Andmore Planning

246-248 Kilburn High Road, London Borough of Camden

Air Quality Assessment

May 2017

Amec Foster Wheeler Environment
& Infrastructure UK Limited

Report for

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1	Draft Report	21/04/2017
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Executive summary

This air quality assessment has been prepared by Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler), on behalf of Andmore Planning, as part of a planning application for the proposed residential development at 246-248 Kilburn high Road, London Borough of Camden (LBC). The site is currently vacant to a large extent and includes one existing house. The Proposed Development will include a two - five storey development comprising 27 residential units, vehicular access via a building undercroft, roof terraces and landscaping.

The Proposed Development is located in an Air Quality Management Area (AQMA) designated as a result of high nitrogen dioxide (NO_2) and particulate matter (PM_{10}) concentrations, which covers the whole of the LBC. Therefore, this assessment is primarily focused on concentrations of the most important traffic derived pollutants, NO_2 and fine particulate matter (both PM_{10} and $PM_{2.5}$).

An assessment of construction-related effects has been undertaken following the IAQM guidance. The Development Site is defined as ‘medium risk’ of dust soiling for demolition and construction activities, and ‘low risk’ for earthworks and trackout. Human health and ecological receptors are at a low risk from construction activities and negligible risk from demolition, earthworks and trackout activities. Impacts during the construction of the Development, such as dust generation and plant vehicle emissions, are predicted to be of short duration. Mitigation measures have been recommended to reduce impacts so that they are not significant.

An assessment of the potential air quality exposure for the redevelopment of an urban site has been undertaken. ADMS-Roads (version 4.0) modelling has been used to model dispersion from traffic to determine likely NO_2, PM_{10} and $PM_{2.5}$ concentrations. The Proposed Development is car-free, and will not therefore have a negative impact on air quality at existing receptors in the area. The dispersion modelling was used to consider pollutant concentrations at proposed residential receptors within the Proposed Development. Predicted concentrations at receptors were then compared to the Air Quality Objectives.

The dispersion modelling carried out suggests that exceedances of the NO_2 annual mean AQO and potentially the hourly mean AQO may occur at proposed receptor locations in Block A and Block B at the Development. As a result, the development should be designed with a ventilation system to draw air from areas with lower NO_2 concentrations than the roadside. It is also recommended that the use of a Mechanical Ventilation with Heat Recovery (MVHR) system equipped with NO_2/NO_X filters is considered to ensure that proposed receptor locations have a source of air with NO_2 concentrations below the annual mean AQO.

As the Proposed Development is car-free, there is no energy centre planned on site, and boilers within properties will have emissions of NOx below 40mg/kwh, the Proposed Development is considered to be air quality neutral for both building emissions and transport emissions.

Contents

1. Introduction

1.1 Purpose of this report

This air quality assessment has been prepared by Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler), on behalf of Andmore Planning, as part of a planning application for the proposed residential development at 246-248 Kilburn high Road, London Borough of Camden (LBC). The site is currently vacant to a large extent and includes one existing house. The Proposed Development will include a two to five storey development comprising 27 residential units, vehicular access via a building undercroft, roof terraces and landscaping.

The Proposed Development is located in an Air Quality Management Area (AQMA) which covers the whole of the LBC, designated as a result of high concentrations of the most important traffic derived pollutants, nitrogen dioxide (NO_2) and particulate matter (PM_{10}). Therefore, this assessment is primarily focused on, NO_2 and fine particulate matter (both PM_{10} and $PM_{2.5}$).

This report has been produced for the purpose of quantifying the air quality likely to be experienced by future residents of the development. This report will allow the suitability of the site for the proposed residential use to be determined. The potential effects of dust generation and dispersion arising from activities such as excavation, movement of vehicles (on and off-site) and general construction activities have also been considered.

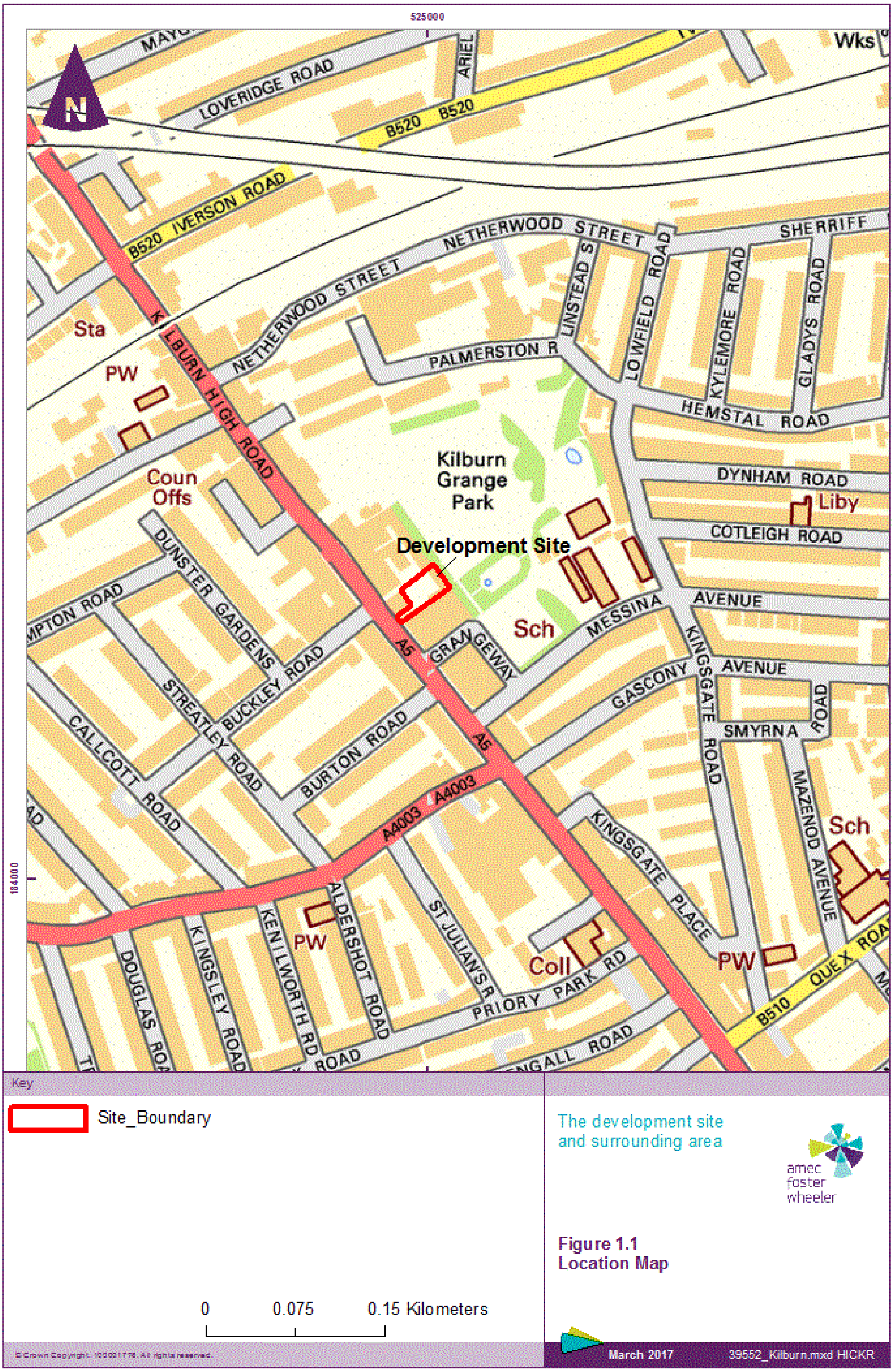
The report consists of a synopsis of the relevant policy and legislation in Section 2, followed by a definition of the scope of the assessment. The assessment methodology is provided in Section 4, whilst a description of the current baseline conditions for NO_2, PM_{10} and $PM_{2.5}$ in Section 5. A quantitative assessment of pollutant concentrations at the future proposed and existing residential receptor locations has been carried out using the ADMS-Roads dispersion model. The modelling work, including input data and predictions of air quality, are reported in Section 6. Finally, the report considers whether proposed future residents at the Proposed Development would be exposed to adverse air quality and draws conclusions as to what degree any exposure is significant.

1.2 Description of the development

The site has received planning permission for the erection of two buildings to provide 14 self-contained flats (Class C3) (4x1 bed, 7x2 bed and 3x3 bed) including vehicular access via an undercroft in the building, roof terraces and landscaping. One proposed building is part four-storey and part five-storey and the other is part two-storey, part three-storey and part five-storey, The planning application to which this assessment relates proposes to take in a wider site, demolishing an existing house, to provide 27 units in two blocks. There will be no car parking spaces provided so the development is considered ‘car-free’.

The Proposed Development is centred at grid reference 524991, 184239. The Proposed Development site is currently occupied by one house and vacant land. The front of the development is adjacent to Kilburn High Road and the back leads on to Kilburn Grange Park. Figure 1.1 shows the site location with respect to Kilburn High Road.

Figure 1.1 The development site and surrounding area



2. Policy and Legislative Context

2.1 Relevant policy

Table 2.1 lists policy guidance and policies relevant to the assessment of the effects on air quality, and the issues included in these policies/guidance that needed to be considered when determining the scope of this assessment.

Table 2.1 Policy issues relating to air quality considered in preparing the scoping report

Policy reference	Policy issues
National Policy	
National Planning Policy Framework (NPPF) March 2012[1]	NPPF states *"Planning policies should sustain compliance with and contribute towards EU limits 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."*
National Planning Policy Guidance (NPPG) March 2014[2]	It is stated in the NPPG that air quality is relevant to planning applications when the development could "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."
Regional Policy	

Clearing the Air: The Mayor's Air Quality Strategy 2010[3]	**The Mayor's Air Quality Strategy** sets out a framework for improving London's air quality. Measures elaborated in the two Supplementary Planning Guidance documents (SPGs) arising include:
	- Developers are to design their schemes so that they are at least 'air quality neutral', meeting the minimum emission benchmarks for buildings' operation and transport. If the benchmarks are not met after mitigation measures have been implemented, the developer will be required to off-set emissions off-site.
	- Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out in the *Sustainable Design and Construction SPG* and use ultra-low NOx boilers.
	- During construction, developers and contractors should follow the guidance set out in *The Control of Dust and Emissions during Construction and Demolition SPG*:
	  - carry out an Air Quality and Dust Risk Assessment, submit an Air Quality and Dust Management Plan for the construction, implement mitigation measures and carry out site monitoring, and
	  - use non-road mobile machinery (NRMM) that complies with the new Ultra Low Emissions Zone (ULEZ) according to the period of construction and the location.

The London Plan: Spatial Development Strategy for London Consolidated with Alterations Since 2011 (March 2015) – Policy 7.14	Strategic - The Mayor will work with strategic partners to ensure pollutant emission reductions are achieved and public exposure to poor air quality is minimised, in line with his Air Quality and Transport strategies. Planning - Development proposals should: minimise increasing exposure to poor air quality; promote sustainable design and construction; be at least 'air quality neutral' and not lead to further deterioration of air quality in areas of existing poor air quality such as AQMAs; 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; and permission should only be granted if no adverse air quality impacts from any proposed biomass boilers are identified.

