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Executive Summary

MLM Consulting Engineers Ltd was commissioned by Fairview Ventures Limited ('the Client') to undertake an Air Quality Assessment for the proposed construction of a new residential led mixed-use development in Centric Close, Camden.

The Local Authority responsible for determining the planning application is London Borough of Camden. This report is to support the planning application for the proposed demolition of existing buildings and the erection of 76 residential units and 1,219 sqm of commercial floor space (Use Class B1) over four, five, six and seven storeys providing a mix of one, two and three bed apartments. The development includes a landscaped courtyard and communal amenity areas.

The redevelopment of the site will make a positive enhancement to the visual appearance of the area, providing much needed homes for the local area, including commercial floor space to reflect the Council's aspirations for the area.

The proposed scope of this assessment was forwarded to the Air Quality Team at London Borough of Camden in November 2016 for review and appraisal of the proposed scope and methodology, however no specific comments were received.

The assessment, using the ADMS Roads Extra dispersion model, determined the impact of the emissions from the local traffic on the proposed development, as well as the impact of the operation of the development on local air quality and nearby sensitive receptors. The latter involves the modelling of the emissions from the proposed combined heat and power (CHP) plant and central boilers, plus the impact of worst-case additional traffic flows on local roads.

The modelling results were compared against the objectives set out in the Air Quality (England) Regulations of 2000. The latest guidance from the Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) document 'Land-Use Planning & Development Control: Planning for Air Quality (May 2015 v1.1)' was also used in the assessment. This document was produced as a guide for both consultants and local planners to assist with the use of air quality assessment in the local development control process.

The performance of the ADMS-Roads Extra model has been verified using the ratified monitoring data from the diffusion tube located on Camden Road and Kentish Town Road. An appropriate adjustment factor was applied to the predicted modelling results.

The results of the assessment are as below:

- The objective for the annual mean NO₂ concentration is 40 µg/m³. This objective is forecast to be met at all receptors representative of the proposed development
- The annual mean objective is forecast to be exceeded at six existing receptors in all future scenarios (with and without scheme), due to existing poor air quality
- The short-term hourly objective for NO₂ is expected to be met at all locations. The PM₁₀ and PM_{2.5} concentrations are forecast to meet their respective long and short term objectives by a considerable margin
- In the 2019 'with development' scenario, no new exceedances are created at existing receptors
- The largest impact descriptors ('Slight Adverse') are seen on various floors of the adjacent building but the overall NO₂ concentrations are still below the annual mean objective at these receptors. Impact descriptors at all other existing receptors are negligible

Given the above, it is concluded that the setting of the new mixed-use development is suitable for its proposed purpose in terms of air quality.

A qualitative assessment on the construction phase activities has also been carried out. The risk of the different activities towards dust soiling ranges from '**Low to Medium**', and that for human health impact ranges from '**Negligible to Low**'. Following implementation of the appropriate mitigation measures as outlined in the report, the impact of emissions during construction of the proposed development would be '**not significant**'.

An Air Quality Neutral Assessment was compiled to support the planning application for the proposed development. The assessment indicates that the total NO_x and PM₁₀ emissions from both the road traffic vehicles meet the Air Quality Neutral Benchmark for the residential element of the development, but not the commercial element. Current guidance recommends that in circumstances where the benchmark is exceeded, mitigation measures to reduce emissions may be applied on-site or off-site. Where this is not practical or desirable, some form of pollutant offsetting could be applied. The emissions for the proposed heating plant meet the Air Quality Neutral benchmark and therefore no further action is required with respect to emissions from energy plant.

According to the London Councils Air Quality and Planning Guidance, the Air Pollution Exposure Criteria (APEC) for the proposed new development is **APEC-A**. Current Guidance published by the London Councils suggests that there should be "No air quality grounds for refusal; however mitigation of any emissions should be considered", reinforcing the conclusions from the Air Quality Neutral Assessment.

However, a further range of mitigation measures will be required to offset the exceedance of the Air Quality Neutral Benchmark for the Energy Centre Emissions, should the future capacity of the Energy Centre be expanded to include three or four CHP units. These include a package of sustainable transport initiatives to encourage higher levels of walking, cycling and public transport use will be supported by the submission of a bespoke Travel Plan. The wider campus provides three electric vehicle charging points to encourage uptake of low emission vehicles levels, and a total of 113 cycle parking spaces to encourage modal shift; 24 cycle parking spaces will be located adjacent to the development.

