Fitzjohn's Avenue, Hampstead – Air Quality Assessment

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1 Introduction

AECOM has been commissioned by Pegasus Life to provide an air quality assessment in support of the redevelopment of Arthur West House in Hampstead, London. Currently the site consists of a 6 storey student hostel which has limited undercroft parking for approximately 5 cars and access to additional parking at the rear of the site.

The application site is located on the corner of Fitzjohn's Avenue and Prince Arthur Road in the London Borough of Camden (LBC). The development proposals include the demolition of the existing building and construction of a new seven storey building providing between 33 and 42 residential apartments purpose built for people of retirement age. The development would include basement parking for approximately 30 cars.

The proposed development has the potential to affect local air quality during its construction phase due to construction dust and emissions from construction plant and during its operational phase due to increased on-site parking provisions. A quantitative assessment has been carried out of the impact of the increased parking provision at the site. A qualitative assessment of the potential construction dust impacts has been carried out in accordance with the Institute of Air Quality Management's (IAQM) guidance. Mitigation measures have been identified to minimise any potential impacts.

LBC have declared the entire Borough an Air Quality Management Area (AQMA) due to elevated concentrations of particulate matter (PM_{10}) and nitrogen dioxide (NO_2). The proposed development will introduce new sensitive receptors into an existing AQMA and as such site suitability will also be a key consideration. However, the development will be mechanically ventilated.

2 Legislative Framework and Planning Policy

2.1 National and European Air Quality Legislation and Policy

2.1.1 Local Air Quality Management

The provisions of Part IV of the Environment Act 1995 establish a national framework for air quality management, which requires all local authorities in England, Scotland and Wales to conduct local air quality reviews. Section 82(1) of the Act requires these reviews to include an assessment of the current air quality in the area and the predicted air quality in future years. Should the reviews indicate that the objectives prescribed in the UK Air Quality Strategy (Defra, 2007) and the Air Quality (England) Regulations (Defra, 2000 and 2002) will not be met, the local authority is required to designate an Air Quality Management Area (AQMA). Action must then be taken at a local level to ensure that air quality in the area improves. This process is known as 'Local Air Quality Management' or LAQM.

2.1.2 UK Air Quality Strategy

The UK Air Quality Strategy (AQS) identifies nine ambient air pollutants that have the potential to cause harm to human health and two for the protection of vegetation and ecosystems. These objectives aim to reduce the impacts of the pollutants to negligible levels. The objectives are not mandatory but targets that local authorities should try to achieve.

2.1.3 European Air Quality Directives

The Air Quality Framework Directive (96/62/EC) on ambient air quality assessment and management defines the policy framework for 12 air pollutants known to have a harmful effect on human health and the environment. The limit values for the specific pollutants are set through a series of Daughter Directives. The limit values have been transposed into The Air Quality Standards Regulations 2010 (SI 2010 No. 1001).

2.1.4 Air Quality Criteria

The pollutants of concern for this assessment are NO_2 and PM_{10}.

The Government's Air Quality Strategy objectives and EU limit values for NO_2 are:

- An annual mean concentration of 40 µg/m^3; and
- A one-hour mean concentration of 200 µg/m^3, not to be exceeded more than eighteen times per year.

The Government's Air Quality Strategy objectives and the EU limit value for PM_{10} are:

- An annual mean concentration of 40 µg/m^3 (gravimetric); and
- A 24-hour mean concentration of 50 µg/m^3 (gravimetric) to be exceeded no more than 35 times per year.

2.2 Planning Policy

2.2.1 National Planning Policy Framework

The NPPF was published on 27 March 2012 and sets out the Government's planning policies for England and how these are expected to be applied. The National Planning Policy Framework advises that: "Planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan."

Planning Practice Guidance has been produced for air quality which provides guiding principles on how planning can take account of the impact of new development on air quality.

2.2.2 London Planning Policy

2.2.2.1 The London Plan[1]

The London Plan is the overall strategic plan for London, and it sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031. It forms part of the development plan for Greater London. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

Improvement of air quality is one of the key policy objectives of the London Plan:

"7.14 Improving air quality

Development proposals should:

a. 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."

2.2.2.2 Mayor of London's Air Quality Strategy

The Mayor of London's Air Quality Strategy[2] (Policy 7) states that *"the Mayor will ensure 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."* It should be demonstrated therefore that any development has no significant impact on local air quality in order to obtain approval.

In addition, Policy 6 of the Mayor's Air Quality Strategy '*Reducing emissions from construction and demolition sites*' states the following:

The Mayor will work with London boroughs, the GLA group and the construction industry to encourage implementation of the Best Practice Guidance for construction and demolition sites across London so as not to pose health risk to people working or living nearby.

[1] The London Plan, The Mayor of London, available at https://www.london.gov.uk/priorities/planning/london-plan
[2] Clearing the Air, The Mayor of London's Air Quality Strategy, December 2010.

2.2.2.3 Mayor of London's Sustainable Design and Construction

The Mayor of London's Supplementary Planning Guidance (SPG) on sustainable design and construction[3] provides guidance on air quality assessment requirements, design and occupation and construction and demolition. The key priorities are:

a. *Developers are to design their schemes to that they are at least 'air quality neutral'.*

b. *Developments should be designed to minimise the generation of air pollution.*

c. *Developments should be designed to minimise and mitigate against increased exposure to poor air quality.*

d. *Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants as set out in Appendix 7 of the SPG.*

e. *Developers and contractors should follow the guidance set out in the emerging "Minimising dust and emissions from construction and demolition" SPG when constructing their development.*

2.2.2.4 Mayor of London's Control of Dust and Emissions SPG[4]

The Mayor of London's SPG on the control of dust and emissions during construction and demolition sets out the requirements of an Air Quality Statement, a dust risk assessment, emission control measures, air quality monitoring and cleaner construction machinery for London. The key requirements affecting this proposed development are summarised below:

a. *Air Quality Statement is required to be submitted to the Local Planning Authority during the application stage prior to works commencing on site. This Statement shall include:*

- *Summary of work to be carried out;*
- *Description of site layout and access;*
- *Inventory and timetable of all dust and NO_x generating activities;*
- *Air quality (Dust) risk assessment (in accordance to the IAQM);*
- *List of all dust and emission control methods to be employed;*
- *Details of any fuel stored on-site;*
- *Identification of an authorised responsible person on-site for air quality. This person needs to have knowledge of pollution monitoring and control methods and vehicle emissions;*
- *Summary of monitoring protocols and agreed procedure of notification to the local authority nominated person(s); and*
- *A site log book to record details and action taken in response to exceptional incidents or dust-causing episodes and the mitigation measures.*

b. *Non-road mobile machineries (NRMM) to be used on any construction sites would need to comply with the European emission standards. This is as set out below:*

- *From 1st September 2015 onwards, all NRMM of net power between 37 kW and 560 kW within Greater London will be required to meet the Stage IIIA of the EU Directive 97/68/EC and its subsequent amendments as a minimum. Compliance of Stage IIIB of the Directive will be required as a minimum of Central Activity Zone or Canary Wharf.*
- *From 1st September 2020 onwards, all NRMM of net power between 37 kW and 560 kW within Greater London will be required to meet the Stage IIIB of the EU Directive 97/68/EC and its subsequent amendments*

[3] Sustainable Design and Construction, SPG, The Mayor of London, April 2014.
[4] The Control of Dust and Emissions during Construction and Demolition, Draft SPG, The Mayor of London, September 2013.

as a minimum. Compliance of Stage IV of the Directive will be required as a minimum of Central Activity Zone or Canary Wharf.

- *This policy is enforced through the planning process and compliance with the NRMM standards should be secured by the local authorities as a planning condition or s106 agreement.*
- *If emissions of NRMM are unknown, developers will be required to provide a written statement of their commitment and ability to meet these standards as part of the Air Quality Statement.*
- *An inventory of all NRMM should be kept on-site stating the emission limits for all equipment and made available to local authority officers if required.*

2.2.3 Local Planning Policy

Camden adopted its Core Strategy in 2010, which sets out the key elements of the Council's planning vision and strategy for the borough from 2010 to 2025. Parts of this strategy highlight the need to improve air quality in the borough, including CS16, in which the Council states its aim to "*recognise the impact of poor air quality on health and implement Camden's Air Quality Action Plan which aims to reduce air pollution levels*."

Camden's Local Development Framework (LDF) also contains policies that focus on the Council's expectation for developments to reduce their impact on air quality. In Development Policy 32, the Council states "*Mitigation measures will be expected in developments that are located in areas of poor air quality*".

Other relevant Local Development Framework policies include:

- CS13 - Tackling climate change through promoting higher environmental standards. The Council expects "*all new developments to be designed to minimise carbon dioxide emissions by being as energy efficient as is feasible and viable*"
- DP22 - Promoting sustainability. The Council will require developments to "*incorporate sustainable design and construction measures*".
- DP17 - Promoting sustainable and efficient transport; "*Development should make suitable provision for pedestrians, cyclists and public transport*."