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

[2] Department for Communities and Local Government (2014) National Planning Practice Guidance – Air Quality.

[3] Mayor of London (2010). Clearing the Air – The Mayor's Air Quality Strategy

Policy reference	Policy issues
Improving Air Quality[4]	
Sustainable Design and Construction: Supplementary Planning Guidance	The Supplementary Planning Guidance (SPG)[5] provides guidance as to how to achieve the goals set out in the 2011 London Plan, specifically targeting resource and pollution management and climate change adaptation. With regards to Air Quality in London, the SPG provides guidance on air quality assessment requirements, the assessment of construction and demolition dust, as well as the design and occupation of buildings. It denotes that new developments should be 'air quality neutral', building on the principles set out in the London Plan, and sets emission standards for combustion plant.
The Control of Dust and Emissions During Construction and Demolition: Supplementary Planning Guidance July 2014[6]	This SPG provides more detailed guidance on the implementation of all relevant policies in the London Plan and the Mayor's Air Quality Strategy to neighbourhoods, boroughs, developers, architects, consultants and any other parties involved in any aspect of the demolition and construction process. It sets out the methodology for assessing the air quality impacts of construction and demolition in London; and identifies good practice for mitigating and managing air quality impacts that is relevant and achievable, with the overarching aim of protecting public health and the environment.
Local Policy	
London Borough of Camden's Core Strategy 2010-2025 [7]	A number of policies relating to improving air quality are contained within the London Borough of Camden's Core Strategy. Policy CS16 (Improving Camden's health and wellbeing) states that the Council will 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 Clean Air Action Plan 2013 - 2015[8]	Camden's Clean Air Action Plan outlines the Councils commitment to improving air quality in the Borough. The key objectives of the plan are to reduce PM_{10} and NO_2 concentrations by: ▶ encouraging the use of clean fuels and technologies; ▶ promoting energy efficient to reduce fossil fuel usage; ▶ raising awareness of air quality issues and promoting lifestyle changes which reduce air; ▶ pollution and improve the health of local residents; and ▶ working in partnership with other organisations to foster improvements in air quality. The Action Plan is supported by The Camden Plan[9] and Camden's Environmental Sustainability Plan[10] drawing on European and National legislation in conjunction with national, regional and local policy to manage and improve air quality across the Borough.

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[4] Greater London Authority (GLA), 2016. The London Plan - Spatial Development Strategy for London Consolidated with Alternations since 2011, March 2016.

[5] GLA (2014). Sustainable Design and Construction – Supplementary Planning Guidance.

[6] GLA (2014). The Control of Dust and Emissions During Construction and Demolition – Supplementary Planning Guidance.

[7] Camden Core Strategy 2010 – 2025, Adopted 2010.

[8] Camden's Clean Air Action Plan 2013 – 2015.

[9] The Camden Plan 2012 -2017.

[10] Camden's Environmental Sustainability Plan – Green Action for Change 2012 – 2020.

Policy reference	Policy issues
Camden Development Policies Local Development Framework (adopted 2010)[11]	Policy DP32 in the Camden Development Policies Local Development Framework document sets out how the Council expects developments to reduce their impact on air quality. It states: "*The Council will require air quality assessments where development could potentially cause significant harm to air quality.* ***Mitigation measures*** *will be expected in developments that are located in areas of poor air quality. The Council will also only grant planning permission for development in the Clear Zone region that significantly increases travel demand where it considers that appropriate measures to minimise the transport impact of development are incorporated. We will use planning conditions and legal agreements to secure Clear Zone measures to avoid, remedy or mitigate the impacts of development schemes in the Central London Area."*

[11] Camden Development Policies Local Development Framework (adopted 2010).

2.2 Relevant legislation

The legislative framework for air quality consists of legally enforceable EU Limit Values that are transposed into UK legislation as Air Quality Standards (AQS) that must be at least as challenging as the EU Limit Values. Action in the UK is then driven by the UK's Air Quality Strategy[12] that sets the Air Quality Objectives (AQOs).

The EU Limit Values are set by the European directive on air quality and cleaner air for Europe (2008/50/EC)[13] and the European directive relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air (2004/107/EC)[14] as the principal instruments governing outdoor ambient air quality policy in the EU. The Limit Values are legally binding levels for concentrations of pollutants for outdoor air quality.

The two European directives, as well as the Council's decision on exchange of information were transposed into UK Law via the Air Quality Standards Regulations 2010[15], which came into force in the UK on 11 June 2010, replacing the Air Quality Standards Regulations 2007[16]. Air Quality Standards are concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment. The Air Quality Strategy sets the AQOs, which give target dates and some interim target dates to help the UK move towards achievement of the EU Limit Values. The AQOs are a statement of policy intentions or policy targets and as such, there is no legal requirement to meet these objectives except in as far as they mirror any equivalent legally binding Limit Values in EU legislation. The most recent UK Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in July 2007.

Since Part IV of the Environment Act 1995[17] came into force, local authorities have been required periodically to review concentrations of the UK Air Quality Strategy pollutants within their areas and to identify areas where the AQOs may not be achieved by their relevant target dates. This process of Local Air Quality Management (LAQM) is an integral part of delivering the Government's AQOs detailed in the Strategy. When areas are identified where some or all of the AQOs might potentially be exceeded and where there is relevant public exposure, i.e. where members of the public would regularly be exposed over the appropriate averaging period, the local authority has a duty to declare an AQMA and to implement an Air Quality Action Plan (AQAP) to reduce air pollution levels towards the AQOs. The latest guidance on the

[12] Defra in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

[13] Official Journal of the European Union, (2008) Directive 2008/50/EC of the European Parliament and of The Council of 21 May 2008 on ambient air quality and cleaner air in Europe.

[14] Official Journal of the European Union, (2004) Directive 2004/107/EC of the European Parliament and of The Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

[15] The Stationery Office Limited (2010) Statutory Instrument 2010 No. 1001 Environmental Protection – The Air Quality Standards Regulation 2010.

[16] The Stationery Office Limited (2007) Statutory Instrument 2010 No. 64 Environmental Protection – The Air Quality Standards Regulation 2007.

[17] HMSO (1995) Environment Act 1995.

LAQM process is given in Defra's 2016 Local Air Quality Management Technical Guidance (LAQM TG (16))[18].

The UK Government and the Devolved Administrations have set national AQOs for particulate matter smaller than 2.5 µm in diameter ($PM_{2.5}$). These objectives have not been incorporated into the LAQM Regime, and authorities have no statutory obligation to review and assess air quality against them. However, given that $PM_{2.5}$ is a pollutant of concern at the national and EU levels it has been included in this assessment.

Emissions of nitrogen oxides (NO_X), PM_{10} and $PM_{2.5}$ have been modelled in this assessment in order to assess concentrations of NO_2, PM_{10} and $PM_{2.5}$ as these are the pollutants of greatest health concern associated with road traffic. The NO_X (NO and NO_2) emitted from vehicle exhausts and other combustion sources undergoes photochemical oxidation in the atmosphere, with NO_2 being formed by oxidation of NO to NO_2 and, conversely, NO_2 undergoing photolysis (in the presence of sunlight) to create NO and ozone.

Emissions of other exhaust gases, such as carbon monoxide (CO), small quantities of sulphur dioxide (SO_2) and non-methane volatile organic compounds (NMVOC) including 1,3-butadiene and benzene, will also occur from vehicles. National level measurement and modelling assessments carried out by Defra have shown that policy measures already in place should reduce levels of CO, 1,3-butadiene and benzene to ensure compliance with the respective standards and objectives, even at busy roadside locations.

For NO_2, it is the annual mean objective that is the more stringent AQO; it is generally considered that the 1-hour mean NO_2 AQO will not be exceeded if the annual mean objective is not exceeded. For PM_{10}, the 24-hour mean objective is more stringent than the annual mean. Table 2.2 sets out the AQOs that are relevant to this assessment, and the dates by which they are to be achieved.

Table 2.2 Summary of relevant air quality standards and objectives

Pollutant	Objective (UK)	Averaging Period	Date to be Achieved by and Maintained thereafter (UK)
Nitrogen dioxide - NO_2	200 μgm^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
	40 μgm^{-3}	Annual mean	31 Dec 2005
Particles - PM_{10}	50 μgm^{-3} not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
	40 μgm^{-3}	Annual mean	31 Dec 2004
Particles - $PM_{2.5}$	25 μgm^{-3}	Annual mean	2020
	Target of 15% reduction in concentration at urban background locations	3 year mean	Between 2010 and 2020

The likelihood of exceeding the NO_2 and PM_{10} short-term AQOs can be assessed with reference to the predicted annual means and the relationships recommended by LAQM.TG(16):

The 1-hour mean NO_2 objective is unlikely to be exceeded[18] if the annual mean is less than 60 μgm^{-3};

An estimate of potentially exceeding the 24-hour mean PM_{10} objective is given by:

$$Number\ of\ 24\ hour\ mean\ exceedences = -18.5 + 0.00145\ x\ annual\ mean^3 + \frac{206}{annual\ mean}$$

[18] Defra (2016) Local Air Quality Management Technical Guidance LAQM.TG (16).

On the basis of the above relationship, the 24-hour mean objective for PM_{10} is likely to be met if the predicted annual-mean PM_{10} concentration is 31.8 μgm^{-3} or less.

2.3 Relevant guidance

Institute of Air Quality Management (IAQM)

The Institute of Air Quality Management (IAQM)[19] has developed guidance regarding the assessment of the impacts of construction on air quality and the determination of their significance.

Local communities may be concerned that development activities (particularly construction works) would result in regular and persistent dust emissions, which may affect local amenity and quality of life. The level of concern, and potential for annoyance, is directly related to the existing baseline dust levels, the number and proximity of residential areas to the Site, and the exact nature of the activities on-site. The degree of actual annoyance would also depend on factors, such as, the rate of dust deposition, and the application of mitigation measures on site.

Dust complaints are usually associated with periods of peak deposition, occurring during particular weather conditions. There is a ‘normal’ level of dust deposition in every community and it is only when the rate of deposition is high relative to the norm that complaints tend to occur. The effects of dust on a community will therefore be determined by the following factors:

- the activities being undertaken (demolition, number of vehicles and plant, etc.);
- the duration of these activities;
- the size of the site;
- the meteorological conditions (wind speed, direction and rainfall);
- the proximity of receptors to the activities;
- the adequacy of the mitigation measures applied to reduce or eliminate dust; and
- the sensitivity of the receptors to dust.

The amount of dust that might cause annoyance in a particular circumstance is very difficult to determine and there are no statutory limits such as those applicable to suspended particulates or gaseous pollutants.

A qualitative approach to the assessment of potential dust effects during the construction phase has been undertaken, along with the identification of best-practice dust minimisation techniques, where appropriate.

IAQM and Environmental Protection UK (EPUK)

The IAQM and Environmental Protection UK (EPUK) has also produced guidance[20] regarding the assessment of air quality issues within planning applications, which includes a summary of relevant legislation and the assessment of significance. Using this guidance, the magnitude of change due to an increase/decrease in the annual mean concentration of NO_2 and PM_{10} and other pollutants due to the development is described using specified criteria. The overall significance of the development is then determined using professional judgement.