In order to mitigate potential operational phase air quality impacts, a Travel Plan will be submitted to encourage future residents to use alternative transport modes rather than private vehicles, with an aim to further reduce the number of traffic to be generated by the proposed development. Cycle parking will also be provided on site, comprising dedicated, secure storage areas. The scheme will provide a total of 138 long-stay and five short-stay cycle parking spaces, of which 124 long-stay and two short-stay spaces will be provided for residential use.

To minimise the need for future households to own a vehicle and reduce demand for on-site parking, the client will provide support towards existing car clubs within the vicinity of the site (final details to be agreed). It is anticipated that the car free nature of the residential aspect of the development would be secured via Section 106 planning obligation preventing future residents from purchasing parking permits within the surrounding Car Parking Zones.

Air quality constitutes a material consideration in the determination of planning applications. However, with the effective implementation of appropriate mitigation measures listed in this report, it is considered that air quality should not present a constraint to the granting of planning permission for the proposed development on this occasion.

Limitations and Exceptions

- 1 This report and its findings should be considered in relation to the terms and conditions proposed and scope of works agreed between MLM Consulting Engineers Ltd and the client.
- 2 The Executive Summary, Conclusions and Recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon until considered in the context of the whole report.
- 3 This report provides available factual data for the site and the surrounding area at the time of the study and as obtained by the means described in the text. The data is related to the site on the basis of the site location information provided by the Client.
- 4 It should be appreciated that the information that has been made available to date, is not necessarily exhaustive and that further information relevant to the proposed site usage may be provided which could change the overall findings.
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- 7 This report is prepared and written in the context of the proposals stated in the introduction to this report and should not be used in a differing context. Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission. Therefore, with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to us for re-assessment and, if necessary, re-appraisal.

1 Introduction

1.1 General

MLM Consulting Engineers Ltd was commissioned by Fairview Ventures Limited ('the Client') to undertake an Air Quality Assessment for the proposed construction of a new residential led mixed-use development in Centric Close, Camden NW1 7EP.

The Local Authority responsible for determining the planning application is London Borough of Camden (LBC). This report is to support the planning application for the proposed demolition of existing buildings and the construction of a residential led mixed-use development.

The redevelopment of the site will make a positive enhancement to the visual appearance of the area, providing much needed homes for the local area, including commercial floor space to reflect the Council's aspirations for the area.

The proposed scope of this assessment was forwarded to the Air Quality Team at LBC Council in November 2016 for review and appraisal of the proposed scope and methodology, however no specific comments were received.

1.2 Report Structure

The structure of the report is summarised below:

- A brief description of the site and proposed development
- A brief description of the legislation governing air quality in England
- Details of the method and the input data used for the assessment
- Results of the assessment
- Construction Dust Risk assessment
- Air Quality Neutral assessment
- Mitigation measures
- Conclusions

1.3 Objective

The objective of this assessment is to use the Gaussian-based ADMS-Roads Extra software developed by Cambridge Environmental Research Consultants (CERC) to predict the impact of the local air quality on the proposed development, as well as the impact of the operation of the development (including the Energy Centre emissions) on the existing Air Quality Management Area (AQMA) and nearby sensitive receptors. The assessment is based upon Local Authority and historical monitoring data available via the public domain. The scope of the assessment is limited to the pollutants nitrogen dioxide (NO₂) and Particulate Matter (PM₁₀ and PM_{2.5}, i.e. particles with an aerodynamic diameter less than 10 µm and 2.5 µm in diameter respectively).

2 The Site

2.1 Location and Description

The site is located at Centric Close, Camden, and offers good access to Central London via the Euston Road (A501), west to the A40 (Westway) or east to The City.

The site, which is currently occupied by a number of commercial buildings, is situated to the west of Oval Road, opposite the junction with Gloucester Crescent. The western perimeter of the site is formed by the West Coast Main Line, whilst a mixture of residential and commercial properties borders the site to the north and south.

Figure 1 shows the red line application site boundary and the location of the proposed development.

The redevelopment of the site will make a positive enhancement to the visual appearance of the area, providing much needed homes for the local area, including commercial floor space to reflect the Council's aspirations for the area.

