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CHARLIE RATCHFORD EXTRA CARE FACILITY
LOCAL AIR QUALITY ASSESSMENT

RAMBOLL

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1. INTRODUCTION

1.0.1. Ramboll UK Limited (Ramboll) has been commissioned by EC Harris LLP to undertake a local air quality assessment to accompany the planning application for a proposed day centre and extra care housing at Crogsland Road, in the London Borough of Camden (LBC). Which is hereafter referred to as the proposed development.

1.1 Scope of Assessment

1.1.1 This report considers the potential significant impacts of the proposed development in terms of local air quality. The report describes the assessment methodology, the baseline conditions currently existing at the application site and surroundings, the likely significant environmental impacts, the mitigation measures required to prevent, reduce and offset significant adverse impacts and the likely residual impacts after these mitigation measures have been implemented.

1.1.2 The following emissions have been considered in the assessment:

i. Dust arising during the construction phase and the potential to cause nuisance;
ii. The suitability of air quality at the application site for residential use; and
iii. Exhaust emissions from vehicles travelling to and from the site during the operational phase and the potential to affect local pollution concentrations.

1.2 Limitations

1.2.1 Ramboll has been commissioned to appraise the air quality baseline of the application site and identify any potential air quality impacts resulting from the proposed development.

1.2.2 Ramboll has endeavoured to assess all information provided to them during this assessment. The report summarises information from a number of external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon. Information from third parties has not been verified by Ramboll unless otherwise stated in this report.

2. SITE INFORMATION AND PROPOSED DEVELOPMENT

2.1 Site Information

2.1.1 The application site is centred at approximate National Grid Reference 528234, 184503 and is located within the LBC. The location of the application site is shown in Figure 1. The application site area is approximately 0.1Ha.

2.1.2 The application site is currently undeveloped. It is bounded by Crogsland Road, the Haverstock School, residential properties, businesses and community facilities.

2.1.3 The nearest sensitive receptors in the vicinity of the application site are existing residential properties located on Crogsland Road.

2.2 Proposed Development

2.2.1 The applicant is seeking planning permission for construction of:

i. 38 Extra Care Housing Flats as part of the Council's Housing for Older People Strategy to support independent living;

ii. Internal communal space likely to be arranged over the ground floor;
iii. Associated staff accommodation; and
iv. External spaces (no car parking) and amenities.

2.3 Potential Impacts

Construction Phase

2.3.1 During the construction phase, activities on the application site could give rise to dust, which, if transported beyond the application site boundary, could have an adverse effect on local air quality. Dust comprises particles typically in the size range of 20 to 80µm in aerodynamic diameter and is created through the action of crushing and abrasive forces on materials.

2.3.2 Dust can cause nuisance when settled particles show up as deposits on clean surfaces such as cars and window ledges.

Operational Phase

2.3.3 There will not be any significant emissions to air from the proposed development once operational. However operation of the development will introduce users of the proposed development to air quality in a busy urban area of Camden. This has been assessed within this report.

3. RELEVANT POLICY, LEGISLATION AND GUIDANCE

3.1 Introduction

3.1.1 Local air quality is monitored and managed under a range of national and international legislation which sets out procedures, guidelines and standard limits for specific commonly occurring air pollutants. Legislation is based upon the effects of air pollutants to human health and safety, the environment, ecosystems, and effects to buildings and structures.

3.2 International Legislation

European Air Quality Directives 2008/50/EC and 2004/107/EC

3.2.1 The European Air Quality Directive 2008/50/EC[1] on ambient air quality and cleaner air for Europe (CAFE) establishes a strategic framework for setting European-wide limit and/or target values for seven pollutants (nitrogen oxides, particulate matter, sulphur dioxide, ozone, carbon monoxide, lead and benzene). Limit values for heavy metals and polycyclic aromatic hydrocarbons are established by the retained 4th Daughter Directive 2004/107/EC[2] and are based on recommendations made by the World Health Organisation (WHO).

3.2.2 Overall responsibility for achieving the limits lies with the Secretary of State; however, local authorities have a role through their duties to work towards meeting the national air quality objectives (detailed in Section 3.3.5) which are similar, or in some cases more stringent than the EU limit values.

3.3 National Legislation

[1] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. European Commission. (2008).
[2] European Air Quality 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. European Commission. (2004).

Air Quality Strategy for England, Scotland, Wales and Northern Ireland

3.3.1 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) most recently updated in July 2007[3]. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that the European Union and International agreements are met in the UK.