2.2.4 Camden's Planning and Air Quality Policy

Camden has produced several pieces of air quality guidance which must be followed when submitting a planning application. Camden's air quality guidance states that, "*A basic air quality assessment should accompany applications for developments where local residents will be exposed to poor air quality (due its location next to a busy road/diesel railway lines or in a generally congested area)".* Where as *, "A detailed air quality assessment should accompany applications for:*

- *commercial developments with a floor space of more than 2500m^2;*
- *developments that have the potential to significantly change road traffic on a busy road (that is, a road that handles more than 10,000 vehicles per day). Significant changes include, any increase in traffic volumes (either annual average daily traffic or peak), any increase to the average vehicle speed, any increase in traffic congestion and/or any increase in the percentage of heavy goods vehicles*
- *developments that will introduce or increase car parking facilities by 300 spaces or more*
- *developments that bring sensitive receptors into an area of poor air quality*
- *developments that include biomass boilers and/or combined heat and power"*

Camden requires that basic air quality assessments should include:

- *"a review of air quality around the development site using existing air quality monitoring and/or modelling data;*
- *an assessment of the impact on air quality during the construction phase and detailed mitigation methods for controlling dust and pollution emissions associated with plant and vehicles;*
- *an indication of the number of receptors which will be exposed to poor air quality as a result of the development, and show their location on a map. The significance of air pollution exposure should be quantified in accordance with the "Air Quality Impact Significance Criteria – New Exposure" outlined in the NSCA Guidance Note;*
- *an outline and justification of mitigation measures associated with the design, location and operation of the development in order to reduce air pollution and exposure to poor air quality. Where a proposed development is in an area of poor air quality it is essential to demonstrate that from the earliest stages, the building has been designed to reduce occupant exposure. This includes consideration of orientation, elevation of residences, and the use of green infrastructure such as green walls, screens and trees. "*

While detailed air quality assessments should include:

- *air quality dispersion modelling data carried out in accordance with the London Councils Air Quality and Planning Guidance;*
- *an indication of the number of receptors which will be exposed to poor air quality as a result of the development, and show their location on a map •the significance of air pollution exposure should be quantified in accordance with the "Air Quality Impact Significance Criteria – New Exposure" outlined in the NSCA Guidance Note;*
- *an outline and justification of mitigation measures associated with the design, location and operation of the development in order to reduce air pollution and exposure to poor air quality. Where a proposed development is in an area of poor air quality it is essential to demonstrate that from the earliest stages, the building has been designed to reduce occupant exposure. This includes consideration of orientation, elevation of residences, and the use of green infrastructure such as green walls, screens and trees."*

Camden has produced an air quality checklist which should be completed for all development which requires an air quality assessment. This has been completed and is presented in Section 8 of this assessment. Camden has also provided additional guidance in the form of a series of guides to reduce air pollution from your buildings including "Manual B – Minimising Air Pollution from new Developments" which details the approach to energy efficient design, calculating the developments heat requirement, selecting appropriate technology, fuel and heating controls.

Camden Planning Guidance (CPG) [3] on Sustainability states that, "*All biomass boilers and CHP will require an air quality assessment, including location and height of flues, details of emissions and how the emissions can be mitigated*" and that, "*Biomass boilers and CHP are required to be designed, operated and maintained in accordance with best practise measures to minimise emissions to air.*" It should be noted that the proposed development does not include a CHP or communal boiler.

Camden Planning Guidance (CPG) [6] on Amenity includes a section specifically related to air quality. The guidance sets out the following policies which are relevant to the proposed development:

- *We will encourage best practice measures to be adopted during construction and demolition work to reduce and mitigate air pollution emissions. You will be encouraged to adopt the procedures outlined in the London Council's best practice guidance The control of dust and emissions from construction and demolition. These focus around three principles to control emissions – prevention, suppression and containment.*

- *Gas boilers are a large source of NO_x emissions in Camden. In order to minimise NO_x emissions arising from heating and hot water systems the Council requires boilers fitted in new development to achieve a NO_x emissions of <40 mg/m^3 and an energy efficiency rating >90%.*
- *We will require evidence that the exhaust stack height of gas CHP/CCHP has been appropriately calculated to guarantee that NO_x emissions are effectively dispersed, and do not risk increasing ground level NO_2 concentrations. An air quality assessment will be required for developments including CHP/CCHP. Where the assessment reveals a negative impact on air quality, mitigation measures will be required entailing the best available techniques to reduce emissions. This includes the installation of NO_x abatement technology such as:*
    - *use of low NO_x burners; or*
    - *increasing stack height.*

  A programme of on-going maintenance and servicing will be necessary to minimise gas emissions released from CHP/CCHP.
- *Reducing car usage caused by new developments is the principle way to minimise vehicle emissions and protect local air quality. Please refer to transport policy CS11 - Promoting sustainable and efficient travel in the Camden Core Strategy for more on our approach to improving air quality through transport measures. This requires:*
    - *the adoption of car free and car capped developments;*
    - *provision cycling facilities to encourage sustainable transport;*
    - *green travel plans;*
    - *provision of car club bays; and*
    - *infrastructure for low emissions vehicles such as electric vehicle recharging points.*

Camden's Core Strategy policy CS13 promotes the use of renewable energy technologies to reduce carbon emissions and tackle climate change. The measures that CS13 sets out include, "*solar thermal collectors and ground source heat pumps in addition to gas and hydrogen fuel cell combined heat and power (CHP) or combined cooling heat and power (CCHP)"*.

3 Baseline Conditions

3.1 Summary of Local Air Quality Management

In the 5th stage of the Review and Assessment in 2012, Camden Council found the UK objectives for NO_2 were being exceeded. As a result, the Council retained the Air Quality Management Area (AQMA) over the whole Borough, which had been designated AQMA since 2001. The concentrations of NO_2 continue to exceed short term and long term air quality objectives at all of the Council's automatic monitoring sites and the vast majority of nitrogen dioxide diffusion tube sites. The air quality objective continues to be met for all of the other pollutants monitored including PM_{10}. The Council's 2013 Progress Report (issued in April 2014) concluded that, "*Concentrations within the AQMA still exceed the long term objectives for NO_2 at all of our automatic monitoring sites and at the vast majority of our nitrogen dioxide diffusion tube sites, and exceeds the short term objectives at two of four of the automatic monitoring sites, so the AQMA should remain. We continue to meet objectives for all of the pollutants we monitor with the exception of NO_2*".

3.2 Local Authority Air Quality Monitoring

The Council monitors NO_2 at four automatic monitoring sites, illustrated in Figure 1; three of which are also used to monitor PM_{10}. Two of the monitoring sites are classified as roadside sites, one as a kerbside site and one as an urban background site. Recent measurements recorded at these locations are summarised in Table 1. The Swiss Cottage station (CD1) is located close to a busy road, approximately 1.7 km south-west of the application site. Concentrations in the years 2011-2013 exceeded both the annual mean NO_2 objective and the hourly NO_2 objective, but satisfied the UK PM_{10} objectives. The other monitoring sites are all located over 5 km away from the application site. The annual mean NO_2 objective was exceeded at all sites but all PM_{10} objectives were achieved.

Table 1: Camden Council's Automatic Monitoring Results

Site ID	Site Name	Grid Reference	Distance from the site (km)	Site Type	Annual Mean NO_2 Concentration / $\mu g/m^3$ Number of Hourly Exceedances in Parenthesis		
					2011	2012	2013
LB	London Bloomsbury	530123, 182014	5.1	Urban Background	**50 (**0**)**	**55 (**1**)**	**44 (**0**)**
CD1	Swiss Cottage	526633, 184392	1.1	Kerbside	**71 (79)**	**70 (43)**	**63 (28)**
CD3	Shaftesbury Avenue	530060, 181290	5.6	Roadside	**76 (**15**)**	**71 (**12**)**	**74 (**6**)**
CD9	Euston Road	529878, 182648	4.5	Roadside	**122 (726)**	**106 (295)**	**106 (296)**
Site ID	**Site Name**	**Grid Reference**	**Distance from the site (km)**	**Site Type**	**Annual Mean PM_{10} Concentration / $\mu g/m^3$ Number of Daily Exceedances in Parenthesis**		
					2011	**2012**	**2013**
LB	London Bloomsbury	530123, 182014	5.1	Urban Background	22 (17)	19 (10)	18 (4)
CD1	Swiss Cottage	526633, 184392	1.1	Kerbside	27 (31)	23 (21)	21 (8)
CD3	Shaftesbury Avenue	530060, 181290	5.6	Roadside	32 (27)	29 (18)	29 ()

Notes: Figures in bold indicate exceedences of the UK objective and EU Limit Value for annual mean NO_2 set at 40 $\mu g/m^3$ or of the UK objective and EU Limit Value for 1-hour mean NO_2 set at 200 $\mu g/m^3$ not to be exceeded 18 times in a year. For PM_{10}, figures in bold indicate exceedences of the UK objective and EU Limit Value for annual mean PM_{10} set at 40 $\mu g/m^3$or of the number of exceedences of the 24 hour mean over 50 $\mu g/m^3$ not to be exceeded 35 times in a year. All results were obtained from the Council's 2014 Air Quality Progress Report.