2.2 Proposed Development

The proposed development comprises the demolition of existing buildings and the erection of 76 residential units and 1,219 sqm of commercial floor space (Use Class B1) over four, five, six and seven storeys providing a mix of one, two and three bed apartments. The development includes a landscaped courtyard and communal amenity areas.

The latest parking provision is for a total of 14 spaces, with the following breakdown:

- Eight disabled residential parking bays
- One disabled commercial parking bay
- Four commercial parking bays
- One servicing/delivery bay

It is anticipated that the car free nature of the residential aspect of the development would be secured via Section 106 planning obligation, preventing future residents from purchasing parking permits within the surrounding Car Parking Zones.

The proposed scheme includes provision for an on-site CHP and boiler plant. These will be located within the plant room within Block A, with the flue stack exiting 1m above the roof level, which is the highest point of the development.

Figure 2 shows the proposed ground floor layout.

3 Legislation and Policy

3.1 International Legislation and Policy

The European Directive (2008/50/EC)¹ sets legally binding limits for concentrations of outdoor air of major air pollutants that impact public health such as particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂). The European Directive is implemented in the UK under the Air Quality Standards Regulations 2010². The obligations under the Air Quality Standards Regulations 2010 are separate from those of the 2000 and 2002 UK Regulations^{3, 4} because local authorities in the UK will only have powers to manage some of the pollutants in the Air Quality Standards Regulations 2010; most of the source pollutants will be managed by the Environment Agency under the IPPC Regime. Therefore the obligation to meet the Air Quality Standards Regulations 2010 rests with the Secretary of State for Environment.

3.2 National Legislation and Policy

3.2.1 Local Air Quality Management

Part IV of the Environment Act 1995⁵, requires the UK Government to publish an Air Quality Strategy and local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM). The 2007 Air Quality Strategy⁶ establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objectives (NAQOs) for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002.

Table 3.1 presents the NAQOs for the key pollutants of concern in relation to vehicle emissions: NO₂, PM₁₀ and PM_{2.5}.

Table 3.1 Relevant Objectives Set Out in the Air Quality Strategy

Pollutant	Concentrations	Measured As	Date to be Achieved by
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times per year	1 hour mean	31 December 2005
	40 µg/m ³	Annual mean	31 December 2005
Particulate Matter (PM ₁₀)	50 µg/m ³ not to be exceeded more than 35 times per year	24 hour mean	31 December 2004
	40 µg/m ³	Annual mean	31 December 2004
Particulate Matter (PM _{2.5})	25 µg/m ³	Annual Mean	2020

The Air Quality Strategy also introduced a new policy framework for tackling fine particles (PM_{2.5}) including an exposure reduction target. However, although EU Directive 2008/50/EC includes a new regulatory framework for PM_{2.5} this pollutant is not included within LAQM, therefore there is no requirement to assess this pollutant unless as part of an Environmental Impact Assessment (EIA).

The NAQOs apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within the recently published London Local Air Quality Management Technical Guidance 2016 (LLAQM.TG (16))⁷ issued by the Greater London Authority (GLA) to support London boroughs in carrying out their duties under the Environment Act 1995 and connected regulations. Information on where the NAQOs apply is provided in Table 3.2. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways).

Table 3.2 Locations Where Air Quality Objectives 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 façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. 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 objective would apply, together with hotels. Gardens of residential properties. ^a	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and: 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes.	

a – Such locations should represent parts of the garden where relevant public exposure to pollutants is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

3.2.2 National Planning Policy Framework

Published on 27 March 2012, the National Planning Policy Framework (NPPF)⁸ sets out the Government's planning policies for England and how these are expected to be applied. It replaces Planning Policy Statement 23: Planning and Pollution Control⁹ which provided planning guidance for local authorities with regards to air quality.

At the heart of the NPPF is a presumption in favour of sustainable development. It requires Local Plans to be consistent with the principles and policies set out in the Framework with the objective of contributing to the achievement of sustainable development.

Current planning law requires that application for planning permissions must be determined in accordance with the relevant development plan (i.e. Local Plan or Neighbourhood Plan). The NPPF should be taken into account in the preparation of development plans and therefore the policies set out within the Framework are a material consideration in planning decisions.

The NPPF identifies 12 core planning principles that should underpin both plan-making and decision-taking, including a requirement for planning to *'contribute to conserving and enhancing the natural environment and reducing pollution'*.