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[19] Institute of Air Quality Management (IAQM) (2014) – Guidance on the Assessment of Dust from Demolition and Construction.

[20] IAQM and EPUK (2017) Land-Use Planning & Development Control: Planning For Air Quality

London Councils 2007 – Air Quality and Planning Guidance

The London Councils 2007[21] guidance provides technical advice on how to deal with planning applications in respect of assessing air quality. Its overarching aim is to ensure consistency in the approach to planning in order to improve air quality in London. The guidance summarises key issues when determining whether an air quality assessment should normally be undertaken; outlines appropriate methodologies for the undertaking of such assessments with particular reference to detailed dispersion modelling and makes recommendations for appropriate mitigation measures that may be implemented.

It states that the key principle of an assessment of air quality impact assessment is that it must determine whether the Development will have a significant impact on air quality or whether the existing air quality is unacceptable for the Proposed Development. The assessment must demonstrate how a development would affect pollution concentrations in relation to health-based statutory and proposed air quality standards and objectives. Where developments are to take place in an AQMA, mitigation measures should be considered as standard practice.

In determining both the significance of exposure to air pollution and the levels of mitigation required, consideration should be given to the following Air Pollution Exposure Criteria (APEC) table:

Table 2.3 APEC Banding

APEC Band	Applicable Range (NO_2 Mean)	Applicable Range (PM_{10} Mean)	Recommendation
A	>5% below objective	Annual Mean: > 5% below national objective 24 hr: > 1-day less than national objective	No air quality grounds for refusal; however mitigation of any emissions should be considered.
B	5% below – above objective	Annual Mean: Between 5% above or below national objective 24 hr: Between 1-day above or below national objective.	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered e.g. Maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
C	>5% above objective	Annual Mean: > 5% above national objective 24 hr: > 1-day more than national objective.	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

[21] London Councils (2007) Air Quality and Planning Guidance – Revised Guidance July 2007.

3. Scope of the Assessment

The Proposed Development includes new residential properties, so this assessment considers the air quality likely to be experienced by residents of these properties and users of the facilities on site. The pollutants of concern which require consideration in an assessment of this nature are those generated from the exhaust of road vehicles, for which one might anticipate potential breaches of the AQOs. The assessment will therefore determine the exposure through quantitative assessment of NO_2, PM_{10} and $PM_{2.5}$ concentrations at residential receptor locations using the ADMS-Roads atmospheric dispersion model.

No parking provision is provided, therefore the development is considered to be ‘car free’. Operational impacts are considered to be negligible and the impact of traffic generated by the development on existing residents has not been considered within this assessment.

The air quality studies undertaken by LBC[22] confirm that concentrations of CO, SO_2, 1, 3-butadiene and benzene are very unlikely to exceed the air quality objectives in this area. The small incremental change due to emission of these pollutants from the development would not change this situation.

The potential effects of dust generation and dispersion arising from activities such as demolition, excavation, movement of vehicles (on and off-site) and general construction activities has also been considered.

3.1 Public exposure

Guidance from the UK Government and Devolved Administrations makes clear that exceedance of the health based objectives should be assessed at outdoor locations where members of the general public are regularly present over the averaging time of the objective. Workplaces are excluded, as explained in Table 3.1 which provides an indication of those locations that may or may not be relevant for each averaging period.

Table 3.1 Examples of where the air quality objectives should apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed	Building facades of offices or other places of work where members of the public do not have regular access.
	Building facades of residential properties, schools, hospitals, care homes etc.	Hotels, unless people live there as their permanent residence.
		Gardens of residential properties.
		Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply, together with hotels	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
	Gardens or residential properties[1]	
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives would apply.	Kerbside sites where the public would not be expected to have regular access.

[22] 2015 Updating and Screening Assessment for the London Borough of Camden.

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
	Kerbside sites (e.g. pavements of busy shopping streets).	
	Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more.	
	Any outdoor locations at which the public may be expected to spend one hour or longer.	
15-minute mean	All locations where members of the public might reasonably be expected to spend a period of 15 minutes or longer.	

Note: [1] For gardens and playgrounds, such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

3.2 Receptor locations

Pollutant concentrations have been predicted at proposed building façades. The new residential property locations within the development have been named ‘Receptors’ in Figure 3.1. Site receptor locations were selected at the sides of the development facing the roads, to represent the locations of receptors which would experience the highest concentrations.

Development receptors have also been located at the back of the property and on different floors.

A height of 1.5 m was used for the receptors on ground floor to represent an average human inhalation height. Receptors were also modelled at heights of 5m, 8m and 11.5m to represent residents living on the first, second and third floors of the building.

Table 3.2 shows the site receptor locations, representing locations of future residents of the development. Figure 3.1 shows existing receptor locations around the Development Site. Table 3.2 provides the Ordnance Survey grid coordinates and receptor heights for each of the receptor locations included within the air quality assessment.

In the assessment of dust during the construction phase, additional receptors were considered as potentially sensitive receptors.

Figure 3.1 Site receptor locations

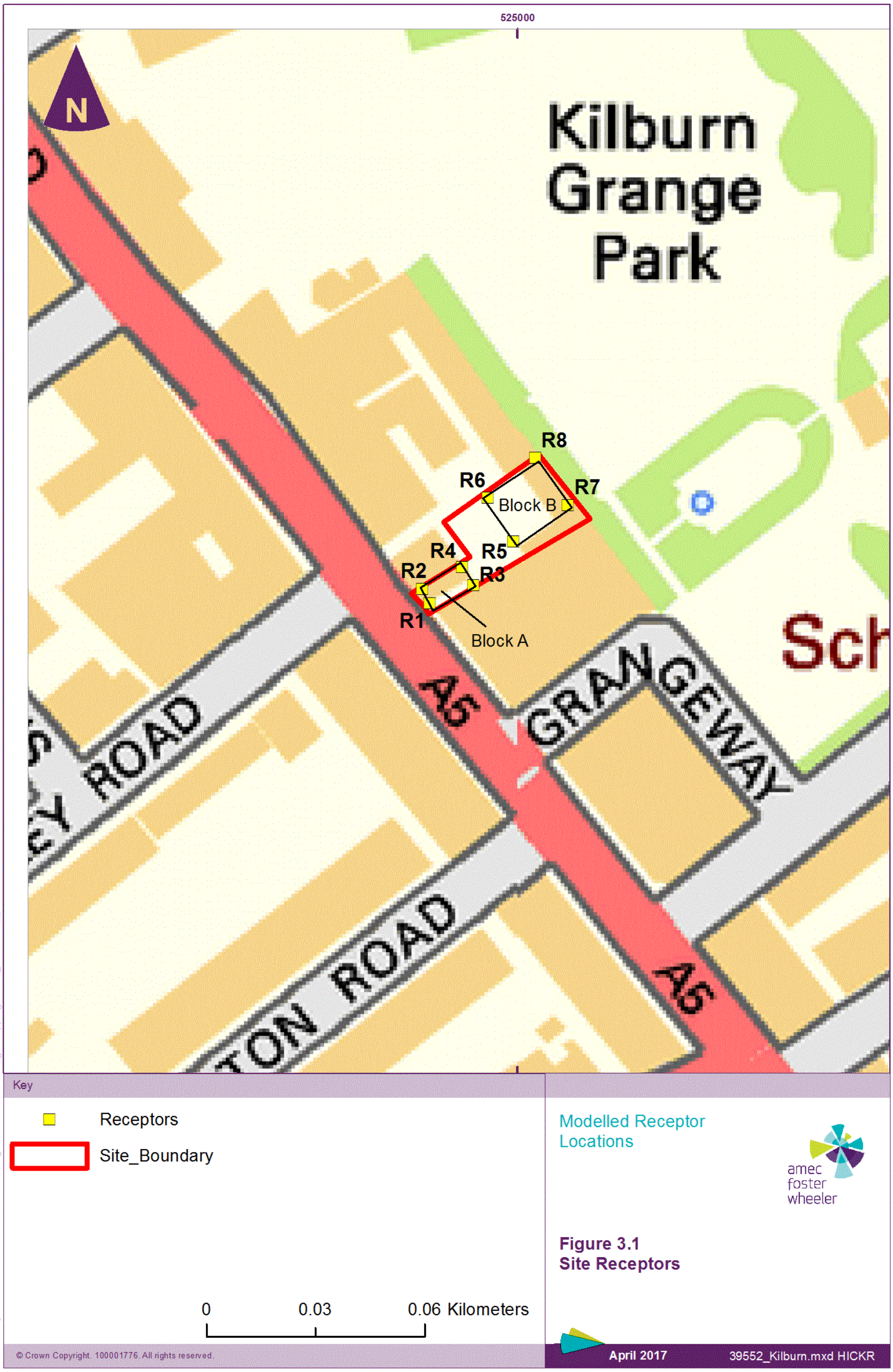

Table 3.2 Human receptor locations

Receptor	Receptor Type	X (m)	Y (m)	Height (m)
R1 Ground	Residential	524976	184220	1.5
R1 1st Floor	Residential	524976	184220	5.0
R1 2nd Floor	Residential	524976	184220	8.0
R1 3rd Floor	Residential	524976	184220	11.5
R2 Ground	Residential	524974	184224	1.5
R2 1st Floor	Residential	524974	184224	5.0
R2 2nd Floor	Residential	524974	184224	8.0
R2 3rd Floor	Residential	524974	184224	11.5
R3 Ground	Residential	524988	184225	1.5
R3 1st Floor	Residential	524988	184225	5.0
R3 2nd Floor	Residential	524988	184225	8.0
R3 3rd Floor	Residential	524988	184225	11.5
R4 Ground	Residential	524985	184230	1.5
R4 1st Floor	Residential	524985	184230	5.0
R4 2nd Floor	Residential	524985	184230	8.0
R4 3rd Floor	Residential	524985	184230	11.5
R5 Ground	Residential	524999	184237	1.5
R5 1st Floor	Residential	524999	184237	5.0
R5 2nd Floor	Residential	524999	184237	8.0
R5 3rd Floor	Residential	524999	184237	11.5
R6 Ground	Residential	524992	184249	1.5
R6 1st Floor	Residential	524992	184249	5.0
R6 2nd Floor	Residential	524992	184249	8.0
R6 3rd Floor	Residential	524992	184249	11.5
R7 Ground	Residential	525014	184247	1.5
R7 1st Floor	Residential	525014	184247	5.0
R7 2nd Floor	Residential	525014	184247	8.0
R7 3rd Floor	Residential	525014	184247	11.5
R8 Ground	Residential	525005	184260	1.5
R8 1st Floor	Residential	525005	184260	5.0
R8 2nd Floor	Residential	525005	184260	8.0
R8 3rd Floor	Residential	525005	184260	11.5

3.3 Potentially significant effects

Effects that could potentially be significant have been considered and addressed to determine whether they warrant further investigation within the report. Table 3.3 lists the primary focus of the assessment and also details all other effects that have been considered but, through professional judgement, have been scoped out of the assessment.