3.3.2 The AQS covers ten air pollutants. These are ammonia (NH_3), benzene (C_6H_6), 1,3 butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), oxides of nitrogen (NO_X) (including nitrogen dioxide NO_2), particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), ozone (O_3), and polycyclic aromatic hydrocarbons (PAHs).

3.3.3 The AQS sets standards and objectives for the ten listed pollutants. Standards are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on the assessment of the effects on human health (including sensitive sub-groups) or ecosystems. In general these are concentration limits above which sensitive members of the public (e.g. children, the elderly and the unwell) might experience adverse health effects. Objectives are policy targets often expressed as maximum concentrations not to be exceeded either without exception or with a limited number of exceedences within a specified timescale.

3.3.4 For some pollutants, there is both a long-term (e.g. annual mean) standard and a short-term (e.g. one-hour mean) standard, to reflect the varying impacts on health of differing exposures to pollutants. Long-term standards are generally lower than short-term standards owing to the chronic health effects associated with exposure to low concentrations of pollutants for longer periods of time.

Air Quality (England) Regulations

3.3.5 Many of the objectives in the AQS were made statutory in England with the Air Quality (England) Regulations 2000[4] and the Air Quality (England) (Amendment) Regulations 2002[5] for the purpose of Local Air Quality Management (LAQM). The objectives for NO_2 and PM_{10} for human health which are relevant to this assessment are as follows:

For NO_2

- The long-term objective is an annual mean concentration of 40µg/m^3 to be achieved by 31 December 2005 and maintained thereafter; and
- The short-term objective is a one-hour mean concentration of 200µg/m^3 not to be exceeded more than 18 times per year to be achieved by 31 December 2005 and maintained thereafter.

For PM_{10}

- The long-term objective is an annual mean concentration of 40µg/m^3 to be achieved by 31 December 2004 and maintained thereafter; and
- The short-term objective is a 24-hour mean concentration of 50µg/m^3 not to be exceeded more than 35 times per year to be achieved by 31 December 2004 and maintained thereafter.

3.3.6 Objectives included in the Air Quality (England) Regulations are generally more stringent than those included within EU legislation and other English regulations. Throughout this report, reference to statutory standards or objectives means those included within the Air Quality (England) Regulations.

[3] The Air Quality Strategy for England, Scotland, Wales and Northern Ireland - Defra - July 2007
[4] The Air Quality (England) Regulations 2000 - Statutory Instrument 2000 No 928
[5] The Air Quality (England) (Amendment) Regulations 2002 - Statutory Instrument 2002 No 3043

3.3.7 The objectives apply at locations where members of the public would be exposed over the relevant exposure period. For example, the annual mean objective applies at the building façades of residential properties and public buildings, but does not apply in gardens of residential properties, at the building façades of offices or other places of work or at kerbside locations where public exposure would be short term. The one hour mean objective would apply at any outdoor location where members of the public might reasonably be expected to spend an hour or longer.

Local Air Quality Management (LAQM)

3.3.8 Part IV of the Environment Act 1995 requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider the present and future air quality and whether any air quality objectives prescribed in regulations are being achieved or are likely to be achieved in the future.

3.3.9 Where any of the prescribed air quality objectives are not likely to be achieved the authority concerned must designate an air quality management area (AQMA).

3.3.10 For each AQMA the local authority has a duty to draw up an air quality action plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the air quality objectives. Local authorities are not statutorily obliged to meet the objectives, but they must show that they are working towards them.

3.3.11 Defra has published technical guidance for use by local authorities in their review and assessment work. This guidance, referred to in this report as LAQM.TG(09)[6], has been reviewed and used, where appropriate, within the assessment.

Local Air Quality Management in the London Borough of Camden

3.3.12 The whole Borough of Camden has been declared an AQMA due to elevated concentrations of annual mean NO_2 and 24 hour PM_{10} caused primarily by emissions from road traffic.

The London Borough of Camden Air Quality Strategy

3.3.13 The London Borough of Camden's A Clean Air Action Plan for 2013-2015 for Camden[7] sets out a range of actions the Borough intends to take to reduce NO_2 and PM_{10} concentrations. There are 37 actions split into five sections:

- Section 1: Reducing transport emissions
- Section 2: Reducing emissions associated with new development
- Section 3: Reducing emissions from gas boilers and industrial processes
- Section 4: Air quality awareness-raising initiatives
- Section 5: Lobbying and partnership working

3.3.14 Table 1 details Section 2 of the document on reducing emissions associated with new developments.

Table 1 Section 2 Reducing Emissions Associated With New Developments

Objective	Description
14	Require developers to undertake an air quality assessment (AQA) in circumstances where a new development could have a negative impact on air quality, and provide an air pollution mitigation plan where necessary.