Under Policy 11: Conserving and Enhancing the Natural Environment the Framework requires the planning system to *'prevent both new and existing developments from contributing to or being put at unacceptable risk or being adversely affected by unacceptable levels of air pollution'*.

In dealing specifically with air quality the Framework states that *'planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan'*.

3.2.3 Control of Dust and Particulates Associated with Construction

Section 79 of the Environmental Protection Act (1990)¹⁰ states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice. Statutory nuisance is defined as:

- *'Any dust or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance'*
- *'Any accumulation or deposit which is prejudicial to health or a nuisance'*

Failure to comply with an abatement notice is an offence and if necessary, the local authority may abate the nuisance and recover expenses.

In the context of the proposed development, the main potential for nuisance of this nature will arise during the construction phase: potential sources being the clearance, earthworks, construction and landscaping processes.

There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist: 'nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

However, research has been undertaken by a number of parties to determine community responses to such impacts and correlate these to dust deposition rates. However, impacts remain subjective and statutory limits have yet to be derived.

3.3 Regional and Local Planning Policy

3.3.1 Cleaning the Air – The Mayor’s Air Quality Strategy, 2010

The Mayor of London’s Air Quality Strategy¹¹ sets out a series of policies and proposals for implementation of the UK AQS and for the achievement of the air quality standards and objectives within Greater London. With regards new developments the following policies are of relevance:

- Policy 1 – Encouraging smarter choices and sustainable travel: The mayor will support a shift to public transport, by only supporting developments that generate high levels of trips in locations with good public transport accessibility, by supporting car free developments and encouraging the inclusion of infrastructure to support sustainable travel, such as cycling, electric vehicle charging points and car clubs
- Policy '6 - Reducing emissions from construction and demolition sites': The London Council's Best Practice guidance will be reviewed and updated, and more vigorously implemented
- Policy '7 - Using the planning process to improve air quality - new developments in London as a minimum shall be 'air quality neutral': The Mayor will encourage boroughs to require emissions assessments to be carried out alongside conventional air quality assessments. Where air quality impacts are predicted to arise from developments these will have to be offset by developer contributions and mitigation measures secured through planning conditions, section 106 agreements or the Community Infrastructure Levy
- Policy '8 - Maximising the air quality benefits of low to zero carbon energy supply': The Mayor will apply emission limits for both PM and NO_x for new biomass boilers and NO_x emission limits for Combined Heat and Power Plant (CHPP). Air quality assessments will be required for all developments proposing biomass boilers or CHPPs and operators will be required to provide evidence yearly to demonstrate compliance with the emission limits
- Policy '9 - Energy efficient buildings': The Mayor will set CO₂ reduction targets for new developments which will be achieved using the Mayor's Energy Hierarchy. These measures will result in reductions of NO_x emissions
- Policy '10 - Improved air quality in the public realm': The Mayor will encourage the improvement of air quality in the public realm by planting vegetation to trap particulate matter. Through the planning system the Mayor will increase the number of green roofs and living walls across London. Additionally, he will encourage the planting of trees in areas of poor air quality

3.3.2 The London Plan 2016

The London Plan 2016¹² was published in March and consolidated the London Plan 2011 with the Revised Early Minor Alterations to the London Plan¹³ and the Further Alterations to the London Plan also published in March 2015¹⁴ along with minor alterations in March 2016. The Plan is the overall strategic plan for London setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. It specifically addresses how development can help support the implementation of the Mayor's Air Quality Strategy and achieve a reduction in pollutant emissions and public exposure to pollution.

Policy 5.7 deals with renewable energy and states that 'all renewable energy systems should be located and designed to avoid any adverse impacts on air quality'.

'Policy 7.14 - Improving Air Quality' requires all development proposals to:

- Minimise increased exposure to existing poor air quality, make provision to address local problems of air quality (particularly within AQMAs) and promote greater use of sustainable transport modes through travel plans
- Promote sustainable design and construction to reduce emissions from demolition and construction of buildings including following current best practice guidance
- Be at least 'air quality neutral' and therefore not leading to further deterioration of existing poor air quality
- Look, in the first instance, to implement measures on-site to reduce emissions from a development. If inappropriate or impractical, other measures should be considered and where found to provide equivalent air quality benefits, planning obligations or planning conditions should be used to ensure their implementation

The policy also states that 'permission will only be granted where a detailed assessment of biomass boilers shows no adverse impact from emissions'.