Camden Council also operates a network of NO_2 diffusion tubes at fourteen locations (reduced from sixteen locations in 2011), illustrated in Figure 1, within the Borough. The results for the six sites located closest to the proposed development (sites within 3 km) from 2011 to 2013 are reported in Table 2. The closest monitoring site, 47 Fitzjohn's Road, is located approximately 1.1 km south-west of the application site. Monitored concentrations from this roadside site were above the UK annual mean NO_2 objective in the years 2011-2013.

Table 2: NO_2 Monitoring with Diffusion Tubes in LB of Camden

Site ID	Site Name	OS Grid Reference	Site Type	Distance from the site (km)	Bias Adjusted Annual Mean NO_2 Concentration (µg/m^3)		
					2011	2012	2013
CA7	Frognal Way	526213, 185519	Urban background	0.2	31.5	28.9	32.0
CA15	Swiss Cottage	526633, 184392	Kerbside	1.1	**73.2**	**72.7**	**83.1**
CA16	Kentish Town Road	529013, 185102	Roadside	2.6	**57.2**	**59.0**	**65.3**
CA17	47 Fitzjohn's Road	526547, 185125	Roadside	0.4	**58.4**	**61.2**	**65.2**
CA21	Chetwynd Road	528722, 185950	Roadside	2.4	**44.1**	**43.7**	**76.1**
CA24	Mill Lane/West End Lane	525366, 185253	Roadside	1.1	**57.1**	**52.1**	**47.8**

Notes: 1) Figures in bold indicate exceedences of the UK objective and EU Limit Value for annual mean NO_2 set at 40 µg/m^3; 2) Figures underlined indicate possible exceedences of the UK objective and EU Limit Value for 1-hour mean NO_2 set at 200 µg/m^3 not to be exceeded 18 times in a year. 3) All results were obtained from the Council's 2014 Air Quality Progress Report. 4) Bias adjustment factors were for 2011=0.95, 2012=0.95, 2013=1.00.

3.3 Defra Mapped Background Pollutant Concentrations

A large number of small sources of air pollutants exist, which individually may not be significant, but collectively, over a large area, need to be considered in the modelling process. Pollutant emissions from these sources contribute to background air quality, which when added to modelled emissions allow estimates of total ambient pollutant concentrations to be made.

Defra has produced maps of background pollutant concentrations covering the whole of the UK for use by local authorities and consultants in the completion of LAQM reports and Air Quality Assessments where local background monitoring is unavailable or inappropriate for use. The maps provide background pollutant concentrations for each 1-km grid square within the UK for all years between 2011 and 2030. A comparison of mapped and monitored background annual mean NO_2 concentrations is shown in Table 3.

Table 3: Comparison of Monitored and Mapped Background Concentrations, 2013

Site ID	Site Name	Site/Grid Square	Pollutant	Annual Mean Concentration (µg/m^3)	
				Monitored	Mapped
LB	London Bloomsbury	530500, 182500	NO_2	44	47
CA7	Frognal Way	526500, 185500	NO_2	32	32
LB	London Bloomsbury	530500, 182500	PM_{10}	18	26

From Table 3 it is seen that mapped background NO_2 concentrations are very close to the monitored concentrations at both the London Bloomsbury automatic monitoring station and Frognal Way diffusion tube site. The application site is located within OS grid square 526500, 185500, i.e. the same grid square as the Frognal Way (CA7) urban

background diffusion tube. The background maps over estimate background concentrations of PM_{10} at the London Bloomsbury automatic monitoring station.

Monitored NO_2 concentrations from the Frognal Way (CA7) urban background diffusion tube have been used in the local air quality assessment for NO_2 while for the construction assessment PM_{10} concentrations have been derived from the London Bloomsbury automatic monitoring station. The assessment has conservatively assumed that background NO_2 and PM_{10} concentrations will not reduce in future years, details of the background concentrations used in the study are given in Table 4.

Table 4: Background Pollutant Concentrations (µg/m³) Used in the Assessment

Pollutant	**Annual Mean Concentrations (µg/m³)**
NO_2	32
PM_{10}	18

4 Assessment Methodology

4.1 Scope of the Assessment

The proposed development has the potential to impact on local air quality during its operational and construction phases. The main impacts during the construction phase will be related to the airborne dust generated by construction activities. These impacts have been assessed qualitatively. The main consideration during the operational phase is the suitability of the site for residential use.

The proposed development includes only 30 car parking spaces and is expected to generate 22 trips per day. Highways Agency [5] guidance advises that changes in air quality will be negligible when AADT flows change by less than 1,000, or Heavy Duty Vehicles (HDVs, which includes Heavy Goods Vehicles (HGVs), buses and coaches) change by less than 200. Based on these criteria, the impact of the proposed development site is expected to be negligible; however impacts at adjacent receptors have been considered in-line with Camden's planning guidance which requires a basic assessment to be carried out for this development. .

In assessing the potential impact of road traffic emissions the following scenarios have been modelled:

- Baseline scenario, 2012, which describes the current local road network in 2012;
- Do-Minimum 2015 (2015 DM) which describes the local road network in 2015, without the proposed development.
- Do-Something 2015 (2015 DS), which describes the local road network in 2015, with the proposed development.

The DMRB methodology requires that only properties and ecologically designated sites within 200 m of roads affected by a development are assessed. As there are no ecologically sensitive sites within 200 m of affected roads, designated ecological sites were not considered in the assessment.

The London Plan and Mayor of London's SPG on Sustainable Design and Construction require that emissions from all new developments in Greater London are assessed against emission benchmarks for buildings and transport to determine whether the proposed development is 'air quality neutral'. An Air Quality Neutral Assessment has been carried out in accordance with the methodology set out in the Air Quality Neutral Planning Support document published by the Greater London Authority.

4.2 Local Air Quality Assessment

An assessment of the impact of the proposed development on local air quality was carried out using the DMRB Screening Method (Version 1.03c (July 2007) to assess potential impacts resulting from road traffic movements. Contributions to pollutant concentrations from other sources were included as background concentrations.

The DMRB Screening Method requires information on traffic flows (as AADT), vehicle speeds and the proportion of HDVs. Changes in exhaust emissions arising from future legislation and emission factors are incorporated into the DMRB methodology, however, these have been shown to be optimistic for NO_2. Therefore additional predictions have been made for the pollutant NO_2 in accordance with the Highways Agency's Interim Advice Note (IAN 170/12)[6]. This additional scenario takes into account the slower decline in vehicle NO_x emissions than was originally forecast in the DMRB model.

[5] Highways Agency, Design Manual for Roads and Bridges (DMRB), Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1, HA 207/07, Air Quality, 2007.
[6] Highways Agency, Interim Advice Note 170/12 Rev 1, Updated Air Quality Advice on the assessment of Future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality', June 2013. Available from http://www.dft.gov.uk/ha/standards/ians/index.htm

The local air quality assessment includes the prediction of pollutant concentrations (NO_2 and PM_{10}) at nearby sensitive receptors. Concentrations were predicted for the base year (2012) for verification against air quality monitoring data and a worst-case opening year of 2015. The predicted concentrations are compared with the Air Quality Strategy objectives and EU limit values.

4.2.1 Sensitive Receptors

Sensitive receptors were chosen to represent the façade of the proposed building and of the surrounding buildings at the worst-case locations at the in terms of exposure to pollution and where impacts might be expected to be greatest. Pollutant concentrations were predicted at six sensitive receptor locations. Details of all modelled sensitive receptors are presented in Table 5 and Illustrated in Figure 2.

Table 5: Discrete Receptors

Receptor Number	Receptor Name	Grid Reference (X, Y)	
1	104 Fitzjohn's Avenue	526455	185530
2	110 Fitzjohn's Avenue	526448	185544
3	84 Fitzjohn's Avenue	526423	185536
4	77 Fitzjohn's Avenue	526462	185487
5	Proposed Development Facade	526439	185520
6	Back of Proposed Development Facade	526396	185492

4.2.2 Traffic Data

Traffic generation for the proposed development has been taken from the traffic assessment prepared for the development by TTP consulting. Traffic data for the major roads within the study area were derived from the London Atmospheric Emissions Inventory (LAEI)[7] . Annual Average Daily Traffic (AADT), heavy-duty vehicle (HDV) percentage and vehicle speeds were all obtained from the LAEI for 2012 and 2015 and are presented in Table 6 and illustrated in Figure 3.

Table 6: Traffic Data

Link ID	Road Name	Speed (kmph)	2012		2015 DM		2015 DS		Change
			AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT
1	Hampstead High Street	21.2	16,540	5.4	16,719	5.4	16,741	5.4	22
2	Arkwright Road	23.4	10,742	7.1	10,858	7.1	10,880	7.1	22
3	Fitzjohn's Avenue	27.9	27,677	7.3	27,976	7.3	27,998	7.2	22
4	Hampstead High Street	16.8	16,540	5.4	16,719	5.4	16,741	5.4	22
5	Fitzjohn's Avenue	24.7	27,677	7.3	27,976	7.3	27,998	7.2	22

7 London Atmospheric Emissions Inventory 2008.

4.2.3 Conversion of NO_x to NO_2

The proportion of NO_2 in NO_x varies greatly with location and time according to a number of factors including the amount of ozone available and the distance from the emission source. Defra has produced a spreadsheet tool[8] for converting NO_x to NO_2 for any given year. This methodology has been used for the purpose of this assessment for all scenarios. The "All London Traffic" traffic mix option was used.