[6] DEFRA: Part IV The Environment Act 1995 Local Air Quality Management Technical Guidance LAQM.TG(09) February 2009
[7] Camden's Draft Clean Air Action Plan 2013-2015, for Public Consultation. Sourced August 2014

Objective	Description
15	Require developers to submit Construction Management Plans in accordance with the London Best Practise Guidance to Control Dust and Emissions from Construction and Demolition. Through onsite pollutant monitoring, ensure that large developments are adhering to the CMP requirements.
16	Continue to use planning conditions and obligations to require developers to adopt measures which will reduce transport emissions, such as requesting travel and business plans, installing electric vehicle recharging infrastructure, and allocating car club bays.
17	Review and update Camden's air quality policies and guidance in line with the National Planning Policy Framework April 2012, and revised Best Practice Construction Guidance from the GLA, which is due end at the end of 2012.
18	Require development sites to meet the Mayor of London's energy hierarchy, with high standards of sustainable building design and construction, and consideration of CHP and renewables. Developers must ensure that best practice requirements for controlling NO_x and PM_{10} emissions from biomass boilers and CHP are met.

3.4 National Planning Policy

National Planning Policy Framework (NPPF)

3.4.1 The NPPF[8] sets out the Government's planning policies for England and how these are expected to be applied. This replaces previous pollution control guidance contained within Planning Policy Statement (PPS) 23.

3.4.2 The NPPF advises that the planning system should prevent both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of air pollution.

3.4.3 The following paragraphs from the NPPF are considered relevant to air quality:

i. *109: The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;*

ii. *120: To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account; and*

iii. *124: 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.*

[8] National Planning Policy Framework, Department for Communities and Local Government, August 2014

3.4.4 The Government published Planning Practice Guidance for England[9] on 6th March 2014 which has a section on air quality that outlines its role in the planning process and states how detailed air quality assessments need to be. This guidance has been taken into account whilst undertaking the assessment.

3.5 Regional Planning Policy

The London Plan

3.5.1 Planning policy in respect of development planning and air quality management is also presented in the London Plan[10]. Policy 7.14: Improving air quality, from the London Plan states that proposals should:

i. Minimise exposure to existing poor air quality, make provision for addressing air quality problems and where development is likely to be used by large numbers of people particularly vulnerable to poor air quality, set-up design solutions, buffer zones and travel plans for promoting a greater use of sustainable transport modes;
ii. Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance;
iii. Be at minimum 'air quality neutral' and not lead to further deterioration of existing poor air quality;
iv. Ensure that where provision needs to be made to reduce emissions from a development, this is generally made on-site; and
v. Where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations.

Clearing the Air: The Mayor's Air Quality Strategy 2010

3.5.2 Regarding new developments, the Strategy plans to make use of the existing planning system to ensure that no new development has a negative impact on air quality in London. It also aims to implement the Construction Best Practice Guidance[11] on all construction sites across London.

3.5.3 The Strategy identifies a small number of sites in London which are most at risk of exceeding the EU daily mean limit value for PM_{10} in 2011. These priority locations (which do not include the location of the Proposed Development) will be the focus of targeted actions that the Mayor, TfL and London Boroughs will introduce to improve air quality. These actions include the following measures:

i. Road cleaning and the application of dust suppressant;
ii. No-idling enforcement;
iii. Changing timings and removing signals;
iv. Capture benefits of new powers to manage road works;
v. Construction site vehicle cleaning; reduced stacking of construction delivery vehicles to reduce idling;
vi. Regular weekend road closures to promote walking and cycling;
vii. Deployment of lower emission buses;
viii. Integrating air quality improvements in planned public realm schemes; and
ix. Managing the flow of traffic to improve air quality.

[9] Planning Practice Guidance [online] Available at http://planningguidance.planningportal.gov.uk/ [date accessed 14 April 2014]
[10] The London Plan: Spatial Development Strategy for Greater London. July 2011
[11] The Control of Dust and Emissions from Construction and Demolition Best Practice Guidance, Produced in partnership by the Greater London Authority and London Councils, November 2006

3.6 Local Planning Policy

The London Borough of Camden Local Development Framework

3.6.1 The London Borough of Camden's Local Development Framework[12], Section 2 includes four Core Strategies (CS) related to air quality as follows:

i. *CS9 Achieving a successful Central London – The Council is developing and promoting schemes to encourage walking and cycling within the Borough to further improve air quality;*
ii. *CS11 Promoting sustainable and efficient travel – The Council is currently embarking on projects to improve public transport networks, promoting sustainable travel (including private travel) and encouraging the sustainable movement of freight;*
iii. *CS13 Tackling climate change through higher environmental standards – The Council requires development and construction to meet the highest environmental standards and promotes local energy generation; and*
iv. *CS16 Improving Camden's health and wellbeing – The Council recognises that Camden has poor air quality and as a result, the whole Borough has been designated an AQMA. An Air Quality Action Plan has been produced and the Council recognises the impact of poor air quality on human health.*

The London Borough of Camden's Development Policies

3.6.2 Camden's development policies[13] are part of their Local Development Framework and outline detailed planning criteria which are used in order to determine planning permissions.