3.3.3 Air Quality Neutral

All major developments in London, defined in The London Plan as residential use with over ten dwellings and other use with floor space $\geq 1,000 \text{ m}^2$, need to be assessed against emissions benchmarks for buildings and transport. Developments with emissions of NO_x and PM_{10} below these benchmarks are considered to avoid increasing concentrations across London as a whole, and hence referred to as 'air quality neutral'.

Developments that are not 'air quality neutral' and cannot reduce emissions further through on-site mitigation will be required to work with local planning authorities to off-set emissions through off-site measures, either provided directly by the developer, or as part of an existing scheme to improve air quality. The local planning authority will secure these measures through conditions or Section 106 agreements.

3.3.4 Local Planning Policy

LBC Council's Draft Local Plan¹⁵ includes an air quality chapter. Within this, Policy CC4 states that:

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

- Air Quality Assessments are required where development is likely to expose residents to high levels of air pollution. Where the assessment shows that a development would cause harm to air quality, the Council will not grant planning permission unless measures are adopted to mitigate the impact. Similarly, developments that introduce sensitive receptors (i.e. housing, schools) in locations of poor air quality will not be acceptable unless designed to mitigate the impact.
- Development that involves significant demolition, construction or earthworks will also be required to assess the risk of dust and emissions impacts in an AQA and include appropriate mitigation measures to be secured in a Construction Management Plan.

Until the new Local Plan is adopted the Council's Local Development Framework from 2010 remains the relevant set of planning policy documents. A number of policies relating to improving air quality are contained within LBC Council's Core Strategy¹⁶. In particular policy CS16 (Improving Camden's health and wellbeing) recognises the impact of poor air quality on public health, which states that:

"The Council will seek to improve health and well-being in Camden. We 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".

The Core Strategy is supported by the Camden Development Policies document¹⁷. Policy DP32 sets out how LBC Council will expect developments to reduce their impact on air quality:

"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".

LBC Council has also prepared a Supplementary Planning Document - Camden Planning Guidance (CPG) 6 Amenity¹⁸, which provides further guidance on air quality. It includes information on when an air quality assessment will be required, what an air quality assessment should cover and what measures can reduce air quality emissions and protect public exposure. LBC Council's overarching aim is for new development to be 'air quality neutral' and not lead to further deterioration of existing poor air quality. Mitigation and offsetting measures to deal with any negative air quality impacts associated with the development proposals may be required. The development should be designed to minimise exposure of occupants to existing poor air quality. It states that the Council requires assessments for development that could have a significant negative impact in air quality. This impact can arise during both the construction and operational stages of a development as a result of increased NO_x and PM₁₀ emissions.

3.3.5 Air Quality Action Plan

Camden Council has declared an AQMA for NO₂ and PM₁₀ that covers the whole Borough, and has developed an Air Quality Action Plan. Camden's Clean Air Action Plan¹⁹ outlines the Council's commitment to improving air quality in the Borough.

The key objectives of the plan are to reduce PM₁₀ and NO₂ concentrations by:

- Encouraging reductions in fossil fuel use, the adoption of clean fuels and low emission technology and promote energy efficiency
- Raising awareness about air quality in Camden and promote lifestyle changes which can help reduce levels of air pollution and minimise exposure to air pollution

- Improving the health and well-being of the local population, including those that work and visit Camden
- Working in partnership with national and regional bodies, and with local public and private organisations, to foster and drive improvements in air quality
- Leading by example and reduce NO₂ and PM₁₀ emissions associated with the Council's own buildings and transport services
- Ensuring actions which serve to reduce NO₂ and PM₁₀ emissions complement actions to mitigate CO₂ emissions

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4 Local Baseline Air Quality

The Council declared the whole borough as an Air Quality Management Area (AQMA) in 2002, for both nitrogen dioxide (NO₂) and fine particles (as PM₁₀), as modelled predictions confirmed that the annual mean NO₂ and 24-hour PM₁₀ objectives were exceeded.

LBC Council's most recent Annual Progress Report within the public domain was published in 2015 and contains monitoring data from the 2014 calendar year.

LBC Council currently operates five automatic monitoring stations within its area but none of these are close to the proposed development site, all being over 2km away.