4.2.4 Significance Criteria

Air quality impacts of a proposed scheme may be considered to be significant if air quality objectives are predicted to be breached or if the development leads to significant impacts on air quality at sensitive receptors. According to EPUK[9] there are two main aspects which need to be taken into account when describing predicted impacts. These are:

- The magnitude of the change; and
- The absolute concentration in relation to air quality objectives.

The first aspect is addressed in Table 7, in which impacts are assigned a magnitude according to the absolute change in pollutant concentrations, derived based upon the predicted change in pollutant concentrations relative to the specific air quality objective or limit value in question.

Table 7 Assessment of Magnitude of Change

Magnitude of Change	Annual Mean NO_2 / PM_{10}
Large	Increase / decrease >4 µg/m^3
Medium	Increase /decrease 2-4 µg/m^3
Small	Increase / decrease 0.4-2 µg/m^3
Imperceptible	Increase / decrease <0.4 µg/m^3

The magnitude of change can then be compared to the absolute concentration in relation to the relevant air quality standard in order to describe predicted air quality impacts as detailed in Table 8.

Table 8 Air Quality Impact Descriptors

Absolute Concentration in Relation to Standard	Magnitude of Impact		
	Small	Medium	Large
Above Objective/Limit Value With Scheme (>40 µg/m³)	Minor Adverse / Beneficial	Moderate Adverse / Beneficial	Substantial Adverse / Beneficial
Just Below Objective/Limit Value With Scheme (36-40 µg/m³)	Minor Adverse / Beneficial	Moderate Adverse / Beneficial	Moderate Adverse / Beneficial
Below Objective/Limit Value With Scheme (30-36 µg/m³)	Negligible	Minor Adverse / Beneficial	Minor Adverse / Beneficial
Well Below Objective/Limit Value With	Negligible	Negligible	Minor Adverse /

[8] NO_x from NO_2 Calculator, v4.1, 19 June 2014. Available from http://laqm.defra.gov.uk/documents/NOx-NO2-Calculator-v4.1.xls
[9] EPUK Development Control: Planning For Air Quality (2010 Update), April 2010.

Scheme (<30 µg/m³)			Beneficial

EPUK also suggests that the following factors should be taken into account when determining the overall significance of predicted air quality impacts:

- The magnitudes of the changes and the descriptions of the impacts at the receptors;
- The number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance;
- Where new exposure is being introduced into an existing area of poor air quality, then the number of people exposed to levels above the objective or limit value will be relevant;
- Whether or not an exceedence of an objective or limit value is predicted to arise in the study area where none existed before or an exceedence area is substantially increased;
- Whether or not the study area exceeds an objective or limit value and this exceedence is removed or the exceedence area is reduced;
- Uncertainty, including the extent to which worst-case assumptions have been made; and
- The extent to which an objective or limit value is exceeded, e.g. an annual mean NO_2 of 41 µg/m³ should attract less significance than an annual mean of 51 µg/m³.

4.3 Construction Dust Assessment Methodology

The proposed development has the potential to impact on local air quality during the construction phase, with the main impacts related to the airborne dust generated by demolition, earthworks, construction and track-out activities. These impacts have been assessed qualitatively in accordance with the IAQM guidance[10] published in February 2014.

The main impacts that may arise due to construction activities are:

- Dust deposition resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM_{10} concentrations as a result of dust-generating activities on site; and
- An increase in the concentrations of airborne particles and nitrogen dioxide resulting from exhaust emissions of diesel-powered vehicles and equipment used on site.

Activities on construction sites with the potential to generate dust and emissions can be categorised into four types of activities, which are:

- Demolition – any activities associated with the removal of existing structures on site;
- Earthworks – includes the processes of soil-stripping, ground-levelling, excavation and landscaping;
- Construction – any activities relating to the provision of new structures on site; and
- Trackout – the transport of dust and dirt from the construction site onto the public road network where it may be deposited and resuspended by traffic using the network.

The potential for dust emissions has been assessed for each activity that is likely to take place. Appropriate mitigation measures have been recommended[11].

[10] IAQM (2014). Guidance on the assessment of dust from demolition and construction. Available at http://iaqm.co.uk/guidance/
[11] Mayor of London, 2014, The Control of Dust and Emissions During Construction and Demolition, Supplementary Planning Guidance.

4.4 Air Quality Neutral Assessment Methodology

The Mayor of London's Air Quality Strategy and SPG on Sustainable Design and Construction, and the London Plan place an emphasis on all new development in Greater London being at least 'air quality neutral', that is to ensure no further deterioration in air quality.

The Air Quality Neutral Planning Support guidance note has been used to assess the proposed development against benchmarked emissions for buildings and transport associated with the proposed development which are set out in the Appendix. The information collated for use in the Air Quality Neutral Assessment is summarised in Table 9.

Table 9: Information Used in Air Quality Neutral Assessment

Data / Information Used	Source of Data / Information
The current recommendation for the development is the use of a VRF air source heat pump for Heating and Cooling and hot water systems.	Designer Specifications
Trip generation of 22 vehicles per day	TTP consulting transport assessment, December 2014

5 Air Quality Neutral Assessment

5.1 Building Emissions

The current recommendation for the development is the use of a VRF air source heat pump for Heating and Cooling and hot water systems. As such no combustion plant are proposed so NO_x and PM_{10} emissions will be zero.

5.2 Transport Emissions

The Transport Emission Benchmarks for C3 use is 558 g/dwelling/annum for NO_x and 100 g/dwelling/annum for PM_{10}.

TRAVL (Trip Rate Assessment Valid for London) is a multi-modal trip generation database to estimate the effect of proposed changes in land use on transport patterns and, in particular, on the amount of road traffic in an area. For the proposed development, the total number of car trips generated is estimated to be 22 trips per day or 8,030 trips per annum. For Option 1, 33 flats, this corresponds to 243 trips/dwelling/annum, while for Option 2, 42 flats, this corresponds to 191 trips/dwelling/annum. For a Class C3 development located in Inner London, the average number of trips generated is 407 trips/dwelling/annum.

As the number of trips generated by the proposed development is lower than the trip rates obtained from TRAVL the proposed development can be assumed to be 'air quality neutral' with respect to transport emissions. The NO_x and PM_{10} emissions per dwelling per year have been calculated and are set out in Table 10 for information. No further mitigation will be necessary.

Table 10: Transport Benchmark Calculations

Number of dwellings	**33**	**42**
Average distance travelled by car per trip for Inner London (km)	3.7	3.7
Car trips per day	22	22
Car trips per year	8,030	8,030
Total distance driven (km/year)	29,711	29,711
Trip rate (km/dwelling/year)	900	707
NO_x emissions (g/vehicle-km)	0.370	0.370
PM_{10} emissions (g/vehicle-km)	0.0665	0.0665
NO_x emissions (g/dwelling/annum)	333.0	261.6
PM_{10} emissions (g/dwelling/annum)	59.0	46.3

5.3 Summary

The proposed development is air quality neutral for buildings and transport.

6 Operation Assessment

6.1 Model Verification

For any assessment it is necessary to consider and account for errors in the modelling process. Systematic errors in modelling results can arise from many factors, such as uncertainties in vehicle flows, speeds and the composition of the vehicle fleet. Such errors can be addressed and corrected for by making comparisons with monitoring data. The modelling results presented in this report were therefore verified by comparing model predictions against monitored pollutant concentrations in the study area and adjusting model predictions where necessary.

The accuracy of the future year modelling results is relative to the accuracy of the base year results, therefore greater confidence can be placed in the future year concentrations if good agreement is found for the base year.

6.1.1 NO_2

Annual average NO_2 concentrations predicted using the DMRB model were verified against monitored NO_2 data collected at the 47 Fitzjohn's Road (CA15) diffusion tube.

Initially the model was found to under-predict NO_2 concentrations at the diffusion tube monitoring site. The model inputs were reviewed and with no reasonable refinements identified (such as reducing vehicle speeds or using different pollutant background concentrations, etc) an adjustment factor (F) of 3.979 was calculated to adjust modelled road contribution NO_x concentrations, in accordance with LAQM.TG(09) guidance.

A summary of the comparison between the monitored and modelled NO_2 concentration at monitoring site is shown in Table 11. This shows that the model prediction, once adjusted, are similar to monitored concentrations.

Table 11: Summary of Model Verification

Site Name	2013 Annual Mean NO_2 Concentration (µg/m^3)			
	Monitored	Modelled (Unadjusted)	Modelled (Adjusted)	Difference (Mod-Mon)
47 Fitzjohn's Road (CA15)	61.2	40.7	61.2	0.0

Note: Adjustment Factor (F) = 3.979 applied to unadjusted modelled NO_x concentrations.

6.1.2 PM_{10}

In the absence of local PM_{10} monitoring data the adjustment factor determined for NO_x above was also applied to modelled PM_{10} concentrations.