3.6.3 There are seven development policies which relate to the Proposed Development which are outlined in Table 3 below:

Table 3 The London Borough of Camden's Development Policies

Policy	Description
DP2 – Making full use of Camden's capacity for housing	The Council will seek to maximise the use of land which is underused or vacant for the construction of new homes, including self-contained accommodation and bedsits. This is in conjunction with Core Strategy Policy CS6 which outlines the Council's need to maximise the number of homes within the Borough.
DP9 – Student housing, bedsits and other housing with shared facilities	The Council seeks to promote a diverse range of housing, including appropriate accommodation for students. This is in line with CS6. DP9 shows the Council will support the development of housing with shared facilities. DP9 indicates that housing should be accessible the institutions it is serving, provide accommodation for higher education institutions within Camden or adjacent boroughs and include a range of flat layouts. Furthermore, the Council recognises that the construction of student accommodation will relieve the pressure on private rented homes in the area.
DP17 – Walking, cycling and public transport	This policy sets out to promote the use of public transport and reduce the number of private vehicles on the road. The Council points out that it will resist developments that will be dependent on private transport. DP17 states that developments should make necessary provisions for cyclists and pedestrians.
DP22 - Promoting sustainable design and construction	Promoting sustainability is a key concept of Camden's core strategy. DP22 states that the Council will require developments to incorporate sustainable design. Developments of over 5 dwellings or more should address the sustainable design principles and should consider, for example: layout, optimising natural ventilation, bicycle storage, level of insulation, source of energy used and educational elements.
DP26 – Managing the impact of	The Council states that it will protect the quality of life of surrounding occupiers and neighbours to a proposed development. DP26 notes factors that will be taken into consideration include: overshadowing and outlook, noise and vibration and odour, dust

[12] Camden Core Strategy 2010
[13] Camden Development Policies 2010-2025. London Borough of Camden, November 2010

Policy	Description
development on occupiers and neighbours	and fumes. The Council acknowledge the poor air quality within Camden and aims to promote developments which will prevent occupants being exposed to pollutants.
DP27 – Basements and lightwells	DP27 notes that developments with basement levels will need to demonstrate structural stability, have no impact on the risk of flooding and not cause any loss of local amenity. However, the Council recognises that basement floors of a development help to utilise the limited amount of land available for development within Camden.
DP32 – Air quality and Camden's clear zone	Where development could cause adverse harm to air quality, as indicated by an Air Quality Impact Assessment, planning permission will be refused unless the effects are mitigated. In the growth area of West Hampstead (as highlighted in the Core Strategy), developments will need to be "well protected against air and noise pollution".

3.7 Planning guidance

The London Councils' Air Quality and Planning Guidance

3.7.1 This Planning Guidance[14] is aimed at developers, their consultants and local authorities. It provides technical advice on how to deal with planning applications that could have an impact on air quality.

3.7.2 An Air Pollution Exposure Criteria (APEC) is set out in this document to help local authorities assess the significance of exposure to air pollution and the levels of mitigation required for new developments. The APEC table is reproduced in Table 2.

Table 2 Significance Criteria from London Councils Air Quality and Planning Guidance

	Applicable Range NO_2 Annual Mean	Applicable Range PM_{10}	Recommendation
APEC – A	>5% below national objective	Annual Mean: >5% below national objective 24hr: >one-day less than national objective	No air quality grounds for refusal; however, mitigation of any emissions should be considered
APEC – B	Between 5% below or above national objective	Annual Mean: Between 5% above or below national objective 24hr: Between one-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.
APEC – C	>5% above national objective	Annual Mean: >5% above national objective 24hr: >one-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. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures

[14] The London Councils Air Quality and Planning Guidance Revised Version January 2007

3.7.3 This Guidance has been used, where appropriate within this assessment.

The London Borough of Camden's Planning Guidance

3.7.4 LBC have published a planning guidance document[15] and air quality is contained within the Amenity Section. The guidance states that Camden aims for all development to have a neutral impact on air quality and 'not lead to further deterioration of air quality'.