Fourteen diffusion tubes were deployed by LBC Council to monitor air quality at mainly roadside, kerbside and urban background locations in 2014.

The closest diffusion tube monitor which measures roadside NO₂ concentrations is CA23 located on Camden Road, approximately 700m to the east of the site and CA16 on Kentish Town Road, approximately 1.2km to the north east of the site (Figure 3).

The captured monitoring data from 2010 to 2014 for these diffusion tubes is summarised in Table 4.1 below.

Table 4.1 Selected NO₂ Diffusion Tubes data for 2012-2015 in RBK

Site	Eastings	Northings	Type	Measured NO ₂ Concentration				
				µg/m ³				
				2010	2011	2012	2013	2014
CA 16	529013	185102	Roadside	74.0	57.2	59.0	65.3	57.8
CA 23	529173	184129	Roadside	84.0	72.2	67.4	77.9	72.2

These locations show a consistent exceedance of the annual objective over the years, with some fluctuation of the measured values between 2010 and 2014.

5 Input for ADMS-Roads Dispersion Modelling

5.1 General

Atmospheric dispersion modelling has been undertaken using the ADMS-Roads Extra software suite (version 4.0.1.0) developed by Cambridge Environmental Research Consultants (CERC). The model uses a number of input parameters to simulate the dispersion of emissions and predictions of pollutant concentration at specified receptors are made across the area of interest. The details of the input parameters are described in the next section.

The following parameters are required to determine the air pollution concentration using the ADMS-Roads model:

- The assessment years
- Receptor(s) location(s) details
- Background concentration
- The road network details (including traffic volume and associated emissions)
- Meteorological data
- Traffic data

The details of the parameters used in the analysis for the site are presented below.

5.2 The Assessment Years

The selected assessment years are 2014 and 2019. 2014 was chosen as the base year to verify the modelling, 2019 was selected as the future year when the new development will be operating. The impact of local air quality on the operational development, as well as the operation of the site heating plant on nearby sensitive receptors, were assessed.

5.3 Receptors Locations

Various points along the façades of the new building have been chosen to assess the impact of local air quality on the proposed development. Also, sensitive receptors along the access roads near the site and the main junction to the south east of the site were chosen to evaluate the impact of emissions from operational traffic increases and the proposed Energy Centre.

Receptors at the proposed development have been selected to represent each floor of the building, assuming the following heights above ground:

- Ground floor (GF) – 1.5 m
- 1st Floor (1) – 5.1 m
- 2nd Floor (2) – 8.5 m
- 3rd Floor (3) – 10.3 m
- 4th Floor (4) – 14.3 m
- 5th Floor (5) – 17.5 m
- 6th Floor (6) – 20.8 m

The diffusion tubes CA16 and CA23 were included as receptors within the model for performance verification purposes. Interrogation of Google Street view images from November 2015 indicated that the diffusion tubes were mounted on a lamp post near the road, and the receptor coordinates were modified to reflect the current status. Table 5.1 and Figure 4 summarise and show the locations of the selected receptors points respectively.

Table 5.1 Receptor Locations

Rec. No	Receptor Name/Description	Easting	Northing	Height (m)
R1	Oval Rd	528553.2	183892.2	1.5
R2	Oval Rd	528589.8	183798.7	1.5
R3	Jamestown Rd	528588.4	183965.4	1.5
R4	Jamestown Rd-FLAT	528785.6	184046.3	4.5
R5	Camden-N-flat	528833.5	183977.6	4.5
R6	Parkway	528780.3	183769.1	1.5
R7	Parkway-flat	528780.3	183769.1	4.5
R8	Camden -S-flat	528954.4	183814.9	4.5
R9	Camden -S -flat	528974.2	183728.8	4.5
R10	Camden Rd- E	528989.3	183934.7	1.5
R11	Camden Rd -E	529037.6	183979.9	1.5
R12	Adjacent Building -8F	528485.6	183924.7	28.0
R13	Adjacent Building -5F	528485.6	183924.7	18.1
R14	Adjacent Building -1F	528485.6	183924.7	5.2
R15	Adjacent Building -GF	528485.6	183924.7	1.5
PR1	North Building-FRONT-GF	528508.1	183912.0	1.5
PR2	North Building-FRONT-6F	528508.1	183912.0	20.8
PR3	North Building-BACK-6F	528489.9	183898.9	20.8
PR4	North Building-Middle-Front	528519.0	183895.3	1.5
PR5	North Building-Middle-Front	528519.0	183895.3	17.6
PR6	North Building-Middle-Back	528500.0	183890.0	17.6
PR7	South Building- Middle-Front	528530.4	183875.5	1.5
PR8	South Building- Middle-Front	528530.4	183875.5	14.3
PR9	South Building- Middle-Back	528512.6	183873.2	14.3
PR10	South Building- Middle-Front	528539.6	183859.8	1.5
PR11	South Building- Middle-Front	528539.6	183859.8	11.1
PR12	South Building- Middle-Back	528525.3	183857.4	11.1