Table 3.3 Potentially significant air quality effects

Potentially significant air quality effects	Dust arising as a result of the construction phase of the development that has the potential to cause annoyance at receptors close to the site.
	Exceedance of the Air Quality Objectives for NO_2, PM_{10} and $PM_{2.5}$ at the proposed residential properties in the development, resulting in exposure to concentration levels deemed potentially damaging to human health.
Potential effects that do not require further assessment	Exhaust emissions from construction plant and construction traffic. There will likely be less than 10 HDV (>3.5 tonne) outward movements in any one day and operating on-site, therefore construction traffic is considered unlikely to have a significant long-term effect on the air quality in the area during the construction period.
	The baseline assessment showed no existing air quality problems for any of the other AQS pollutants (sulphur dioxide, benzene, 1, 3-butadiene and lead) and therefore no further assessment of these pollutants is warranted.
	The impact of the vehicle movements and road traffic emissions associated with the development on air quality at existing residential receptors has been scoped out. Environmental Protection UK/IAQM[20] guidance suggests that a change of LDV flows of more than 100 AADT within or adjacent to an AQMA should be considered as significant. It is not considered likely that the Proposed Development will have this level of impact, therefore consideration of the impact of the development at existing residents has been scoped out of the assessment.
	The impact of combustion emissions associated with the development on air quality experienced by local receptors.

4. Assessment Methodology

LBC were contacted to confirm the assessment methodology in emails sent on the 16 March and 10 April 2017, and numerous phone calls. No response was received, but the best practice methodology detailed below is considered to be appropriate for a development of this nature. The assessment has been undertaken following the planning guidance available on Camden's website[23]. The Air Quality Planning Checklist for Camden is included in Appendix F.

4.1 Construction dust assessment methodology

The IAQM guidance[21] provides a method to assess the significance of construction impacts by considering the annoyance due to dust soiling as well as harm to ecological receptors and the risk of health effects due to any significant increases to PM_{10} or $PM_{2.5}$. Site activities are divided into four types to reflect their different potential impacts:

- Demolition – an activity involved with the removal of an existing structure or structures;
- Earthworks – the processes of soil-stripping, ground-levelling, excavation and landscaping;
- Construction – an activity involved in the provision of a new structure; and
- Trackout – the transport of dust and dirt from the site onto the public road network. This arises when lorries leave site with dusty materials or transfer dust and dirt onto the road having travelled over muddy ground on-site.

A detailed assessment is deemed to be required where there is:

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

Detailed assessment involves a three-stage process; construction sites are classified according to the risk of effects (based upon the scale and nature of the works, plus the proximity of sensitive receptors), appropriate site-specific mitigation measures are identified and the significance of effects is then determined.

The significance of the dust effects is generally undertaken after applying the site-specific mitigation. This would take account of the risk of effects, and other factors that might affect the risk of dust effects arising, even after any site-specific mitigation has been implemented. The overall significance of the effects arising from the entire construction phase of the development is based on professional judgement, taking into account the significance of the effects of each of the four activities.

4.2 Assessment of road traffic derived emissions methodology

Annual average concentrations in air of NO_X and PM_{10} and $PM_{2.5}$ have been determined using the ADMS-Roads version 4.0 atmospheric dispersion model[24] for the baseline year (2015) for verification purposes and 2017 (assumed as the opening year of the development as a worst-case scenario). A brief description of the model is provided in Appendix A.

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[23] https://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/two/planning-applications/making-an-application/supporting-documentation/air-quality-assessment/

[24] www.cerc.co.uk/environmental-software/ADMS-Roads-model.html

Annual mean concentrations of NO_2 were derived from the model-predicted NO_x concentrations, through application of the NO_x to NO_2 conversion tool version 5.1 developed for LAQM purposes, which takes into account the interaction between nitrogen oxides and background ozone[25].

The modelling assessment requires source, emissions, meteorological and other site specific data. For modelling traffic impacts, one year of data is used and model verification is carried out following Defra's guidance. The results of the assessment have been compared with the AQOs (Table 2.2).

The Road Network

Traffic data comprising AADT and numbers of different vehicle types for the roads surrounding the development site were obtained from the Department for Transport website[26]. Traffic data for 2015 was used to estimate pollutant concentrations at the site in the current baseline (2015). Traffic data for 2015 was also used to represent AADT flows for 2017 in the absence of traffic data for 2017.

In view of uncertainties around future pollutant emissions, 2017 background concentrations and emission factors have been used in the opening year scenario. This is a conservative approach as traffic emissions are predicted to decline each year as new vehicles replace older ones so emissions are likely to be lower in the opening year of the development, which will be later than 2017. The following scenarios have been modelled:

- The 2015 baseline (based on 2015 background maps, emission factors, diffusion tube concentrations, meteorological data and DfT traffic count data used in the modelling for verification purposes) [2015 baseline and verification]; and
- The opening year of the development (based on 2017 background maps and emission factors, with 2015 meteorological data and DfT traffic count data) [2017 with development operational].

Emissions were calculated using the latest emissions factors from Defra, the Emission Factor Toolkit v7.0[27], which is used to predict emissions which are imported into ADMS-Roads. Particulate generated due to brake and tyre wear are also included in the Toolkit. These two factors lead to improved forecasts of particulate concentrations due to traffic. $PM_{2.5}$ emissions were assumed to be the same as PM_{10} as a conservative approach.

Following the introduction of European emission standards for road vehicles in 1992, emissions from the overall road vehicle fleet have been decreasing due to the penetration of new vehicles and trucks meeting the emission regulations. Future emissions (per vehicle) are therefore likely to continue to decrease as new vehicles, meeting the increasingly stringent emission regulations, replace older vehicles and form a greater part of the UK fleet. Market demand and future UK and European policies are likely to achieve further reductions in vehicle emissions.

Figure 4.1 shows the road links that have been modelled in this assessment. The data obtained from the DfT are given in Appendix B.

Model verification

Model verification enables an estimation of uncertainty and systematic errors associated with the dispersion modelling components of the air quality assessment to be considered. There are many explanations for these errors, which may stem from uncertainty in the modelled number of vehicles, speeds and vehicle fleet composition. Defra has provided guidance in terms of preferred methods for undertaking dispersion model

[25] AEA Technology (2013). *NO_x to NO_2 Calculator version 4.1.* http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

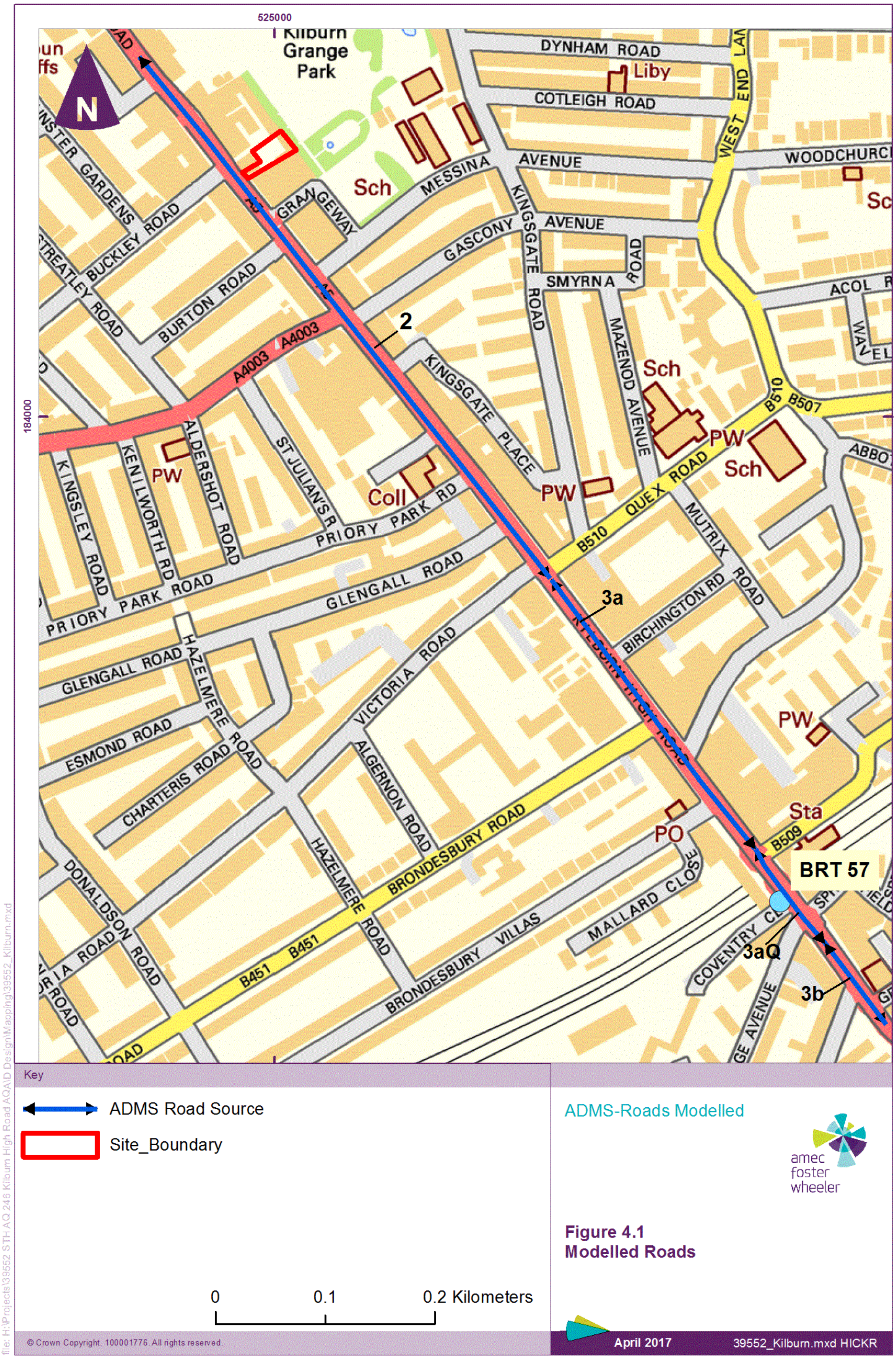
[26] http://www.dft.gov.uk/traffic-counts/cp.php

[27] http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html#eft

verification[9]. Model verification involves the comparison of modelled concentrations and local monitoring data.

Full details of the model verification procedure are provided in Appendix C. The diffusion tubes used in the verification process are shown in Figure 4.1. In summary, the verification process led to the use of a modelled Road-NO_X adjustment factor of 4.83 as a conservative approach. In the absence of local PM_{10} monitoring data, this adjustment factor was also used for Road-PM_{10} and Road-$PM_{2.5}$.