3.7.5 It is outlined within the guidance that exposure of occupants to poor air quality should be minimised from the design of structures. In addition to this, mitigation measures for reducing the impact of development on air quality should be included.

4. METHODOLOGY

4.1 Scope of the Assessment

4.1.1 The scope of the assessment has been determined by consideration of the following:

i. A review of the development proposals;
ii. Consultation with the Senior Sustainability Officer (Air Quality) at the LBC;
iii. A review of the local air quality data surrounding the application site, including data from local authorities and the UK-AIR: Air Information Resource by DEFRA; and
iv. Desk study to confirm nearby sources of emissions to air.

4.1.2 The assessment of existing baseline conditions has been undertaken utilising the following sources of information:

i. Local authority websites[16] and local air quality reports;
ii. Defra website[17]; and
iii. Environment Agency website[18].

4.2 Consultation with the London Borough of Camden

4.2.1 Consultation was undertaken with the Senior Sustainability Officer (Air Quality) Poppy Lyle to agree the scope and methodology of the air quality assessment for the proposed development.

4.2.2 Correspondence is available in Appendix A.

4.3 Construction Phase

Dust

4.3.1 An assessment of the impacts of dust emissions during construction has been undertaken by considering relevant guidance[19] and the availability and applicability of dust control measures.

4.3.2 The Guidance describes the factors which affect the potential for dust to be created and released from the application site during construction activities and to migrate to, and be deposited on surfaces and cause nuisance. These factors are as follows:

- The nature, scale and duration of activities;
- Dust control measures employed;
- The local climate and meteorology; and

[15] London Borough of Camden (2011). Camden Planning Guidance CPG6 Amenity
[16] http://www.camden.gov.uk/ccm/navigation/environment/green-camden/air-quality/ sourced August 2014
[17] http.uk-air.defra.gov.uk sourced August 2014
[18] www.environment-agency.gov.uk sourced August 2014
[19] Guidance on the assessment of dust from demolition and construction, 2014, Institute of Air Quality Management

- The character and land use of the surrounding area.

4.3.3 The likelihood of dust nuisance to occur has been assessed by consideration of each of the factors above and following IAQM Guidance. Construction dust impacts have been assessed within 350m of the application site boundary.

4.4 Operational Phase

Air Quality Neutral Assessment

4.4.1 An Air Quality Neutral (AQN) Assessment needs to be undertaken for the building following guidance[20]. Impacts are determined by comparing the estimated building emissions of the proposed development to the building emission benchmark using default emission factors and the energy demand of the proposed development in kilowatt hour per annum. However at this stage of planning the energy demand of the prosed development has not be determined, once this is known an AQN assessment will need to be completed.

Site Suitability

4.4.2 Impacts from vehicle emissions on nearby roads have been assessed using the Breeze Roads CAL3QHC(R) air quality dispersion model and following guidance published by DEFRA. The model uses local traffic survey data and digitised meteorological observation data collected at a Met Office observation station representative of conditions at the site itself.

4.4.3 The assumed opening year of the proposed development, i.e. when the proposed development will be completed and fully occupied, is 2016. It is likely that improvements in background concentrations and vehicle exhaust emissions from 2013 to 2016 will result in reductions in near road concentrations in the future. Measurements recently made by local authorities, however, have not demonstrated the improvement in concentrations that would be expected, when considering government predictions of background concentrations and vehicle emission factors.

4.4.4 Defra's background prediction maps[21] have been used for background NO_X and NO_2 for the model verification, opening year site suitability and impact assessment.

4.4.5 A summary of the traffic data used in the assessment, detailing the annual average daily traffic (AADT) flows, average vehicle speeds and HGV percentages for both the existing baseline and the future with and without development scenarios, is presented in Appendix B.

4.4.6 The Emissions Factor Toolkit Version 6.0.1, released 2014, has been used to calculate vehicle emissions of NO_X and PM_{10}. The Emission Factor Toolkit[22] inputs and outputs are presented in Appendix B.

4.4.7 In accordance with guidance, modelled baseline concentrations have been compared to measured concentrations and the modelled results adjusted accordingly. This process is known as model verification, and details of the procedure together with further details regarding the modelling calculations and methodology are given in Appendix C.

[20] Air Quality Consultants (2014) Air Quality Neutral Planning Support Update:GLA80371

[21] Defra background maps [online] Available at http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013 [Date accessed: 12 August 2014]

[22] Emissions Factor Toolkit Version 6.0.1 Developed on behalf of Defra and the Devolved Administrations by Bureau Veritas, the Highways Agency, AEA, and Transport for London (TfL). (2014) [online] Available at http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html [Date accessed: 12 August 2014]

4.4.8 Conversion of NO_X to NO_2 has been undertaken using Version 4.1 of the NO_X to NO_2 conversion spread sheet released in June 2014 by AEA Technology PLC[23].