5.4 The Road Network

The following roads were selected for the assessment, for the reasons provided:

- A308 Kingston Hill/Kingston Vale (Main access road to the proposed development, and one of the main sources of air pollution in the area)
- A3 Kingston Bypass/ Roehampton Vale (One of the main sources of air pollution in the area)
Campus access Road (Access route for all traffic accessing the Kingston Hill campus)

Camden High Street-north junction
Camden High Street-south junction
Camden Road - east junction
Parkway- west junction
Oval Road
Jamestown Road

A503- Camden Road - for verification of diffusion tube CA21

A400- Kentish Town Road - for verification of diffusion tube CA16

5.5 Traffic Data

Traffic data for roads around the proposed development in terms of Annual Average Daily Traffic (AADT) were obtained from two sources:

- London Atmospheric Emissions Inventory (2013)
- Via the Transport Consultant (TC) for this project

Traffic flows from 2013 were factored to 2014 and 2019 by applying correction factors of 1.0141 and 1.0927 respectively, generated using the Department for Transport's TEMPRO software (NTEM 7.0).

2014 traffic flows were used in the verification of the dispersion model.

For the 2019 'without development' scenario, the 2013 baseline traffic data were used and projected to 2019 by applying the TEMPRO factor.

The TC provided an estimation of vehicle trips associated with the development; this equated to 42 daily trips from the residential component and 52 associated with the commercial element, making a total of 94 trips in total. These flows were conservatively applied to all road links incorporated into the model for the 2019 'with development' scenario.

Traffic data used in the ADMS model for the 2014 verification, and for all future scenarios in 2019, are presented in Table 5.2.

Table 5.2 AADT Data for Baseline and Future Scenarios for Proposed Development at Centric Close

Road	Baseline (2014)		Future without Development (2019)		Future with Development (2019)	
	AADT	HGV%	AADT	HGV%	AADT	HGV%
A503	27933	9.9	-	-	-	-
A400	20914	18.6	-	-	-	-
Camden High Street-north junction	-	-	10568	19.6	10662	19.4
Camden High Street-south junction	-	-	13335	20.2	13429	20.1
Camden Road - east junction	-	-	16013	13.1	16107	13.1
Parkway- west junction	-	-	15404	6.2	15498	6.2
Oval Road	-	-	56	0.0	150	0.0
Jamestown Road	-	-	56	0.0	150	0.0

Road dimensions were determined from the interrogation of ordnance survey (OS) mapping sets and digital satellite images. A typical national diurnal profile provided by DfT has been incorporated into the models. The diurnal profile used is presented in Appendix A.

5.6 Emissions from Road Traffic

Roads are the main source of pollution in this area. The road source emissions are calculated from traffic flow data using the latest Defra Emission Factor Toolkit (EFT v 7.0, July 2016). The toolkit calculates emission rate for selected pollutants for each modelled road for input in to the atmospheric dispersion modelling.

The most detailed input option along with a vehicle fleet composition year of 2019 was used to derive emission rates for all future scenarios.

5.7 Background Air Pollution

Defra provides estimated background air quality data in the form of background maps. Background concentrations of NO₂, NO_x, PM₁₀ and PM_{2.5} are provided for each 1x1 km grid for each local authority area. The latest data, which is based on 2013 monitoring results across the UK, is summarised in Table 5.3 below.