Figure 4.1 Roads modelled



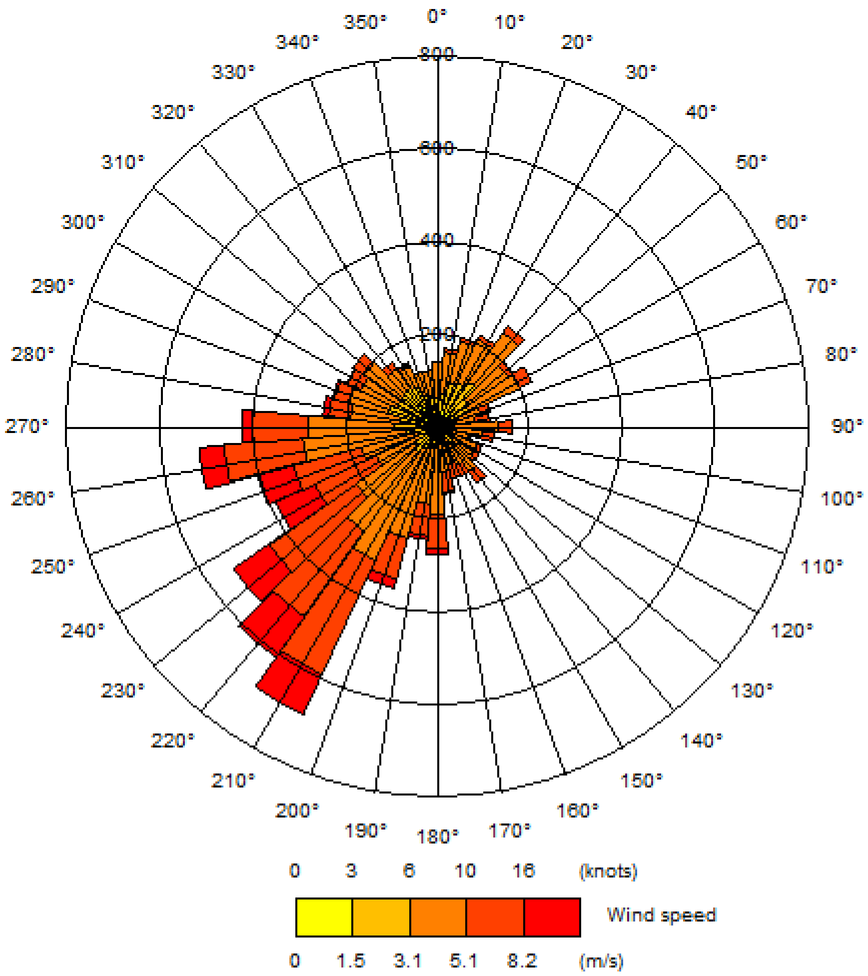
4.3 Meteorological data

Detailed dispersion modelling requires hourly sequential meteorological data from a representative synoptic observing station. Hourly sequential meteorological data was obtained for the Heathrow Airport synoptic observing station, which is situated approximately 17 km to the south-west of the Proposed Development site.

The meteorological data for 2015 has been used with monitoring data and DfT traffic data from 2015 in the model verification and road traffic emissions assessment.

Figure 4.2 summarises the hourly wind speed and wind direction as a wind rose. In 2015 there were a significant proportion of winds from the south-west.

Figure 4.2 Heathrow Airport Wind Rose for 2015



4.4 Surface characteristics

The surface roughness is a model parameter that is related to the height of features, such as buildings and trees. The value of 1.5 m is recommended in the ADMS models to represent large urban areas, therefore, a surface roughness value of 1.5 m was used to represent the nature of the surface features in the vicinity.

A value of 30 m, suitable for mixed urban/industrial space, was used for the minimum Monin-Obukhov length. This model parameter is used to account for the urban heat island effect where city buildings and surfaces are hotter than the surrounding air due to heating or release of heat absorbed. The urban heat island effect is most significant at night.

The concentrations of an emitted pollutant found in elevated, complex terrain differ from those found in simple level terrain. However, these effects are most pronounced when the terrain gradients exceed 1 in 10 i.e., a 100 m change in elevation per 1 km step in the horizontal plane. As there are no areas surrounding the site that meet this criterion, it was decided not to include terrain effects in the dispersion modelling. This is in line with the approach recommended in the LAQM.TG(16) Guidance.

5. Baseline Air Quality

Information on air quality in the UK is available from a variety of sources, including local authorities and national network monitoring sites. This section presents information with respect to baseline air quality and compliance with the Air Quality Standards.

5.1 Local authority review and assessment

During the LAQM Review and Assessment process carried out by LBC Council, areas within the Borough have been identified with relevant public exposure in which the annual mean AQO for NO_2 is likely to be exceeded. As a result, the Council designated an AQMA for the entire Borough of Camden. The Development Site is within this AQMA.

Dust deposition

Dust deposition rates are not monitored extensively in the UK. Monitoring that is undertaken, is usually connected with specific activities such as mining and mineral extraction operations and major infrastructure projects. Dust monitoring may also be undertaken to investigate specific complaints received by local authorities, who are then empowered to investigate dust nuisance under the Environmental Protection Act (1990). No dust measurement data have been obtained for the area surrounding the Development Site.

5.2 Air quality monitoring

Continuous monitoring

There were 5 operational automatic continuous monitoring sites in the LBC in 2016. The nearest continuous monitor to the Development Site is located at Swiss Cottage (C1). This monitor is located 1.6 km to the east of the Development Site.

Table 5.1 shows the location of the site, the classification type and distance from the Site. Table 5.2 shows the monitored concentrations of NO_2 and PM_{10} for 2012 to 2014, provided in the 2015 Air Quality Progress Report for LBC. Figure 5.1 shows the location of the continuous monitor with relation to the Development Site.

Table 5.1 Automatic monitoring sites in the London Borough of Camden

Site Name	Classification Type	X	Y	Distance to Road (m)	Distance from Site (km)
Swiss Cottage	Kerbside	526633	184392	1.5	1.6

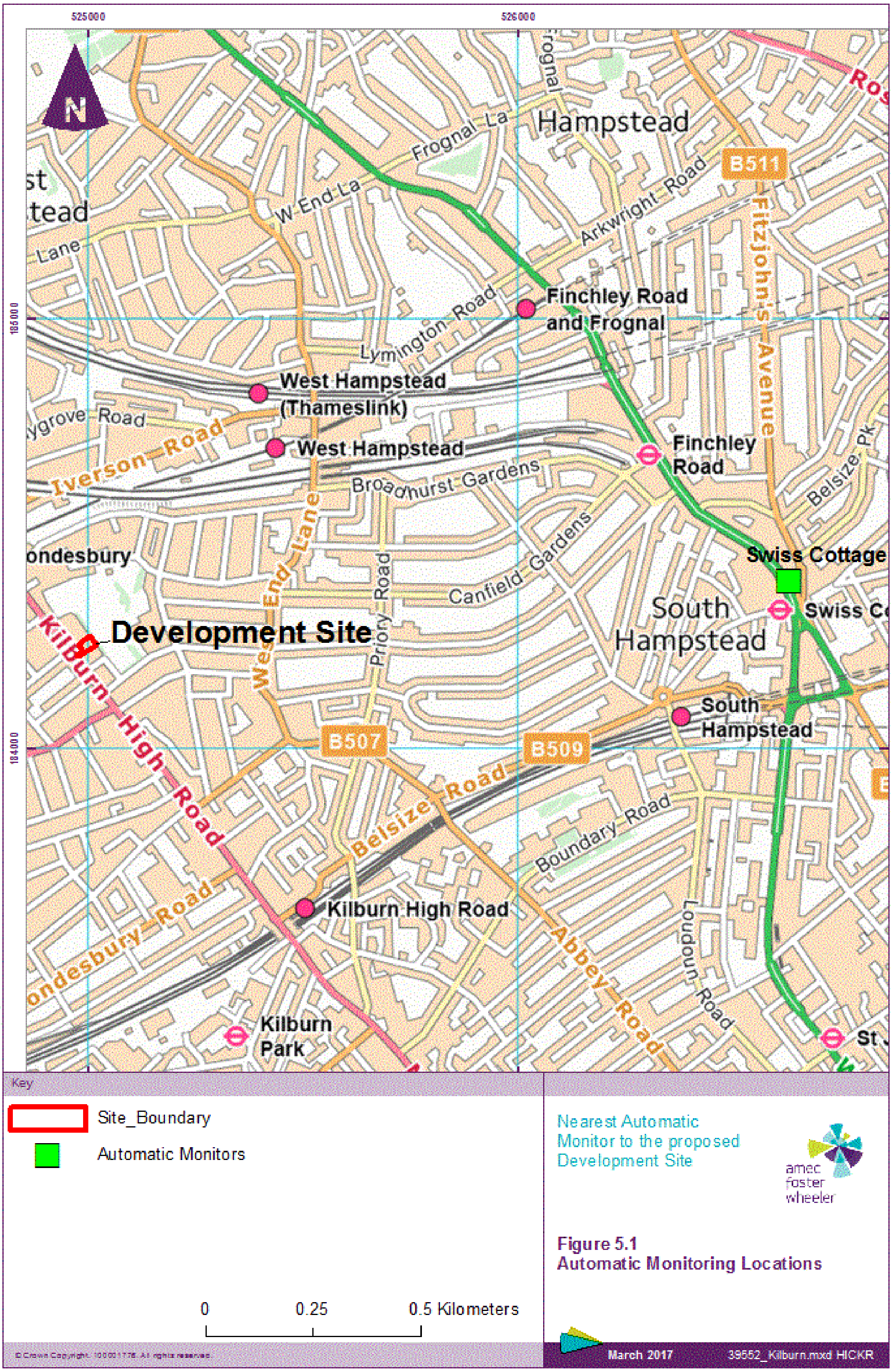
Table 5.2 Summary of NO_2 monitoring data: annual mean (μgm^{-3}) and number of hour's exceedance of 1-hour mean for NO_2

Pollutant	2014	2015	2016
NO_2	**66** (13)	**61** (11)	**64 (34)**
PM_{10}	n/a (11)	20 (8)	21 (8)

Exceedances of the AQOs shown in **bold.**
Exceedances of 1-hour mean for NO_2 shown in ( ).
Source: LondonAir website.

The results from 2014 to 2016 show that the NO_2 annual mean has remained above the AQO of 40 μgm^{-3} at the Swiss Cottage continuous monitor. An exceedance of the 1-hour mean AQO for NO_2 was also recorded in 2016. There were no exceedances of the AQOs for PM_{10} between 2014 and 2016.

Figure 5.1 Locations of automatic monitoring locations near to the development site



Passive monitoring

LBC monitored NO_2 concentrations using passive diffusion tubes at 14 locations in 2016, three of which are co-located at the Swiss Cottage automatic monitor. Four of the diffusion tube monitoring locations are in the area of the Development Site. The locations of the passive monitoring sites from LBC, their classification and distance from the Site are given in Table 5.3. The bias-adjusted concentrations monitored for the years 2014 - 2016 are shown in Table 5.4.

A diffusion tube at Kilburn Bridge is maintained by the London Borough of Barnet (LBB) and is the closest monitoring location to the site. The details and monitored concentrations at tube BRT 57 are provided in Table 5.3 and Table 5.4, respectively.

Figure 5.2 shows the nearest passive monitors to the site.