4.4.9 The model does not provide a method for the conversion of annual mean NO_2 concentrations to one-hour mean NO_2 concentrations. However, research[24,25] has concluded that exceedances of the one-hour mean objective are unlikely to occur where annual mean concentrations do not exceed 60µg/m^3. This relationship has been used to assess whether exceedances of the hourly mean objective are likely.

4.4.10 Daily mean PM_{10} concentrations were calculated from annual mean PM_{10} concentrations using the method described in Paragraph 2.36 of LAQM.TG(09)[26].

5. BASELINE CONDITIONS

5.0.1. The proposed development site is located in an urban area where air quality is mainly influenced by emissions from road transport. The whole of the LBC has been designated as an AQMA due to poor air quality. There are no industrial pollution sources in the immediate vicinity of the application site that will affect air quality.

5.1 Local Authority Monitoring Data

5.1.1 LBC operates four automatic monitoring sites and also has a number of diffusion tubes in various locations (background, urban, roadside and kerbside).

5.1.2 An automatic monitor is located adjacent to the A41 Finchley Road at the junction with B511, approximately 1.5km from the application site. This site monitors NO_2 and PM_{10} and is classed as a kerbside location (NGR: 526633, 184392). Table 4 below provides NO_2 and PM_{10} annual mean data between 2011 and 2013. This monitoring station is shown on Figure 2.

Table 4 NO_2 and PM_{10} Automatic Annual Mean Data 2011 - 2013

Monitoring Station	Pollutant (µg/m^3)	UK Objective	2011	2012	2013
Swiss Cottage – kerbside	NO_2 Hourly mean	200 µg/m^3 No more than 18 times per year (number of days exceeded)	**79**	**43**	**28**
	NO_2 Annual mean	40 µg/m^3	**70**	**71**	**63**
	PM_{10} Daily Mean	50 µg/m^3 No more than 35 times per year (number of days exceeded)	31	21	8
	PM_{10} Annual mean	40 µg/m^3	27	23	21

Note: numbers in **bold** are exceedances of the AQS.

5.1.3 The monitoring site meets the standards for PM_{10} but exceeds the standards for NO_2 from 2010 to 2013.

[23] Defra NO_x to NO_2 Calculator [online] Available at http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc [Date accessed: 12 August 2014]

[24] D Laxen and B Marner, Analysis of the relationship between one-hour and annual mean nitrogen dioxide at UK roadside and kerbside monitoring sites, July 2003

[25] Cook A, Analysis of the relationship between annual mean nitrogen dioxide concentration and exceedences of the one-hour mean AQS, May 2008

[26] LAQM Technical Guidance (TG09), DEFRA, 2009

5.1.4 The closest NO_2 diffusion tube monitoring site is located approximately 950m from the application site (GR: 529173, 184129) and is shown on Figure 2. This monitoring site is classed as a roadside site. Table 5 below provides NO_2 annual mean data and data capture percentage between 2011 and 2013.

Table 5 NO_2 Diffusion Tube Annual Mean Data 2011 - 2013

Monitoring Station		2011	2012	2013
Camden Road	Roadside	**72.21**	**67.40**	**77.85**
Finchley Road	Kerbside	**73.17**	**72.66**	**83.08**
Frognal Way	Urban background	31.46	28.89	31.95
AQS NO_2 Annual mean		40 µg/m^3		

Note: numbers in **bold** are exceedances of the AQS.

Defra 2011 Background Maps for NO_X, NO_2 and PM_{10}

5.1.5 Defra provides computer modelled predictions of background concentrations[27] of air pollutants over the whole of the UK with a grid resolution of 1km^2. Background concentrations are those levels that would be observed away from specific sources such as roads and industry.

5.1.6 Table 6 shows background data from Defra for the application site.

Table 6 Background Mapped Concentration Data from Defra

Pollutant	OS Grid Ref	Concentration (µg/m^3)			
		2013	2014	2015	2016
NO_X	527500, 184500	52.73	51.27	49.82	47.82
NO_2		32.42	31.66	30.90	29.83
PM_{10}		22.45	22.10	21.74	21.56

5.1.7 Background concentrations shown in Table 6 assume that both ambient concentrations and emissions of NO_X, NO_2 and PM_{10} are reducing with time (as industrial and vehicle emission technology improves).