Table 5.3 Background Concentrations for Site and Diffusion Tube Locations from Defra Background Map for 2014

Pollutant	Estimated NO ₂ Annual Mean Value (µg/m ³)		
	Site (520500, 171500)	Tube CA23 (529500, 184500)	Tube CA16 (529500, 185500)
NO ₂	34.4	35.5	32.3
PM ₁₀	22.9	23.7	22.8
PM _{2.5}	14.9	15.3	

As recommended by guidance provided in the publication 'Local Air Quality Management Technical Guidance LAQM. TG (16)²⁰ published by Department for Environment, Food and Rural affairs (Defra), since there is no local measurement of PM₁₀ and PM_{2.5} background concentrations, the predicted values provided by Defra were used instead.

For model verification, the background data for 2014 were used. For the future year 2019, when the development will become operational, background data for 2014 were used again. The reason for this is that in theory the background concentrations should decrease over the years. This is due to the advancement of technologies for emissions control, leading to lower emissions especially from road vehicles. However, latest air quality monitoring in the borough shows that the downward trend is not as obvious as previously predicted. Therefore as a worst case scenario, it is assumed that the background concentration will not decrease, but remain the same as the base year used for model verification.

5.8 Emissions from Gas Fired Heaters (Point Sources)

For the proposed development, it is understood that there will be one CHP unit and one central boiler provided for heating and power generation purposes. The stacks for the flue gas will run up from the plant room to 1m above the roof of Block A, which is the highest point of the development. Since all the units will be gas-fired, nitrogen oxides (NO_x) will be the main pollutant within its flue gas emission. The client's M&E consultant has provided the following details (Table 5.4) which were included in the ADMS model to consider the impact of the NO_x emissions from the plant. It is understood that the CHP and boilers will run throughout the year, with the CHP averaging a daily run-time of 15 hours, while the boilers will be available 24 hours a day. All operating parameters are included in the dispersion model as appropriate.

Table 5.4 CHP Details and Emissions Data

Parameter	Boilers	CHP	Units
Stack diameter	350	150	mm
Emission rate of NO _x	0.015	0.004	g/s
Exhaust NO _x emissions @ 0% O ₂	40	16.8	mg/m ³
Stack height above building (assumed)	1.0	1.0	m
Stack gas temperature	70	120	°C
Stack velocity	4	15	m/s
Flue Stack Location	528496.8, 183901.0	528498.7, 183901.8	m

Table 5.4 CHP Details and Emissions Data (continued)

Parameter	Boilers	CHP	Units
Annual Natural Gas Consumption	69,771	267,692	kWh
Operating regime (i.e. days of the week and operating hours)	24 availability	15	hours

It is understood that the exact units to be installed may differ from those currently proposed, as it will be up to the contractor to choose the exact make and model at subsequent stage of the development.

In accordance to guidance provided by the Environment Agency Air Quality Modelling and Assessment Unit, it is assumed that 70% of the total NO_x emissions will be converted into NO₂.

5.9 The Effect of Buildings on Dispersion

Buildings have an effect on the dispersion of pollutants and can alter the predicted ground level pollutant concentration. This is by entraining pollutants in the cavity region on the leeward side of the buildings containing the sources and bringing the pollution levels down to ground level. Consequently, concentrations near the buildings could be increased but further away they are decreased (CERC 2013). ADMS Roads Extra has algorithms that model the effect of the buildings on the dispersion of pollutants specifically from point sources.

The details entered into the ADMS Roads Extra are shown in Table 5.5 below. They represent the massing of the buildings which may affect the dispersion of the pollutants from the point sources as realistically as possible.

Table 5.5 Details for the Buildings Entered into ADMS Roads Extra

No	Building	Centre Point Coordinates	Height (m)	Length (m)	Width (m)	Angle (°)
1	North Tower	528497.7, 183909.2	22.5	23.6	21.5	340
2	North-Middle	528510.7, 183889.4	19.3	23.2	19.5	340
3	South-Middle	528522.6, 183871.3	16.1	19.6	17.4	340
4	South Building	528533.2, 183856.4	12.8	16.0	14.3	340
5	Adjacent Building	528494.0, 183961.8	29.2	64.0	64.0	340

5.10 Meteorological Data

ADMS Roads utilises sequential meteorological data to calculate atmospheric dispersion. The minimum meteorological data that must be entered are: wind speed and direction, and cloud cover. The wind, cloud, temperature, rainfall and humidity data were taken from the London City Airport weather station.

London City Airport is the closest meteorological station with suitable data capture for the assessment years. The London City Airport meteorological station is approximately 14km east of the proposed site and the dominant prevailing wind direction is from the south west.