicted to be 'negligible'.

As indicated in Table B1, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development, is 0.02 µg/m^3 at The Royal Central School of Speech and Drama Embassy Theatre (R4).

All proposed sensitive receptor locations are predicted to be below the AQO during the 'do something' scenario and therefore no further mitigation would be required.

For PM_{10}, the maximum predicted change in the annual average exposure to PM_{10} at any existing, due to changes in traffic movements associated with the development, is 0.01 µg/m^3 at Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue (R2) and The Royal Central School of Speech and Drama Embassy Theatre (R4).

For $PM_{2.5}$, the maximum predicted change in the annual average exposure to $PM_{2.5}$ at any existing, due to changes in traffic movements associated with the development, is <0.01 µg/m^3 at all identified sensitive receptor locations.

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 for existing receptors, including those within the AQMA, is determined to be 'negligible' at all receptors.

Appendix C Defra Background Concentration Assessment

Model Verification

Table C1 Comparison of Roadside Modelling & Monitoring Results for NO_2

Tube location	NO_2 µg/m³		
	Monitored NO_2	Modelled NO_2	Difference (%)
CD1	53.00	59.54	12.33
CA25	55.16	39.50	-28.39

The final model produced data at the monitoring locations to within ~28% of the monitoring results. The percentage divergence is outside the requirement of the TG16 guidance which is considered to be unrepresentative. Therefore, this verification, using Defra background map concentrations at all monitoring location is not considered representative of the monitored results.

The final verification model correlation coefficient (representing the model uncertainty) is 1.03[3]. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

Table C2 Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
R1	Flat 8 South, 43-45 Fizjohn's Avenue	32.58	31.59	31.59	<0.01
R2	Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue	39.12	37.39	37.40	0.01
R3	37c Fitzjohn's Avenue	37.02	35.83	35.83	<0.01
R4	The Royal Central School of Speech and Drama Embassy Theatre, 63-64 Eton Avenue	47.59	43.47	43.48	0.01
R5	97 Avenue Road	41.98	39.25	39.25	<0.01
R6	Flat 1, 115 Finchley Road	38.16	36.60	36.60	<0.01
R7	199 Finchley Road	38.35	36.65	36.66	0.01
R8	Flat above Unit 1, 321 Finchley Road	38.32	35.57	35.57	<0.01
R9	1 Ardwick Road	34.35	32.53	32.53	<0.01
R10	118a Cholmley Gardens	34.22	32.86	32.86	<0.01
R11	Ground Floor Flat, 97 West End Lane	31.09	30.33	30.33	<0.01
R12	Flat c, 129 Belsize Road	34.82	33.84	33.84	<0.01
R13	20e Hilgrove Road	37.04	35.75	35.75	<0.01
P1	Proposed Development: East Façade	-	-	31.41	-
P2		-	-	31.50	-
P3		-	-	35.40	-
P4		-	-	35.49	-
P5		-	-	35.46	-
P6	Proposed Development: South Façade	-	-	35.39	-

[3] This was achieved by applying a model correction factor of 2.30 to roadside predicted NO_X concentrations before converting to NO_2

Receptor		NO_2 (µg/m³)			
		Baseline 2017	Do Minimum 2021	Do Something 2021	Development Contribution
P7		-	-	35.11	-
P8		-	-	34.91	-
P9		-	-	34.76	-
P10	Proposed Development: West Façade	-	-	34.69	-
P11		-	-	34.59	-
P12		-	-	34.62	-
P13		-	-	34.62	-
P14		-	-	30.93	-
P15		-	-	30.85	-
P16	Proposed Development: North Façade	-	-	31.15	-
Annual Mean AQO		**40 µg/m³**			

The majority of the receptor locations are predicted to be below the AQO during the 'do minimum' and 'do something' scenario. It should be noted that all receptors are located within the borough wide AQMA and therefore experience high background pollutant concentrations prior to the Proposed Development. Despite this, the impact description of the effects as a result of the proposed development at all receptors is predicted to be 'negligible'.

As indicated in Table C2, the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor, due to changes in traffic movements associated with the development, is 0.01 µg/m³ at Flat 10, Fitzjohn's House, 46 Fitzjohn's Avenue (R2) and The Royal Central School of Speech and Drama Embassy Theatre (R4).

All proposed sensitive receptor locations are predicted to be below the AQO during the 'do something' scenario and therefore no further mitigation would be required.

The impact description of changes in traffic flow associated with the 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 C3 (overleaf).

Table C3 Impact Description of Effects at Key Receptors (NO_2)

NO_2 Impact Description of Effects at Key Receptors					
Recep.	Change Due to Development (DS-DM) (µg/m³)	% of AQO	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Descriptor
R1	<0.01	0.00	0%	76-94% of AQAL	Negligible
R2	0.01	0.03	0%	76-94% of AQAL	Negligible
R3	0.01	0.00	0%	76-94% of AQAL	Negligible
R4	0.01	0.03	0%	103-109 of AQAL	Negligible
R5	<0.01	0.00	0%	95-102% of AQAL	Negligible
R6	<0.01	0.00	0%	76-94% of AQAL	Negligible
R7	<0.01	0.03	0%	76-94% of AQAL	Negligible
R8	<0.01	0.00	0%	76-94% of AQAL	Negligible

NO_2 Impact Description of Effects at Key Receptors					
Recep.	**Change Due to Development (DS-DM) (µg/m³)**	**% of AQO**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Descriptor**
R9	<0.01	0.00	0%	76-94% of AQAL	Negligible
R10	<0.01	0.00	0%	76-94% of AQAL	Negligible
R11	<0.01	0.00	0%	76-94% of AQAL	Negligible
R12	<0.01	0.00	0%	76-94% of AQAL	Negligible
R13	<0.01	0.00	0%	76-94% of AQAL	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, including those within the AQMA, is determined to be 'negligible' at all receptors. This based on the methodology outlined in Section 3.

Appendix D Report Terms & Conditions

This Report has been prepared using reasonable skill and care for the sole benefit of Godfrey London Ltd ("the Client") for the proposed uses stated in the report by [WYG Environment Planning Transport Limited] ("WYG"). WYG exclude all liability for any other uses and to any other party. The report must not be relied on or reproduced in whole or in part by any other party without the copyright holder's permission.

No liability is accepted or warranty given for; unconfirmed data, third party documents and information supplied to WYG or for the performance, reliability, standing etc of any products, services, organisations or companies referred to in this report. WYG does not purport to provide specialist legal, tax or accounting advice.

The report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections'. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times. No investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather-related conditions. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions. The "shelf life" of the Report will be determined by a number of factors including; its original purpose, the Client's instructions, passage of time, advances in technology and techniques, changes in legislation etc. and therefore may require future re-assessment.

The whole of the report must be read as other sections of the report may contain information which puts into context the findings in any executive summary.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. WYG accept no liability for issues with performance arising from such factors.