5.2 Summary of Baseline Data

5.2.1 Monitoring and measured background data show that the annual mean NO_2 concentrations will not meet the objective of 40µg/m^3. However the locations where monitoring is undertaken are not representative of the application site which is away from these busier roads so not such high concentrations are anticipated .

5.2.2 Monitoring and measured background data show that the annual mean PM_{10} concentrations will meet the objective of 40µg/m^3.

[27] Defra NO_x to NO_2 Calculator [online] Available at http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc [Date accessed: 12 August 2014]

6. IMPACTS APPRAISAL AND SITE SUITABILITY

6.1 Construction Phase

Dust Assessment

6.1.1 The main sources of dust during construction will include:

- Earthmoving and site preparation;
- Construction operations;
- Materials handling, storage, stockpiling, spillage and disposal; and
- Fabrication and internal and external finishing and landscaping.

6.1.2 The planned works are expected to commence August 2015 with completion of the proposed development operational by August 2016, totalling 50 weeks.

Dust Control Measures Employed

6.1.3 The Greater London Authority and London Councils produced a Guidance Document[28] to promote best practice and outline mitigation measures which should be followed to reduce dust emissions from construction projects in London. Dust will be controlled through the adoption of the mitigation measures shown in Table 7.

Table 7 Dust Mitigation Measures

Activity	Dust Control Measures
Site planning	Erection of barriers around dusty activities or the site boundary No bonfires or unauthorised burning of material anywhere on the site Location of dusty activities and stockpiles away from the site boundary and sensitive receptors
Construction traffic	Maintenance of construction traffic and plant in good working order and not left running when not in use Covering of all loads entering and leaving the site No site run off of water or mud Routine use of wheel washing and water spraying to clean vehicles leaving the application site Use of ultra-low sulphur diesel in all non-road mobile machinery where available Regularly cleaning and watering of haul roads Imposition of an appropriate site speed limit Regular inspection of local highways and site, and cleaning of highways if necessary Implementation of design controls on construction equipment and vehicles, Use of appropriately designed vehicles for materials handling
Demolition works	Use water or suitable local exhaust as a dust suppressant Use of ventilation systems on cutting equipment Secure covering of skips and minimising drop heights Wrap buildings to be demolished
Site activities	Minimise dust generating activities Use water as a dust suppressant where appropriate Keep stockpiles for the shortest possible time and minimise their surface area, where possible they should be enclosed or securely sheeted Completed earthworks will be covered or vegetated as soon as is practicable

[28] The control of dust and emissions from construction and demolition – Best Practice Guidance, GLA and London Councils, 2006

The Local Climate and Meteorology

6.1.4 Dust impacts would be greatest in dry weather following long periods without rain and with the wind blowing towards sensitive receptors.

6.1.5 A Wind Rose has been produced showing the prevailing wind and wind speeds for the meteorological station at London City for 2013. This wind rose is shown below in Figure 3.

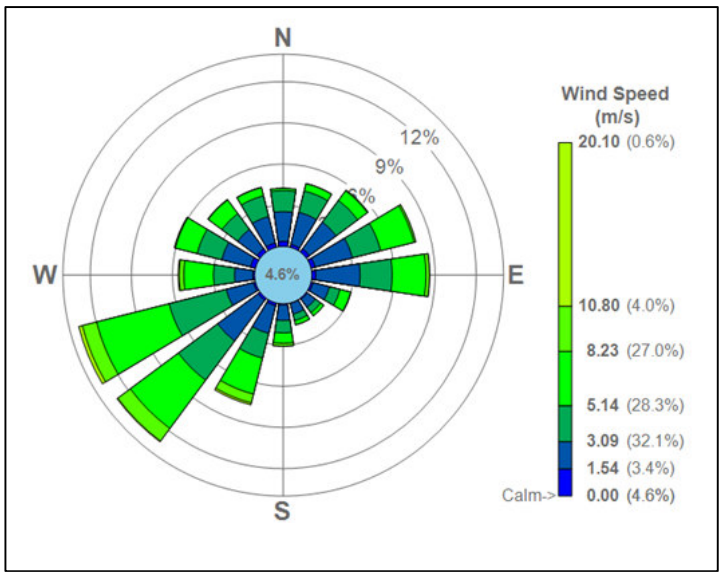

Figure 3 London City 2013 Wind Rose

The Character and Land Use of the Surrounding Area

6.1.6 Depending on wind speed and turbulence it is likely that the majority of dust will be deposited within 100m of the source. It can be seen from Figure 3 that the prevailing wind is north easterly.

6.1.7 Contours of buffer zones showing locations within 350m of the application site and which may therefore experience elevated levels of dust deposition are shown in Figure 4.