Table 5.3 Location details of passive monitoring sites near to the site

Site ID	Site Name	Classification Type	X (m)	Y (m)	Distance from Development Site (km)
CA7	Frognal Way	Urban background	526213	185519	1.8
CA15 (3)	Swiss Cottage, Finchley Rd	Kerbside	526633	184392	1.6
CA17	47 Fitzjohn's Ave	Roadside	526547	185125	1.8
CA25	Emmanuel Primary School	Roadside	525325	185255	1.1
BRT57	Kilburn Bridge	Roadside	525461	183558	0.8

Table 5.4 Passive monitoring data of annual average NO_2 concentration (μgm^{-3}), 2014 - 2016

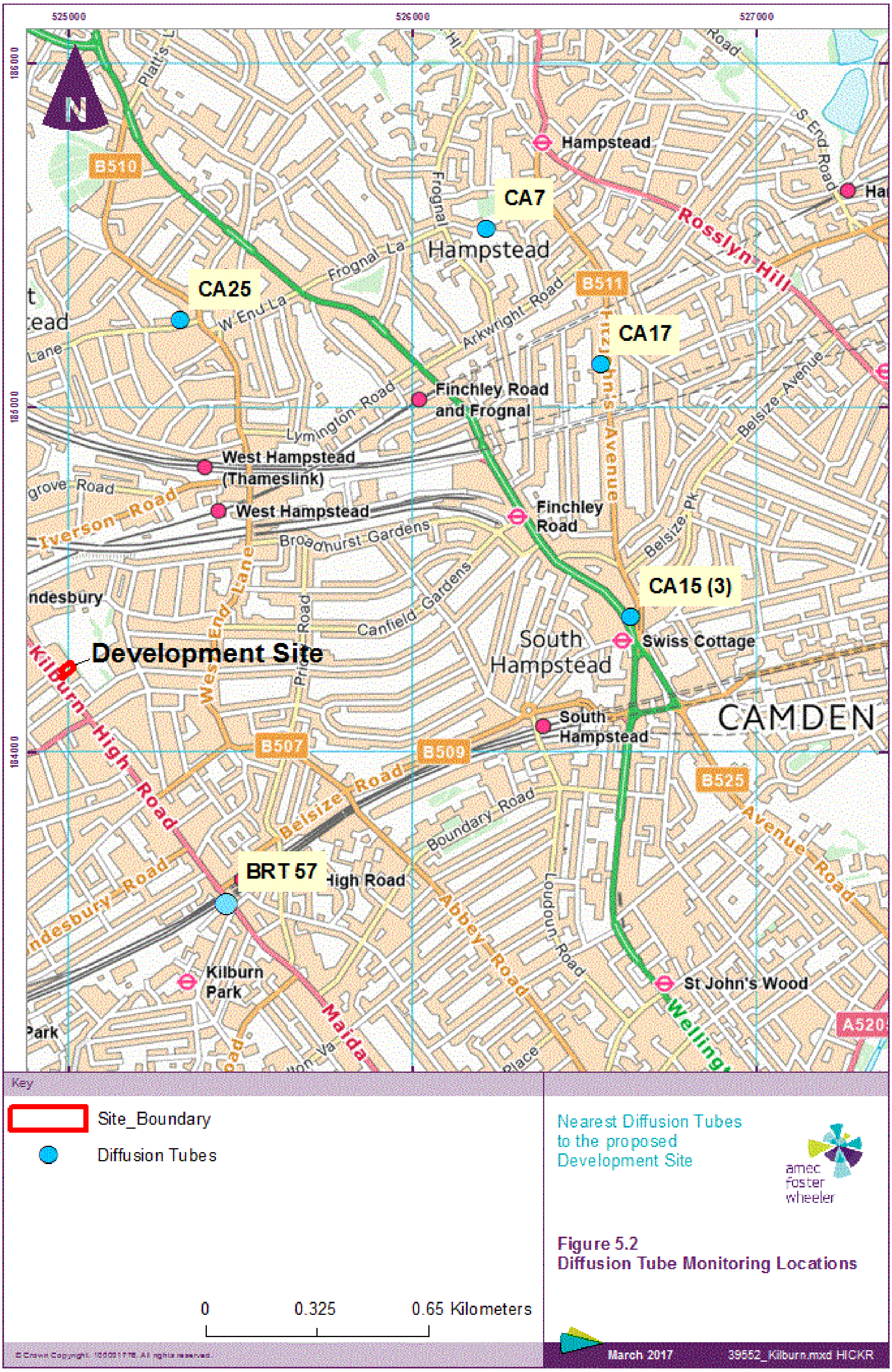
Site ID	2014	2015	2016
CA7	28.5	25.3	26.8 [a]
CA15 (3)	**74.3**	**68.9**	**70.9** [a]
CA17	**60.3**	**54.7**	**54.1*** [a]
CA25	**48.3**	**46.1**	**50.1** [a]
BRT57	**86.2**	**100.7***	n/a

Exceedances of the NO_2 annual mean AQO are shown in **bold**.
[a] 2015 Bias Adjustment Factor of 0.96 used to adjust raw 2016 concentrations.
*Data capture below 75%. BRT 57 had an annual mean concentration of 85.3 μgm^{-3} before being annualised using urban background monitors at North Kensington, Horseferry and Bloomsbury.
n/a – The Environmental Health team at Brent Council said monitoring data for 2016 was unavailable at the time of the assessment.

Four of the five diffusion tubes shown in Table 5.4 recorded exceedances of the AQO for NO_2 between 2014 and 2016. The highest annual mean NO_2 in 2015 was 100.7 μgm^{-3}, based on concentrations measured at tube BRT57 in Brent, located less than a kilometre south from the development site along Kilburn High Road. The results for 2015 in Brent were annualised and the details of the annualisation process are provided in Appendix E.

The diffusion tube at Kilburn Bridge was used for model verification using the annualised 2015 monitored concentration. The 2015 concentration was used with DfT Traffic Count data available for 2015 along Kilburn High Road in the verification process.

Figure 5.2 Locations of passive monitoring locations near to the development site



5.3 Estimated background concentrations

Defra has made estimates of background pollution concentrations on a 1 km^2 grid for the UK for seven of the main pollutants, including NO_2, PM_{10} and $PM_{2.5}$, using data for a base year of 2013, making projections for years from 2011 to 2030 inclusive[28]. Table 5.5 shows the estimated values of the pollutants for 2015 and 2017 for the cells that will be used in the modelling. The Development Site to be modelled falls within the cell centred at 524500, 184500. The background concentrations for the grid squares containing the monitoring site used in the model verification, C1, located in grid square centred at 526500,184500 respectively.

Table 5.5 Defra 2015 and 2017 mapped background annual mean pollutant concentrations (µg m^{-3})

Pollutant	2015	2017
Development Site (524500, 184500)		
Nitrogen Dioxide, NO_X	49.3	45.0
Nitrogen Oxides, NO_2	30.1	28.0
Particulate Matter, PM_{10}	19.7	19.4
Particulate Matter, $PM_{2.5}$	14.1	13.7
Development Site (525500, 184500)		
Nitrogen Dioxide, NO_X	51.4	47.0
Nitrogen Oxides, NO_2	31.4	29.2
Particulate Matter, PM_{10}	19.3	19.0
Particulate Matter, $PM_{2.5}$	13.9	13.6
BRT57 Kilburn Bridge Monitor (525500,183500)		
Nitrogen Dioxide, NO_X	56.2	51.3
Nitrogen Oxides, NO_2	33.4	31.0
Particulate Matter, PM_{10}	20.5	20.1
Particulate Matter, $PM_{2.5}$	14.7	14.3

The baseline/ verification year for the assessment of air quality effects was selected as 2015, the last full calendar year for which meteorological and monitoring data are available. On this basis, this year was used to test the performance of the dispersion model and undertake verification of the model outputs, by comparing predicted concentrations against the actual nearby monitoring data collected close by and in a similar location that is representative of the site.

The estimated background NO_2 for 2015 in the cell centred at 524500, 184500 where the Development Site is located is 30.1 µgm^{-3}. The Defra gridded values have been used in the modelling.

[28] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011a.gov.uk/review-and-assessment/tools/background-maps.html

6. Assessment of Air Quality Effects

6.1 Construction assessment

This assessment of dust/PM_{10} presents the effects which are likely to be relevant both without and with the implementation of the appropriate mitigation measures on-site, which would be outlined by the site contractor. As per the IAQM guidance, the risk associated with the site to potentially generate dust/PM_{10} in the absence of any mitigation is has been identified and site-specific recommendations made to ensure residual dust/PM_{10} effects associated with the construction phase are not significant.

Potential dust emission magnitude

Demolition

Potential sources of impacts associated with demolition activities include fugitive dust/PM_{10} emissions resulting from disturbance of dusty materials by construction plant, vehicle movements and wind action. The demolition activities at the site will involve the demolition of a house with a volume of <20,000 m^3. The dust emission magnitude for demolition is therefore considered to be 'small'.

Earthworks

Potential sources of impacts associated with earthworks/ground preparation activities include fugitive dust/PM_{10} emissions resulting from disturbance of dusty materials by construction plant, the construction materials used vehicle movements and wind action. Taking account of the fact that the total site area is less than 2,500 m^2 and that there is unlikely to be more than 5 heavy earth moving vehicles active at one time, the dust emission magnitude for the earthworks phase of the development is considered to be 'small'.

Construction

Potential sources of impacts associated with construction activities include fugitive dust/ PM_{10} emissions resulting from disturbance of dusty materials by construction plant, the construction materials used vehicle movements and wind action. The potential dust emission magnitude for construction activities associated with the residential dwellings and supporting infrastructure is considered to be 'medium', given that the total building volume will be 25,000 - 100,000 m^3.

Trackout

Dust emissions during trackout from the site may occur from the transport of dust and dirt from the construction site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. The dust emission magnitude for the effects of trackout is considered to be 'small' as there will likely be less than 10 HDV (>3.5 tonne) outward movements in any one day, and given the likely short unpaved road length and moderately dusty surface material.

Summary

The magnitude of impacts from the four activities is summarised in Table 6.1 below.

Table 6.1 Construction dust emission magnitude

Source	Dust Emission Magnitude
Demolition	Small

Source	Dust Emission Magnitude
Earthworks	Small
Construction	Medium
Trackout	Small

Sensitivity of area

There are 10-100 residential properties located within 20 m of the site boundary, which is mainly residential in nature on Kilburn High Road. The sensitivity of the area with respect to dust soiling effects on people and property in relation to demolition, earthworks and construction activities is therefore considered to be 'high'.

There are several residential properties along Kilburn High Street and nearby likely routes of construction vehicles. The sensitivity of the area with respect to dust soiling effects on people and property in relation to trackout is therefore also considered to be 'high'.

The estimated existing background PM_{10} concentration is 19.7 μgm^{-3} (see Table 5.5). Given that there are 10 - 100 receptors within 20 m of the site boundary and within 500 m from the site entrance on the public highway, the sensitivity of the area with respect to human health impacts in relation to demolition, earthworks, construction and trackout is 'low'.

The nearest ecological receptor is located approximately 1.1 km from the site; the Westbere Copse Local Nature Reserve (LNR). Given that the distance from the Proposed Development site is greater than 500m, there are no ecologically sensitive sites within 50 m of the Development Site therefore the impact of dust emissions on ecologically sensitive receptors has not been considered any further in this assessment.

Tables 6.2 and 6.3 detail the human and ecological receptors close to the site. The sensitivity of the surrounding area is summarised in Table 6.4 below.