6.2 Modelled Effects at Sensitive Human Receptors

Predicted concentrations of NO_2 and PM_{10} at the modelled sensitive receptor locations are given in Table 12 to Table 14. As required by the Highways Agency, two sets of results are reported for the pollutant NO_2 to show the adjustments made to project future concentrations. Modelled results and changes in concentrations between the Do-Something and Do-Minimum scenarios are reported to 1 decimal place, as stated in the Interim Advice Note 174/13[12].

[12] Interim Advice Note 174/13, Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA207/07), June 13

Table 12: Predicted Annual Mean NO_2 Concentrations at Sensitive Receptors

Receptor	Predicted Annual Mean NO_2 Concentration (µg/m^3) Defra's Technical Guidance				RATIO A LAQM. TG(09) Projected Base Year /Modelled 2012 Base Year	RATIO B Alternative Projection Between 2012 and 2015	GAP FACTOR Ratio B /Ratio A	2015 DM x Gap Factor	2015 DS x Gap Factor
	2012 Base Year	Projected Base Year 2015	2015 DM	2015 DS					
1	64.9	61.8	62.0	62.0	0.95	0.98	1.03	63.7	63.7
2	62.3	59.3	59.5	59.5	0.95	0.98	1.03	61.1	61.1
3	61.9	59.0	59.1	59.1	0.95	0.98	1.03	60.7	60.7
4	63.7	60.7	60.8	60.8	0.95	0.98	1.03	62.5	62.5
5	64.3	61.3	61.4	61.4	0.95	0.98	1.03	63.1	63.1
6	45.3	43.6	43.6	43.6	0.96	0.98	1.02	44.4	44.4

Table 13: Predicted Change at Sensitive Receptors in Air Quality in 2015

Receptor	Defra's Technical Guidance Predicted Annual Mean NO_2 Concentration (µg/m^3)			Highways Agency Long Term NO_2 Trend Projections (µg/m^3)		
	DS-DM	Magnitude of Change	Impact	DS-DM	Magnitude of Change	Impact
1	0.0	Imperceptible	Negligible	0.0	Imperceptible	Negligible
2	0.0	Imperceptible	Negligible	0.0	Imperceptible	Negligible
3	0.0	Imperceptible	Negligible	0.0	Imperceptible	Negligible
4	0.0	Imperceptible	Negligible	0.0	Imperceptible	Negligible
5	0.0	Imperceptible	Negligible	0.0	Imperceptible	Negligible
6	0.0	Imperceptible	Negligible	0.0	Imperceptible	Negligible

The results in Table 12 and Table 13 indicate that the UK annual mean NO_2 objective of 40 µg/m^3 is likely to be exceeded at all receptor locations in 2012 and 2015 with or without the proposed development. The maximum NO_2 concentration is predicted to occur at Receptor 1 in the base year and both the 2015 Do-Minimum and Do-Something scenarios. In the base year annual NO_2 concentrations at Receptor 1 is predicted to be 64.9 µg/m^3 while in the opening year NO_2 concentrations are predicted to be 62.0 µg/m^3 (both the Do-Minimum and Do-Something scenarios) based on the Defra Technical Guidance methodology and 63.7 µg/m^3 in the Do-Minimum scenario and Do-Something scenario based on the Highway Agency's methodology.

The proposed development is predicted to lead to an imperceptible change in air quality at any of the existing receptor locations and as such is considered to be of negligible significance in accordance with the criteria applied to this assessment.

Defra's LAQM.TG(09) guidance states that "exceedences of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60 µg/m^3 or above". Predicted annual NO_2 concentrations at five of the receptors which are adjacent to roads are either just above or just below 60 µg/m^3 and, as such, the hourly NO_2 objective may potentially be exceeded at receptor locations in both the Do-Minimum and Do-Something scenarios.

The results of the air quality assessment indicate that the annual mean air quality objective / EU limit value for NO_2 will be exceeded at the ground-level facades of the proposed building. However, it should be noted that the whole of Camden has been declared an AQMA due to wide ranging exceedences of the annual NO_2 objective. The results presented in this assessment represent a conservative approach, with limited reductions in vehicle NO_x emissions assumed between 2012 and 2015 and no improvement in background air quality. Air quality in the future is predicted to improve with the introduction of Euro VI emission standard for new vehicles which has been shown so far to lead to reductions in NO_x under real world driving conditions.

The predicted PM_{10} concentrations are shown in Table 14.

Table 14: Predicted Annual Mean PM_{10} Concentrations at Sensitive Receptors

Receptor	Predicted Annual Mean PM_{10} Concentration ($\mu g/m^3$) – Number Daily Exceedences in Parenthesis			Impact		
	2012	2015 DM	2015 DS	DS-DM	Magnitude of Change	Impact
1	28.2	26.7	26.7	0.0	Imperceptible	Negligible
2	27.2	25.8	25.8	0.0	Imperceptible	Negligible
3	27.0	25.7	25.7	0.0	Imperceptible	Negligible
4	27.8	26.3	26.3	0.0	Imperceptible	Negligible
5	28.0	26.5	26.5	0.0	Imperceptible	Negligible
6	21.6	21.1	21.1	0.0	Imperceptible	Negligible

The results in Table 14 indicate that the UK annual mean PM_{10} objective of 40 $\mu g/m^3$ is likely to be achieved at all receptors in the base year 2012 and future year 2015 with or without the proposed development. The maximum PM_{10} concentration is predicted to occur at Receptor 1 in the base year and both the 2017 Do-Minimum and Do-Something scenarios with a predicted annual average PM_{10} concentration of 28.2 $\mu g/m^3$ in the base year, 26.7 $\mu g/m^3$ in the Do-Minimum and Do-Something scenarios.

There is no appreciable change in predicted annual PM_{10} concentrations at any of the receptors modelled and as such the effect of the development is considered to imperceptible in accordance with the significance criteria applied to this assessment. Exceedences of the daily mean PM_{10} concentrations are not expected as the annual mean concentrations are all significantly less than 32 $\mu g/m^3$.

6.2.1 Mitigation Measures and Residual Effects

The design and operation of any ventilation system is critical to reduce the ingress of pollutants from the outside air. In particular, the positioning of air intakes for ventilation systems has been given careful consideration.

The development includes mechanical and heat recovery ventilation which has been designed in accordance with the Building Regulations Approved Document F which require that the system provide 0.4 air changes every hour continuously. The car park will not be occupied so will not be ventilated, except for natural smoke ventilation, at $1/40^{th}$ of the floor area in accordance with Approved Document B. The mechanical ventilation system avoids drawing air from the Fitzjohn facade of the building so filtered air will be drawn from the rear or side of the building away from the elevated pollutant concentrations in Fitzjohn's Avenue. The ventilation system has been designed to provide cooling in the summer months; however, windows can be opened at the resident's discretion. Appropriate particulate filters will be fitted to all air intakes to reduce PM_{10} concentrations in the air drawn into the building via the ventilation system. The filtration system will consist of a suitably rated particulate filter such as a Grade F7

particulate filter (which is 99.9% efficient against particles of 2.5 µm in diameter). As particles are the pollutant of most concern in relation to human health impacts, reducing these concentrations should reduce the health impacts of the poor air quality in London for the residents of the development.

The building has been carefully designed to minimise the residents' exposure to pollution. No apartments are single sided onto the Avenue so all apartments have at least one side or rear elevation that provides access to cleaner air. Trees on the street elevations are either being retained or replaced with semi-mature specimens. Advanced (around 1.2 m high) hedge planting is also being considered. Rear peripheral and boundary walls will be planted with creeping plants and the rear landscaped gardens will include plentiful new planting.

7 Construction Phase

7.1 Construction Dust

7.1.1 Assessment of Risk of Dust Effects

Dust sensitive receptors have been identified in the vicinity of the application site in accordance with the methodology outlined in the IAQM guidance. A summary of the approximate numbers of receptors in distance bands from the development site boundary and sensitivity of those receptors is shown in Table 15. The area within 350 m of the site that could potentially be affected by dust is shown in Figure 1.

Table 15 Numbers and Dust-Sensitivities of Dust-Sensitive Receptors

Activity	Number of Receptors and Sensitivity			
	<20 m	<50 m	<100 m	<350m
Demolition	10 - 100	10 - 100	10 - 100	>100
Earthworks	10 -100	10 -100	10 -100	>100
Construction	10 - 100	10 - 100	10 - 100	>100
Trackout	10 -100	10 -100	10 -100	>100

There are likely to be between 10 and 100 receptors with high sensitivity to dust soiling effects and to the health effects of PM_{10} located within 20 metres of the proposed demolition, earthworks, construction areas and trackout routes, and >100 high sensitivity receptors located within 350 metres of these areas. This is due to the close proximity (<20m) of a local residential receptors which are considered to be high sensitivity receptors to the effects of dust soiling and health effects.

Background PM_{10} concentrations in the study area have been considered to determine the sensitivity of the area to human health impacts. The PM_{10} concentrations recorded by the London Bloomsbury automatic monitor were 19 µg/m³ and 18 µg/m³ in 2012 and 2013 respectively. These concentrations are well within the annual mean PM_{10} objective. Likewise monitored kerbside PM_{10} concentrations at the Swiss Cottage automatic monitoring location, approximately 1.1 km to the south west of the application site on the A41, recorded PM_{10} concentrations of less than 24 µg/m³ in 2012 and 2013. No sensitive ecological receptors have been identified within 50 metres of the application site, as such impacts on ecological receptors have not been considered further in this assessment.