6.1.8 The prevailing wind will predominately move dust away to the north east.

6.1.9 Properties within 100m of the application site boundary include residential, office and commercial properties along Crogsland Road and Haverstock School.

6.1.10 A breakdown of the relative locations of sensitive receptors at different distances from the site boundary is provided below in Table 8 in line with IAQM Guidance.

Table 8 Relative Locations of Sensitive Receptors

Distance from Site Boundary (m)	Number of Sensitive Receptors
<20	10-100
20 - 50	>100
50 - 100	>100
100 - 350	>100

6.1.11 There are no nationally or internationally designated ecological sites within 500m of the application site that may be sensitive to increased dust deposition.

6.1.12 The sensitivity of the area surrounding the development was determined to be 'High' for dust soiling and health effects in line with IAQM Guidance.

Assessment of Potential Impact

6.1.13 The risk of potential air quality impacts from demolition, earthworks, construction and trackout (the transport of dust and dirt from the site onto the public road network) was assessed according to guidance developed by IAQM. The summary of risk effects before mitigation was determined to be 'Medium' risk for earthworks and 'Low' risk for demolition and construction, as shown below in Table 9.

Table 9 Summary Risk of Dust Effects with no Mitigation

Source	Dust Soiling Effects	Ecological Effects	Human Health Effects
Demolition	Low risk	N/A	Low risk
Earthworks	High risk	N/A	Medium risk
Construction	Medium risk	N/A	Low risk
Trackout	Medium risk	N/A	Low risk

6.1.14 On the basis of the determined level of risk and sensitivity of the area, the overall significance of the effects was deemed to be not significant with mitigation in place. This impact will also be short term and temporary for the duration of the construction phase.

Construction Vehicles

6.1.15 The maximum number of construction vehicles anticipated to visit the application site during the construction phase will be lower than the 200 HGV movements per day that EPUK Guidance[29] states when an air quality assessment for construction vehicles would be necessary. Therefore this has been scoped out of the assessment.

6.2 Operational Phase

Site Suitability

6.2.1 An assessment of the baseline air quality has been undertaken to assess the air quality at the development site location.

6.2.2 The Breeze model was verified using 2013 monitoring data from the Swiss Cottage automatic monitor. The verification process is outlined in Appendix B.

6.2.3 The receptor locations which have been considered within the assessment are shown on Figure 5.

6.2.4 Table 10 below shows the receptor location results by APEC Category. All of the receptor locations are predicted to be well within the UK air quality objectives when considering the NO_2 and PM_{10} emissions from the nearby roads in 2016.

[29] Development Control: Planning For Air Quality (2010 Update) EPUK, April 2010

6.2.5 All receptors fall within APEC Category A following London Council's Guidance. Full results are provided in Appendix D.

Table 10 Summary of Locations Modelled by APEC category for NO_2 and PM_{10}

APEC Category			Receptor Location
APEC – A	>5% below 40µg/m^3	No air quality grounds for refusal; however, mitigation of any emissions should be considered	CR1 (1) CR2 (2) CR3 (3) CR4 (4) F1 DECK A (5) F1 DECK B (6) F1 DECK C (7) F1 DECK D (8)
APEC – B	Between 5% below or above 40µg/m^3	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.	
APEC – C	>5% above 40µg/m^3	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. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.	

7. MITIGATION MEASURES

7.1 Construction Phase

7.1.1 No additional mitigation measures are proposed additional to those outlined in Table 7.

7.2 Operational Phase

7.2.1 No mitigation measures are proposed.

8. CONCLUSIONS

8.1 Construction Phase

8.1.1 On the basis of the determined level of risk and sensitivity of the area, the overall significance of the effects was deemed to be low risk with mitigation in place. This impact will also be short term and temporary for the duration of the construction phase.

8.2 Operational Phase

Site Suitability

Nitrogen Dioxide

8.2.1 Predicted modelling utilising 2016 background NO_X and NO_2 levels showed that the application site would be within the annual mean objective of 40µg/m^3 at all façade receptor locations at the proposed development for NO_2.

8.2.2 Predicted annual mean NO_2 levels at the application site are all below 60µg/m^3 and therefore it can be assumed that there would be no breach of the one-hour objective of 200µg/m^3.

Particulate Matter

8.2.3 Predicted modelling utilising 2016 background PM_{10} levels showed that the application site would be within the annual mean objective of 40µg/m^3 at all façade receptor locations at the proposed development for PM_{10}.

8.2.4 Overall, both monitoring and modeling data demonstrate that annual mean and short term concentrations of NO_2 and PM_{10} are within the relevant objectives at the application site. Therefore air quality at the site is considered suitable for the intended use of the proposed development.