Table 6.2 Human receptors near to the site

Receptor Name	Receptor Type	Distance from Site Boundary (m)	Direction from Development	Reason for Selection
250 Kilburn High Road		< 20m	W	Representative of sensitive human receptors within 350m of the site boundary or within 100m of the route used by construction vehicles on the public highway, up to 500m from the site entrance.
244 Kilburn High Road		< 20m	E	
Buckley Road		< 20m	S	

Table 6.3 Sensitivity of surrounding area to dust impacts

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

Risk of dust impacts

The risk of dust impacts is defined using Tables 6, 7, 8 and 9 in the IAQM guidance[2] for demolition, earthworks, construction and trackout respectively. The dust emission magnitude classes combined with the sensitivity of surrounding area classes, result in the site risk categories shown in Table 6.4.

Table 6.4 Construction dust summary of dust risk

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

6.2 Operational road traffic results assessment

This section presents a summary of the modelling assessment in relation to the concentrations of NO_2, PM_{10} and $PM_{2.5}$. The full table of results is shown in Appendix D.

Nitrogen dioxide

Predicted concentrations

Table D1 presents the annual mean NO_2 concentrations predicted for 2017, the assumed opening year of the Proposed Development.

All predicted concentrations at development receptors decrease as height from the ground increases and the distance from Kilburn High Road increases.

Block A

The annual mean AQO of 40 µgm^{-3} is exceeded at all modelled ground floor locations throughout Block A at the Proposed Development site.

Modelled concentrations are above 60 µgm^{-3}, indicating that the hourly mean AQO for NO_2 is likely to be exceeded, at all receptor heights at receptor location R1, due to its proximity to the busy Kilburn High Road. The maximum concentration is modelled on the ground floor at receptor R1 where an annual mean concentration of 66.9 µgm^{-3} is predicted.

Modelled concentrations are below the AQO of 40 µgm^{-3} at 2nd floor heights and above at receptors R2, R3 and R4 in Block A.

According to London Councils guidance, several receptor locations are in APEC Band C, indicating that mitigation measures must be presented within the air quality assessment. As exceedances of the annual mean and hourly mean AQO for NO_2 are predicted at several receptor locations and heights throughout Block A at the Proposed Development site, mitigation measures are recommended for the whole block to ensure concentrations are below the AQO at proposed residential units.

Block B

All concentrations in Block B are predicted to be below the AQO of 40 µgm^{-3}. The maximum predicted concentration is 37.1 µgm^{-3} at the front of the Block at ground floor receptor location R5. All concentrations are predicted to be less than 5% below the AQO therefore all receptors are in APEC Band A, indicating that there are no air quality grounds for refusal; however mitigation of any emissions should be considered. Mitigation measures recommended for residential units in Block A should also be considered for Block B.

Particulate matter

Predicted Concentrations

PM_{10}

As annual mean predicted PM_{10} concentration is 31.8 µgm^{-3} or less at all receptor locations, the 24-hour mean objective for PM_{10} is likely to be met and has not been calculated.

In all cases the predicted concentrations are well below the AQOs. The highest predicted concentration of PM_{10} in 2017 is 25.0 µgm^{-3} at the R1 site receptor on the ground floor, which is well below the AQO.

With the development operational in 2017 the AQOs for PM_{10} are unlikely to be exceeded at the proposed residential locations.

$PM_{2.5}$

In all cases the predicted concentrations are well below the AQOs. The highest predicted concentration of $PM_{2.5}$ in 2017 is 19.4 µgm^{-3} at R1, which is below the AQO.

With the development operational in 2017 the AQOs for $PM_{2.5}$ are unlikely to be exceeded at the proposed residential locations.

6.3 Air quality neutrality

The GLA Sustainable Design and Construction SPG[5] specifies that developments are to be at least 'air quality neutral'. The SPG instructs that air quality impacts for developments are assessed against benchmarks for emissions from buildings and emissions from transport. Application of how to apply the emission benchmarks is detailed in Air Quality Consultants Air Quality Neutral Planning Support (2014)[29].

As the Proposed Development is car-free, it is expected to be air quality neutral with regards to emissions from transport.

As there is no energy centre planned on site, the Proposed Development is expected to be air quality neutral with regards to emissions from buildings. It is assumed that boilers within properties will have emissions of NOx below 40mg/kwh.

[29] Air Quality Consultants. Air Quality Neutral Planning Support: GLA 80371 (April 2014).

6.4 Mitigation measures

Construction phase

As the site is defined as 'medium risk' of dust soiling for the demolition and construction phases, suitable dust and emission control measures suitable to this risk category should be applied during the construction phases of the development. The measures shown in Table 6.5 are highly recommended by the IAQM for a 'medium risk' site. Additional measures to be considered in the event of substantial dust complaints are also provided.

Table 6.5 Recommended mitigation measures for the demolition and construction phase

Mitigation area	Mitigation measures to be incorporated	Additional measures to be considered in the event of substantial dust complaints
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 Project Manager. Display the head or regional office contact information.	
Dust Management	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	
Site 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 emissions, either on- or off-site and the action taken to resolve the situation in the log book.	Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are coordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.
Monitoring	Carry out regular site inspections to monitor compliance with the AQMP, 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. Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	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.

Mitigation area	Mitigation measures to be incorporated	Additional measures to be considered in the event of substantial dust complaints
Preparing and maintaining site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible. Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. Avoid site runoff of water or mud. Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period. 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. Cover, seed or fence stockpiles to prevent wind whipping.	
Operating vehicle/machinery	Ensure all Non-Road Mobile Machinery (NRMM) comply with the London NRMM Low Emission Zone standards. 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 sustainable delivery of goods and materials.	Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas. Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing).
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction e.g. suitable local exhaust ventilation systems. Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate. Use enclosed chutes and conveyors, and covered skips. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate. Ensure equipment readily available on-site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event, using wet cleaning methods.	
Waste Management	Avoid bonfires and burning of waste materials	
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	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).

Mitigation area	Mitigation measures to be incorporated	Additional measures to be considered in the event of substantial dust complaints
	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.	
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	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	Avoid scabbing if possible. Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent the escape of material and overfilling during delivery. For smaller supplies of fine powder materials, ensure bags are sealed after use and stored appropriately to prevent dust
Trackout		Access gates to be located at least 10m from receptors where possible. 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). Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned. 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.

Operational phase

As stated in Camden's Development Policies Local Development Framework[11], mitigation measures will be expected in developments that are located in areas of poor air quality.

The dispersion modelling carried out suggest that exceedances of the NO_2 annual mean AQO and potentially the hourly mean AQO may occur throughout the Proposed Development, particularly in Block A. Mitigation is therefore required to reduce the exposure of future residents of the Development to high NO_2 concentrations. It is considered best practice to mitigate those areas which exceed the AQO, and, in view of uncertainties in dispersion modelling, those fall within 5% of exceeding the AQO. As such, residential units on all floors within Block A of the development, as a minimum, will require mitigation to ensure that they have a source of air with NO_2 concentrations below the annual mean AQO.

In view of the high NO_2 concentrations around Block A, it is also recommended that a Mechanical Ventilation with Heat Recovery (MVHR) system equipped with NO_2/NO_X filters is considered. There are systems available which incorporate dry chemical scrubbing media to reduce NO_2 and NO_X concentrations for indoor air quality management purposes[30]. It is recommended that developers adhere to European standard CEN/TR 14788, *Ventilation for buildings — Design and dimensioning of residential ventilation systems*, to ensure that the air filters are fitted and maintained correctly. This type of ventilation system permits the façades to these residential units to be sealed and therefore limits the ingress of both noise and air pollutants. PM_{10} filters are not required for the ventilation system as all predicted concentrations of PM_{10} and $PM_{2.5}$ are below the AQO.

All receptors in Block B are in APEC Band A, indicating that there are no air quality grounds for refusal; however mitigation of any emissions should be considered, according to London Councils guidance. Mitigation should be considered for ground floor units in Block B, in particular, to ensure that NO_2 concentrations are below the AQO throughout the Proposed Development site. It is recommended that air with NO_2 concentrations below the annual mean AQO is extracted from the roof level at the back of the property into residential units.

[30] AAC Swiftpack NITROSORB Filter System - http://www.aaceurovent.co.uk/wp-content/uploads/2015/08/AACNITROSORBBrochure2014.pdf

7. Conclusions

An assessment of construction-related effects has been undertaken following the IAQM guidance. The Development Site is defined as 'medium risk' of dust soiling for demolition and construction activities, and 'low risk' for earthworks and trackout. Human health and ecological receptors are at a low risk from construction activities and negligible risk from demolition, earthworks and trackout activities. Impacts during the construction of the Development, such as dust generation and plant vehicle emissions, are predicted to be of short duration. Mitigation measures have been recommended to reduce impacts so that they are not significant.

As the development is car-free and there is no energy centre proposed, the development is not considered to have an impact on the existing residential receptors and the Proposed Development is considered to be air quality neutral for building emissions and transport emissions.

An assessment of the potential air quality exposure for the redevelopment of an urban site has been undertaken. ADMS-Roads (version 4.0) modelling has been used to model dispersion from traffic to determine likely NO_2, PM_{10} and $PM_{2.5}$ concentrations at proposed residential receptors with the Proposed Development. Predicted concentrations at receptors were then compared to the Air Quality Objectives.

All predicted concentrations at development receptors decrease as height from the ground increases and distances from Kilburn High Road increases. The annual mean AQO of 40 μgm^{-3} is exceeded at all modelled ground floor locations throughout Block A at the Proposed Development site. Modelled concentrations are above 60 μgm^{-3} at some locations, indicating that the hourly mean AQO for NO_2 is likely to be exceeded. The maximum concentration is modelled on the ground floor at the front of Block A, where an annual mean concentration of 66.9 μgm^{-3} is predicted. As exceedances of the annual mean and hourly mean AQO for NO_2 are predicted at several receptor locations and heights throughout Block A at the Proposed Development site, mitigation measures are required to ensure concentrations are below the AQO at proposed residential units.

All concentrations in Block B are predicted to be below the AQO of 40 μgm^{-3}. The maximum predicted concentration is 37.1 μgm^{-3} at the front of the Block.

It was predicted that concentrations of PM_{10} and $PM_{2.5}$ are likely to be below the Air Quality Objectives at all modelled receptor locations in 2017. The maximum annual mean PM_{10} and $PM_{2.5}$ concentrations at the development predicted for 2017 are 25.0 $\mu g\ m^{-3}$ and 19.4 $\mu g\ m^{-3}$, respectively.

In conclusion, the dispersion modelling carried out suggests that exceedances of the NO_2 annual mean AQO and potentially the hourly mean AQO may occur at proposed receptor locations in Block A and Block B at the Development. As a result, the development should be designed with a ventilation system to draw air from areas with lower NO_2 concentrations than the roadside. It is also recommended that the use of a Mechanical Ventilation with Heat Recovery (MVHR) system equipped with NO_2/NO_X filters is considered to ensure that proposed receptor locations have a source of air with NO_2 concentrations below the annual mean AQO.

Appendix A
Modelling Software

About ADMS-Roads

The ADMS-Roads dispersion model, developed by CERC[6], is a tool for investigating air pollution problems due to small networks of roads that may be in combination with industrial sites, for instance small towns or rural road networks. It calculates pollutant concentrations over specified domains at high spatial resolution (street scale) and in a format suitable for direct comparison with a wide variety of air quality standards for the UK and other countries. The latest version of the model, version 4.0, was used in this study.