A summary of the sensitivity of the area for each construction activity is presented in Table 16.

Table 16 Summary of Area Sensitivity With Respect to Dust Effects

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

7.1.2 Demolition

Demolition activities on the site will involve the demolition of the existing building. The total building volume involved in demolition is likely to be <20,000m^3. This activity will involve potentially dusty construction material; therefore the potential dust emission magnitude for demolition activities is expected to be small. Given that the sensitivity of the area to dust soiling is high and to human health is low, the risk of dust impact for demolition activities is classified as medium risk for dust soiling and negligible risk for human health.

7.1.3 Earthworks

The application site area is <2,500m^2. The potential dust emissions magnitude associated with earthworks is therefore considered to be of small magnitude. Given that the sensitivity of the area to dust soiling is high and to human health is low, the risk of dust impact for earthworks activities is classified as low risk for dust soiling and negligible risk for human health.

7.1.4 Construction

Construction activities will likely involve a total building volume of <25,000. The potential dust emission class for construction activities is therefore likely to be small on the basis of the buildings volume. Given that the sensitivity of the area to dust soiling is high and to human health is low, the risk of impact from construction activities are defined as medium risk for dust soiling and low risk for PM_{10} effects.

7.1.5 Trackout

The number of construction-related heavy duty vehicle (HDV) movements generated by the proposed development is not currently known. The potential dust emissions class for trackout is assumed to be medium due to dust-sensitive receptors within 20 m of potential routes used by construction vehicles. The site is defined as medium risk for dust soiling and low risk for PM_{10} effects with respect to trackout activities.

7.1.6 Summary of Risk of Dust Effects

The results of the assessment of risk of dust effects associated with construction phase activities are summarised in Table 3. It should be noted that the risk classifications presented in Table 4 have assumed no mitigation is in place. Furthermore, as proximity to sensitive receptors has been determined by distance from the site boundary, the risk categorisations can be considered conservative.

Table 17: Summary of Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Small
Construction	Small
Trackout	Medium

Table 18: Summary Dust Risk Table to Define Site-Specific Mitigation

Source	Dust Soiling	Human Health	Ecology
Demolition	Medium	Negligible	N/A
Earthworks	Low	Negligible	N/A
Construction	Medium	Negligible	N/A
Trackout	Medium	Low	N/A

7.1.7 Construction Vehicle and Plant Exhaust Emissions

Exhaust emissions from construction vehicles and machinery will also impact on air quality during the construction phase. The number of construction vehicles using the local road network is likely to be small in comparison to normal traffic flows. The impact is thus considered to be of negligible significance.

Construction plant used at the proposed development will have to comply with GLA's 2015 emission standards for NRMM. This requires emissions from plant (between 37 kW and 560 kW) to meet Stage IIIA of the EU Directive 97/68/EC. This and good maintenance practice should ensure the residual impact of construction vehicle and plant exhaust emissions is negligible

7.1.8 Mitigation Measures and Residual Effects

Dust will be mitigated in accordance with the Mayor of London's SPG on the control of dust and emissions from construction and demolition works. The site is considered to represent a medium risk overall and, as such, the mitigation measures set out in Appendix 8 of the SPG for a medium risk site should be implemented. The implementation of appropriate mitigation measures should effectively reduce the effects to negligible significance for all construction activities.

There are a number of mitigation measures that can be employed to lessen the nuisance and human-health impacts of the dust and PM_{10} generated during construction activities. Construction dust usually responds well to these measures as long as a co-ordinated Construction Environmental Management Plan (CEMP) is implemented.

All potential dust-generating activities and locations should be identified prior to commencement of work.

Dust should be controlled at source by the use of appropriate plant handling techniques, good maintenance and housekeeping. A list of appropriate mitigation measures is presented in Table 19 of the Appendix.

Should effective mitigation measures be enforced and implemented within a Dust Management Plan and/or CEMP then the residual impact of the construction phase will be 'not significant' for all the activities, with respect to dust soiling and PM_{10} effects.

8 Camden Air Quality Checklist

8.1 Travel and Transport

Question 1) If there will be parking in the development, will electric vehicle charging points be included?

Answer: The development will include automatic parking for approximately 30 vehicles. However the automatic parking system is not compatible with electric charging points, as such no charging points will be provided.

Question 2) Will secure cycle storage be provided for users of the building?

Answer: Yes the development will include secure storage for bicycles. The amount of secure cycle storage will be dependent to the final number of properties. Storage will be provided inline with guidance set out in the Code for Sustainable Homes i.e. studios and 1 bedroom dwellings have storage for 1 cycle per dwelling and that 2 and 3 bedroom dwellings have storage for 2 cycles per dwelling.

8.2 Energy

Question 3) If a CHP is to be included, did you ensure that this technology is suitable for the energy requirements of the building? Please see Camden's Boiler Guidance Manual B for more information.

Answer: The development does not include a CHP or communal boiler.

Question 4) If CHP is to be included, was this included within the air quality modelling in the AQA?

Answer: The development does not include a CHP or communal boiler.

Question 5) If CHP will be included and the final technology agreed, have you ensured that it is the best in class in terms of NO_x emissions?

Answer: The development does not include a CHP or communal boiler.

8.3 Exposure

Question 6) If located in an area of poor air quality and/or next to a busy road or diesel railway line, does the AQA include details of the way in which the building has been designed to reduce the exposure of occupants (e.g. through orientation, greening, placement of residential properties, or, only for developments in areas of very poor air quality, mechanical ventilation?)

Answer: The development includes mechanical and heat recovery ventilation which has been designed in accordance with the Building Regulations Approved Document F which require that the system provide 0.4 air changes every hour continuously. The mechanical ventilation system avoids drawing air from the Fitzjohn facade of the building so filtered air will be drawn from the rear or side of the building away from the elevated pollutant concentrations in Fitzjohn's Avenue. The ventilation system has been designed to provide cooling in the summer months; however, windows can be opened at the resident's discretion. Appropriate particulate filters will be fitted to all air intakes to reduce PM_{10} concentrations in the air drawn into the building via the ventilation system. The filtration system will consist of a suitably rated particulate filter such as a Grade F7 particulate filter (which is 99.9% efficient against particles of 2.5 µm in diameter). As particles are the pollutant of most concern in relation to human health impacts, reducing these concentrations should reduce the health impacts of the poor air quality in London for the residents of the development.

The building has been carefully designed to minimise the residents' exposure to pollution. No apartments are single sided onto the street so all apartments have at least one side or rear elevation that provides access to cleaner air. Trees on the street elevations are either being retained or replaced with semi-mature specimens. Advanced (around 1.2 m high) hedge planting is also being considered. Rear peripheral and boundary walls will be planted with creeping plants and the rear landscaped gardens will include plentiful new planting.

8.4 Construction Dust

Question 7) Does the project have a Construction Management Plan written in accordance with the recommendations in the Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, including an assessment of the risk? And, if the risk is High, a real time monitoring proposal?

Answer: The risk of dust impacts from the construction phase of the proposed development have been assessed in accordance with the recommendations in the Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance and mitigation measures proposed which should be incorporated into the Construction Management Plan. The risk has been assessed to be Medium as such real time monitoring is not proposed.

9 Summary

An air quality assessment has been undertaken in order to assess the potential air quality impacts associated with the proposed redevelopment of Arthur West House in Hampstead, London. The application site is located on the corner of Fitzjohn's Avenue and Prince Arthur Road in the London Borough of Camden (LBC). Currently the site consists of a 6 storey student hostel while the development proposals include the demolition of the existing building and construction of a new seven storey building providing between 33 and 42 residential apartments purpose built for people of retirement age. The development would include basement parking for approximately 30 cars.

LBC have declared the entire Borough an Air Quality Management Area (AQMA) due to elevated concentrations of PM_{10} and NO_2. The potential impacts on local air quality of the additional road traffic movements associated with the proposed development and the suitability of the application site for residential use have been assessed using the DMRB screening tool. A qualitative assessment of the impacts arising due to demolition and construction activities has also been undertaken in accordance with the latest IAQM guidance. The key findings are summarised below.

The results of the assessment indicate that, in the absence of mitigation, construction phase impacts associated with the proposed development can be described as medium risk with regard to dust soiling and low risk with regards to human health. There are a number of mitigation measures to be followed to lessen the nuisance and human-health impacts of the dust and PM_{10} generated during construction activities. Construction dust usually responds well to these measures as long as a co-ordinated Construction Environmental Management Plan (CEMP) is implemented. The mitigated impacts can be described as being of a negligible nature and are not considered to have any significant impact on human sensitive receptors.

Pollutant concentrations have been predicted at four existing sensitive receptors close to the application site and at the façade of the proposed building fronting onto Fitzjohn's Avenue and at the rear of the property.

1. The annual mean NO_2 objective is predicted to be exceeded at all modelled receptor locations in both the base year 2012 and assessment year 2015, with and without the proposed development.
2. The predicted impacts of the proposed development on annual mean NO_2 concentrations at all existing receptor locations are less than 0.1 $\mu g/m^3$. The proposed development is predicted to have an insignificant effect on annual mean NO_2 concentrations and, as such, in according to IAQM assessment criteria this impact is of negligible significance.
3. Predicted annual mean NO_2 concentrations at five receptors are close to or just above 60 $\mu g/m^3$ and, as such, there is the potential that the 1 hour AQS objective of 200 $\mu g/m^3$ could be exceeded.
4. The annual mean PM_{10} objective is not predicted to be exceeded at any receptor locations in any modelled scenario.
5. The predicted impacts of the proposed development on annual mean PM_{10} concentrations at all existing receptor locations are less than 0.1 $\mu g/m^3$. The proposed development is therefore predicted to have an imperceptible effect on annual mean PM_{10} concentrations and can be described as a negligible impact.
6. The daily mean PM_{10} objective is predicted to be achieved at all modelled receptor locations in all scenarios.
7. The proposed development is predicted to have a negligible effect on the number of days of PM_{10} greater than 50 $\mu g/m^3$ as a change of less than 1 day is predicted at all modelled receptors.

The results of this assessment therefore indicate that the impact of the proposed development on air quality is expected to be of negligible significance during construction and operation and would not have a significant adverse effect on local air quality

The development is 'air quality neutral' with respect to its comparable building emission benchmark and transport emissions benchmark and, as such, no further mitigation will be required.

The development includes mechanical and heat recovery ventilation which has been designed in accordance with the Building Regulations Approved Document F which require that the system provide 0.4 air changes every hour continuously. The mechanical ventilation system avoids drawing air from the Fitzjohn facade of the building so filtered air will be drawn from the rear or side of the building away from the elevated pollutant concentrations in Fitzjohn's Avenue. The ventilation system has been designed to provide cooling in the summer months; however, windows can be opened at the resident's discretion. Appropriate particulate filters will be fitted to all air intakes to reduce PM_{10} concentrations in the air drawn into the building via the ventilation system. The filtration system will consist of a suitably rated particulate filter such as a Grade F7 particulate filter (which is 99.9% efficient against particles of 2.5 µm in diameter). As particles are the pollutant of most concern in relation to human health impacts, reducing these concentrations should reduce the health impacts of the poor air quality in London for the residents of the development.

The building has been carefully designed to minimise the residents' exposure to pollution. No apartments are single sided onto the street so all apartments have at least one side or rear elevation that provides access to cleaner air. Trees on the street elevations are either being retained or replaced with semi-mature specimens. Advanced (around 1.2 m high) hedge planting is also being considered. Rear peripheral and boundary walls will be planted with creeping plants and the rear landscaped gardens will include plentiful new planting.

Figures

Figure 1: Air Quality Monitoring Locations

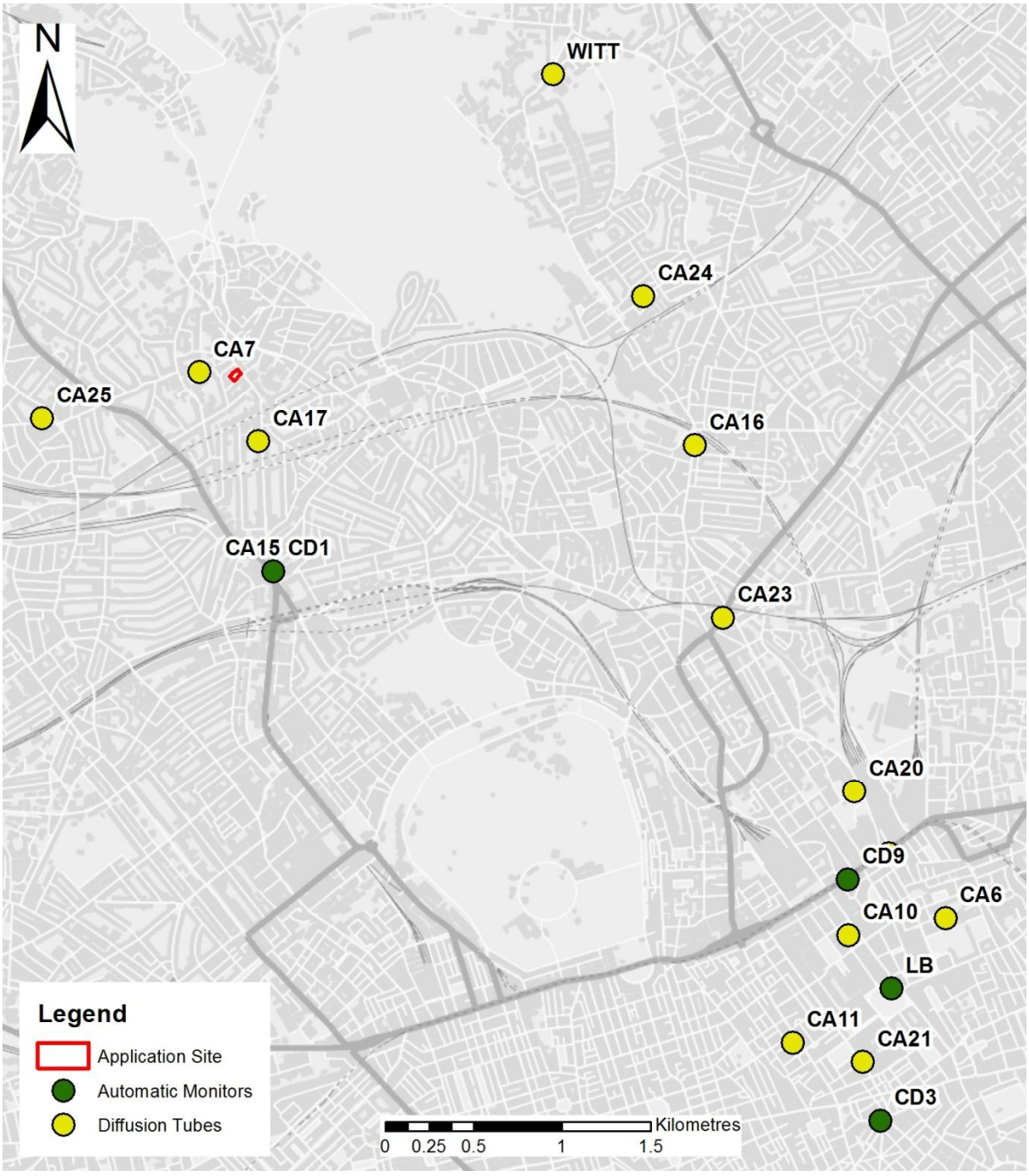
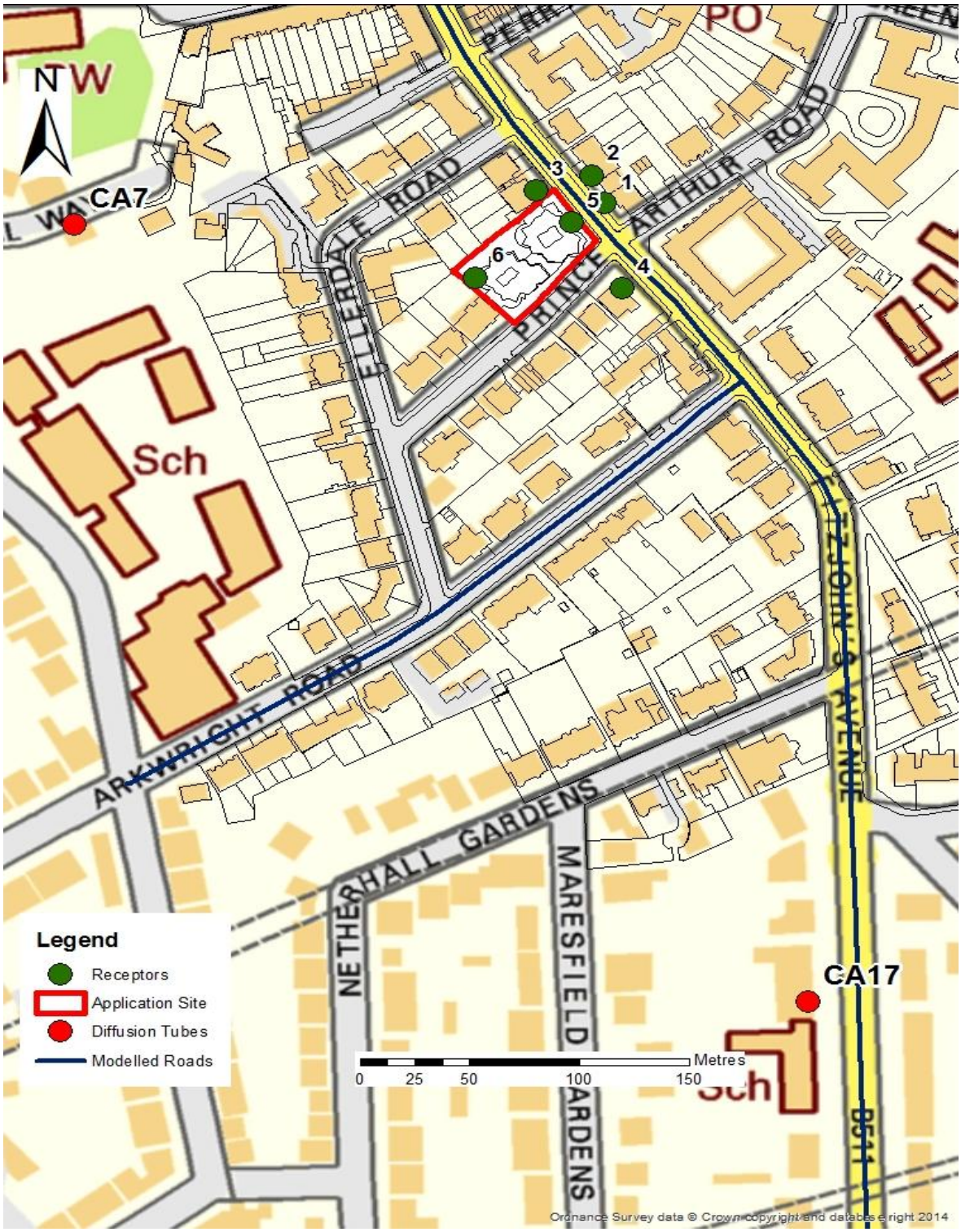