ADMS-Roads is referred to as an advanced Gaussian or, new generation, dispersion model as it incorporates the latest understanding of the boundary layer structure. It differs from old generation models such as ISC, R91 and CALINE in two main respects:

- It characterises the boundary layer structure and stability using the boundary layer depth and Monin-Obukhov length to calculate height-dependent wind speed and turbulence, rather than using the simpler Pasquill-Gifford stability category approach; and
- It uses a skewed-Gaussian vertical concentration profile in convective meteorological conditions to represent the effect of thermally generated turbulence.

Validation

ADMS-Roads has been validated using UK and US data and has been compared with the DMRB spreadsheet model and the US model, CALINE. Validation of the ADMS and ADMS-Urban models are also applicable to the performance of ADMS-Roads as they test common features: basic dispersion, modelling of roads and street canyons, the effect of buildings and the effect of complex terrain. These validation studies are all reported on the CERC web site[31].

In addition, ADMS-Urban has been validated during its use in modelling many urban areas in the UK for local authorities as part of LAQM, Heathrow Airport for the Department for Transport[32] and all of Greater London for a Defra model inter-comparison exercise[33].

[31] http://www.cerc.co.uk/environmental-software/model-documentation.html#validation Date of access: 19th October 2012

[32] CERC (2007) Air Quality Studies for Heathrow: Base Case, Segregated Mode, Mixed Mode and Third Runway Scenarios Modelled Using ADMS-Airport, prepared for the Department for Transport, *HMSO* Product code 78APD02904CERC

[33] Carslaw, D. (2011), Defra urban model evaluation analysis – Phase 1, a report to Defra and the Devolved Authorities. http://uk-air.defra.gov.uk/library/reports?report_id=654 Date of access: 19th October 2012

Appendix B
ADMS-Roads Input

Tables B1 shows the traffic data obtained from the DfT traffic counts[26]. Road widths were estimated from information available on Google Street View[34].

Table B1 ADMS-Roads input data from 2015 DfT data

Source	AADT	%Cars	LGV%	Rigid HDV%	Artic HGV%	%Bus and Coach	%Motorcycle	Average Speed (kmh^{-1})	Canyon Width (m)	Canyon Height (m)
Kilburn High Road (2)	46617	74.2	14.6	3.1	0.5	4.1	3.4	25	20	14
Kilburn High Road (3aQ)	46617	74.2	14.6	3.1	0.5	4.1	3.4	5	28	12

Table Notes:
2-sided street canyons were modelled along Kilburn High Road to represent the 3 to 4-storey buildings on either side of the road at the diffusion tube verification location and the Proposed Development Site.
A speed of 5 kmph was used along the junction where diffusion tube BRT 57 was located to represent queuing traffic at the traffic lights.
The speed limit on Kilburn High Road is 30 mph (50 kph); however an average speed of 25 kph has been assumed where the Proposed Development is located to account for traffic congestion and turning vehicles.

[34] https://www.google.com/maps/views/home?hl=en-GB&gl=gb

Appendix C
ADMS-Roads Model Verification

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is specifically listed in the Defra's LAQM.TG (09)[35] guidance as an accepted dispersion model.

Model validation undertaken by the software developer (CERC) will not have included validation in the vicinity of the Proposed Development site. It is therefore necessary to perform a comparison of modelled results with local monitoring data at relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including uncertainties associated with:

- Background concentration estimates;
- Meteorological data;
- Source activity data such as traffic flows and emissions factors;
- Model input parameters such as surface roughness length, minimum Monin-Obukhov length;
- Monitoring data, including locations; and
- Overall model limitations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

Model setup parameters and input data were checked prior to running the models in order to reduce these uncertainties. The following were checked to the extent possible to ensure accuracy:

- Traffic data;
- Road widths;
- Distance between sources and monitoring as represented in the model;
- Speed estimates on roads;
- Source types, such as elevated roads and street canyons;
- Selection of representative meteorological data;
- Background monitoring and background estimates; and
- Monitoring data.

Suitable local monitoring data for the purpose of verification is available for annual mean NO_x/NO_2 concentrations as shown in Table C1 below. Monitoring site BRT 57 was used for verification purposes as it is on the modelled road. The automatic monitor and diffusion tube at Swiss Cottage were considered for verification but it was decided that the location of BRT57 alone was more representative of conditions at the Proposed Development site.

Verification could not be undertaken for modelled particulate matter because the annual mean monitored PM_{10} concentration for 2015 at the Swiss Cottage automatic monitoring station (20.0 µgm^{-3}) was less than the Defra gridded background concentration (20.2 µgm^{-3}).

[35] Defra (2009) Local Air Quality Management – Technical Guidance 09

Table C1 Local monitoring data suitable for ADMS-Roads model verification

Location	2015 Annual Mean NO_2 (μgm^{-3})	X (m)	Y (m)
BRT 57	100.7	525461	183558

Verification Calculations

The verification of the modelling output was performed in accordance with the methodology provided in Annex 3 of LAQM.TG (09). Table C2 shows that there was under-prediction of monitored concentrations at the monitoring sites.

Table C2 Verification, modelled versus monitored

Site	2015 Modelled Annual Mean NO_2 (μgm^{-3})	2015 Monitored Annual Mean NO_2 (μgm^{-3})	% (Modelled-Monitored)/ Monitored
BRT57	50.9	100.7	-49.49

Table C3 shows the comparison of modelled road-NO_X, a direct output from the ADMS-Roads modelling, with the monitored road-NO_X, determined from the LAQM NO_X to NO_2 conversion tool.

Table C3 Comparison of modelled and monitored road NO_x to determine verification factor

Site	2015 Modelled Annual Mean Road NO_X (μgm^{-3})	2015 Monitored Annual Mean Road NO_X (μgm^{-3})	Ratio
BRT57	40.7	196.7	4.83

Table C4 shows the comparison of the modelled NO_2 concentration calculated by multiplying the modelled road NO_X by the average adjustment factor of 4.83 and using the LAQM's NO_X to NO_2 conversion tool to calculate the total adjusted modelled NO_2.

Table C4 Comparison of adjusted modelled NO_2 and modelled NO_2

Site	2015 Background NO_X Concentration	2015 Background NO_2 Concentration	2015 Adjusted Modelled Annual Mean NO_2 (μgm^{-3})	2015 Monitored Annual Mean NO_2 (μgm^{-3})	% (Modelled-Monitored)/ Monitored
BRT57	56.2	33.4	100.7	100.7	0%

Following adjustment the NO_2 concentration matches the monitored concentration. Modelled NO_2 and PM_{10} concentrations have been adjusted using this adjustment factor.

Appendix D
ADMS-Roads Results

Table D1 Annual mean 2017 predicted concentrations (μgm^{-3})

Block	Receptor	NO_2	APEC Band	PM_{10}	APEC Band	$PM_{2.5}$
Block A	R1 Ground	**66.91**	C	25.01	A	19.41
	R1 1st Floor	**65.53**	C	24.77	A	19.17
	R1 2nd Floor	**64.66**	C	24.63	A	19.02
	R1 3rd Floor	**64.08**	C	24.53	A	18.92
	R2 Ground	**55.25**	C	23.08	A	17.48
	R2 1st Floor	**43.52**	C	21.34	A	15.74
	R2 2nd Floor	35.43	A	20.26	A	14.66
	R2 3rd Floor	31.51	A	19.77	A	14.17
	R3 Ground	**42.81**	C	21.24	A	15.64
	R3 1st Floor	39.33	B	20.77	A	15.17
	R3 2nd Floor	35.45	A	20.27	A	14.66
	R3 3rd Floor	32.10	A	19.85	A	14.24
	R4 Ground	**42.40**	C	21.19	A	15.58
	R4 1st Floor	39.09	B	20.74	A	15.13
	R4 2nd Floor	35.37	A	20.26	A	14.65
	R4 3rd Floor	32.09	A	19.84	A	14.24
Block B	R5 Ground	37.13	A	20.48	A	14.88
	R5 1st Floor	35.83	A	20.31	A	14.71
	R5 2nd Floor	34.09	A	20.09	A	14.49
	R5 3rd Floor	32.09	A	19.84	A	14.24
	R6 Ground	36.65	A	20.42	A	14.81
	R6 1st Floor	35.46	A	20.27	A	14.66
	R6 2nd Floor	33.86	A	20.07	A	14.46
	R6 3rd Floor	31.99	A	19.83	A	14.23
	R7 Ground	35.49	A	19.72	A	14.33
	R7 1st Floor	34.89	A	19.65	A	14.25
	R7 2nd Floor	34.02	A	19.54	A	14.14
	R7 3rd Floor	32.86	A	19.39	A	14.00
	R8 Ground	35.28	A	19.70	A	14.30
	R8 1st Floor	34.71	A	19.62	A	14.23
	R8 2nd Floor	33.87	A	19.52	A	14.12

Block	Receptor	NO_2	APEC Band	PM_{10}	APEC Band	$PM_{2.5}$
	R8 3rd Floor	32.75	A	19.38	A	13.99

Exceedances of the annual mean AQO are shown in **bold.**
Concentrations > 60 µgm^{-3}, indicative of exceedances of the short-term AQO for NO_2, are underlined.

Appendix E
Annualisation

Short-term to long-term data adjustment

Diffusion tube BRT57

Data capture at the diffusion tube site BRT57 at Kilburn Bridge was below the recommended 75%, therefore annualisation was undertaken, in accordance with the guidance in Box 3.2 of LAQM.TG(09) and Box 7.9 of LAQM.TG(16). The correction factors in the table below have been derived using the average ratio of the annual mean to the period mean for the monitoring data obtained from the North Kensington, Horseferry Road and Bloomsbury urban background monitors, which are available on the London-air website[36]. These factors were applied to the measured period mean at the diffusion tube site to annualise the data.

Annual mean concentrations for 2015 were based on monitoring data for January 2015 and July to December 2015 inclusive.

Table E1 Adjustment factors to estimate annual mean concentrations at the temporary automatic monitor at Prince Avenue

Pollutant	Dates	Long term site	Annual mean	Period mean	Ratio	Average
NO_2	January, July – December 2015	North Kensington, Kensington	31.7	32.1	1.0	1.2
		Horseferry Road, Westminster	39.2	33.5	1.2	
		Bloosmbury, Camden	48.3	34.8	1.4	

The average results before annualisation are presented in Table E3.

Table E2 BRT57 monitored annual mean NO_2 results pre- and post-annualisation in 2015 (μgm^{-3})

Pollutant	Pre-Annualisation	Post-Annualisation
NO_2	85.3	100.7

[36] https://www.londonair.org.uk/LondonAir/Default.aspx

Appendix F
Camden's Air Quality Planning Checklist

Travel and Transport

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

No parking.

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

Yes – at least 14 cycle parking slots are proposed in the current plans.

Energy

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.

No CHP proposed.

4) and 5) refer to details of the CHP.

Exposure

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?)

Yes, mechanical ventilation is recommended throughout the development. There is also a green wall and trees/plants proposed throughout the Development Site.

Construction Dust

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?

A qualitative dust risk assessment has been undertaken following the IAQM guidance. The Development Site is defined as 'medium risk' of dust soiling for demolition and construction activities, and 'low risk' for earthworks and trackout. Mitigation measures have been recommended to reduce impacts so that they are not significant.

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