Figure 2: Receptor Locations

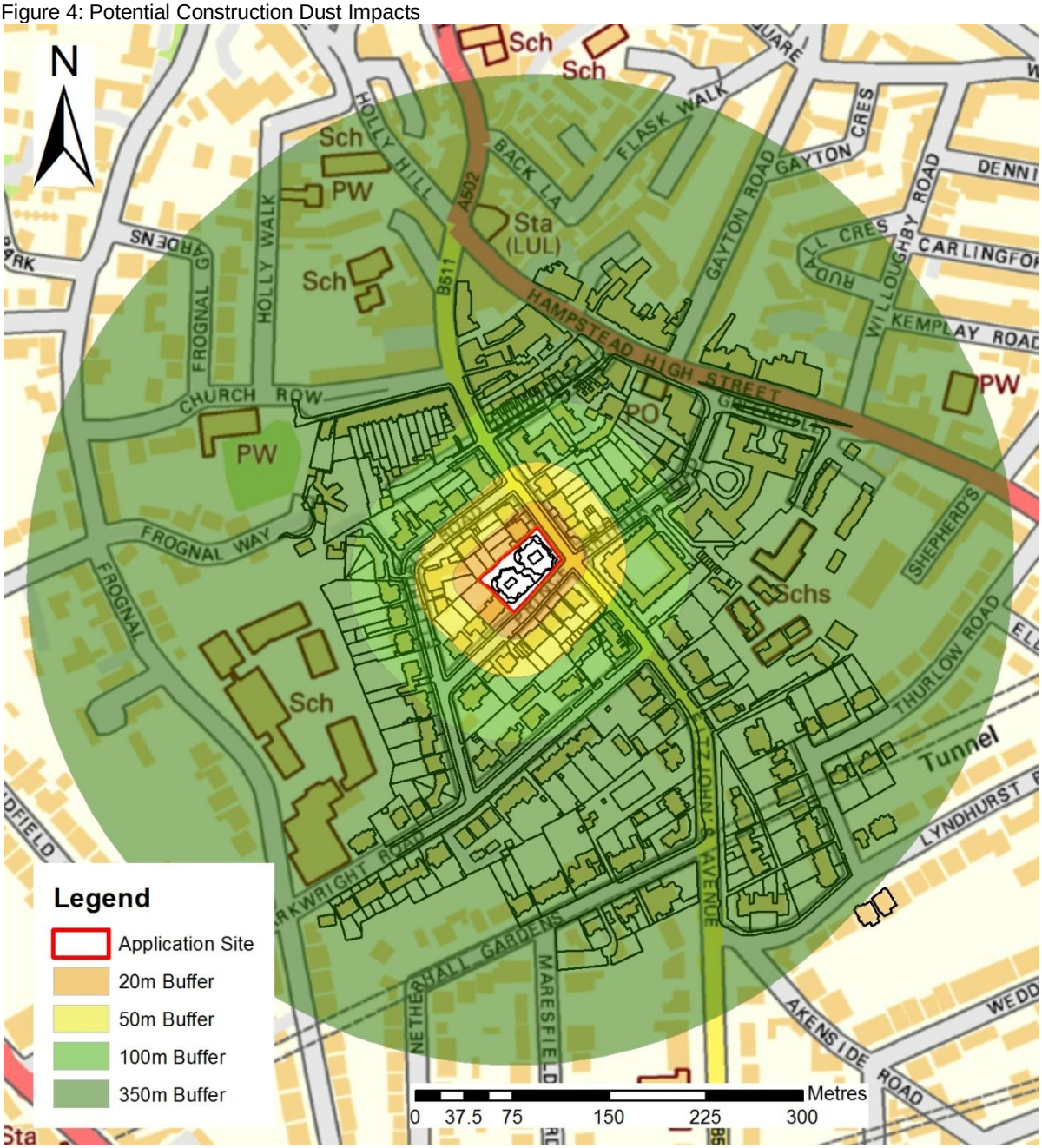
Capabilities on project:
Environment



Capabilities on project:
Environment

Figure 3: Road Links

Figure 4: Potential Construction Dust Impacts



Appendix: Dust Mitigation Measures

Table 19: Mitigation Measures for Construction Phase Activities

Activity	Mitigation Measures for Medium Risk Site	Desirable or Highly Recommended
Site Management	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	Highly Recommended
	Develop a Dust Management Plan.	Highly Recommended
	Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary.	Highly Recommended
	Display the head or regional office contact information.	Highly Recommended
	Record and respond to all dust and air quality pollutant emissions complaints.	Highly Recommended
	Make a complaints log available to the local authority when asked.	Highly Recommended
	Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked.	Highly Recommended
	Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions.	Highly Recommended
	Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.	Highly Recommended
Preparing and maintaining the site	Plan site layout: machinery and dust causing activities should be located away from receptors.	Highly Recommended
	Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site.	Highly Recommended

Activity	Mitigation Measures for Medium Risk Site	Desirable or Highly Recommended
	Fully enclosure site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	Highly Recommended
	Install green walls, screens or other green infrastructure to minimise the impact of dust and pollution.	Desirable
	Avoid site runoff of water or mud.	Highly Recommended
	Keep site fencing, barriers and scaffolding clean using wet methods.	Highly Recommended
	Remove materials from site as soon as possible.	Highly Recommended
	Cover, seed or fence stockpiles to prevent wind whipping.	Highly Recommended
	Carry out regular dust soiling checks of buildings within 100m of site boundary and cleaning to be provided if necessary.	Desirable
	Agree monitoring locations with the Local Authority.	Highly Recommended
	Where possible, commence baseline monitoring at least three months before phase begins.	Highly Recommended
	Put in place real-time dust and air quality pollutant monitors across the site and ensure they are checked regularly.	Highly Recommended
Operating vehicle/machinery and sustainable travel	Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone.	Highly Recommended
	Ensure all non-road mobile machinery (NRMM) comply with the standards set within this guidance.	Highly Recommended
	Ensure all vehicles switch off engines when stationary – no idling vehicles.	Highly Recommended
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where possible.	Highly Recommended

Activity	Mitigation Measures for Medium Risk Site	Desirable or Highly Recommended
	Impose a signpost a maximum-speed-limit of 10 mph on surfaced haul routes and work area (if long haul routes are required these speed may be increased with suitable additional control measure provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Desirable
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	Highly Recommended
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)	Desirable
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Highly Recommended
	Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible).	Highly Recommended
	Use enclosed chutes, conveyors and covered skips.	Highly Recommended
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly Recommended
Waste Management	Reuse and recycle waste to reduce dust from waste materials.	Highly Recommended
	Avoid bonfires and burning of waste materials.	Highly Recommended
Demolition	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	Desirable
	Ensure water suppression is used during demolition operations.	Highly Recommended
	Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly Recommended

Activity	Mitigation Measures for Medium Risk Site	Desirable or Highly Recommended
	Bag and remove any biological debris or damp down such material before demolition.	Highly Recommended
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces.	Desirable
	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil.	Desirable
	Only remove secure covers in small areas during work and not all at once.	Desirable
Construction	Avoid scabbling (roughening of concrete surfaces) if possible	Highly Recommended
	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	Highly Recommended
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	Highly Recommended
	For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	Desirable
Trackout	Regularly use a water-assisted dust sweeper on the access and local roads, as necessary, to remove any material tracked out of the site.	Highly Recommended
	Avoid dry sweeping of large areas.	Highly Recommended
	Ensure vehicles entering and leaving sites are securely covered to prevent escape of materials during transport.	Highly Recommended
	Record all inspections of haul routes and any subsequent action in a site log book.	Highly Recommended

Activity	Mitigation Measures for Medium Risk Site	Desirable or Highly Recommended
	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems and regularly cleaned.	Highly Recommended
	Inspect haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	Highly Recommended
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Highly Recommended
	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	Highly Recommended
	Access gates to be located at least 10m from receptors where possible.	Highly Recommended
	Apply dust suppressants to locations where a large volume of vehicles enter and exit the construction site	Desirable