Camden Town Hall Annexe

Air Quality Assessment

On behalf of **Tower8**

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1 Introduction

1.1 Proposed Development

1.1.1 Tower 8 has commissioned Peter Brett Associates LLP (PBA) to prepare an air quality assessment for the proposed conversion of Camden Town Hall Annexe into a hotel. The development consists of the change of use from council offices and library (sui generis use class) to hotel, and alterations to the building including removal of roof top plant, an extension at roof level and alterations to the façade.

1.1.2 The site is located in Argyle Street on the south side of the Euston Road opposite St Pancras International and King's Cross stations, in the London Borough of Camden.

1.2 Scope

1.2.1 This report describes existing air quality in proximity to the site, assesses the impact of the construction activities on air quality in the surrounding area and the likely suitability of the site for its use. The main air pollutants of concern relating to construction are fine particulate matter (PM_{10}), and to road traffic emissions are nitrogen dioxide and fine particulate matter.

1.2.2 The conversion of the existing office and library building into a hotel, with ancillary uses, is unlikely to generate significant volumes of additional traffic, especially given the location of the site in relation to public transport links. As such, the impact of development traffic has been scoped out of the assessment.

1.2.3 The hotel bedrooms will be locations or relevant exposure for the short term objectives (hourly mean nitrogen dioxide and daily mean particulates), but commercial areas of the hotel will not be. The hotel is not a location of relevant exposure for the annual average objectives.

1.2.4 The proposals include an energy centre located in the basement of the building to supply heating and domestic hot water (DHW). The energy centre will consist of gas fired boilers and a gas fired Combined Heat and Power (CHP) unit. A modelling assessment has been undertaken to demonstrate that the proposed stack height above the building will be sufficient to adequately disperse emissions from the anticipated plant to be installed in the energy centre. The main pollutant of concern with regard to the energy centre is nitrogen dioxide.

1.2.5 The assessment has been prepared taking into account all relevant local and national guidance and regulations.

2 Legislation and Policy

2.1 The Air Quality Strategy

2.1.1 The Air Quality Strategy (2007) establishes the policy framework for ambient air quality management and assessment in the UK. The primary objective is to ensure that everyone can enjoy a level of ambient air quality which poses no significant risk to health or quality of life. The Strategy sets out the National Air Quality Objectives (NAQOs) and Government policy on achieving these objectives.

2.1.2 Part IV of the Environment Act 1995 introduced a system of Local Air Quality Management (LAQM). This requires local authorities to regularly and systematically review and assess air quality within their boundary, and appraise development and transport plans against these assessments. The relevant NAQOs for LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002.

2.1.3 Where an objective is unlikely to be met, the local authority must designate an Air Quality Management Area (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

2.1.4 The Local Air Quality Management Technical Guidance 2009 (LAQM.TG(09))[1] issued by the Department for Environment, Food and Rural Affairs (Defra) for Local Authorities provides advice as to where the NAQOs apply. These include outdoor locations where members of the public are likely to be regularly present for the averaging period of the objective (which vary from 15 minutes to a year). Thus, for example, annual mean objectives apply at the façades of residential properties, whilst the 24-hour objective (for PM_{10}) would also apply within the garden. They do not apply to occupational, indoor or in-vehicle exposure.

2.2 EU Limit Values

2.2.1 The Air Quality Standards Regulations 2010 implements the European Union's Directive on ambient air quality and cleaner air for Europe (2008/50/EC), and includes limit values for NO_2. These limit values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and the legal responsibility for ensuring that they are complied with. The compliance date for the NO_2 EU Limit Value was 1 January 2010, five years later than the date for the NAQO.

2.2.2 Directive 2008/50/EC consolidated the previous framework directive on ambient air quality assessment and management and its first three daughter directives. The limit values remained unchanged, but it now allows Member States a time extension for compliance, subject to European Commission (EC) approval.

2.2.3 The UK has a time extension for compliance of the daily PM_{10} limit value in London until the end of 2011. Despite many areas of the UK not being compliant with the annual average NO_2 limit value, the UK has decided not to seek an extension to the compliance date for this pollutant. This was on the basis that it could not be guaranteed that the UK would be compliant by the latest date allowable under the Directive (1 January 2015).

2.2.4 The Directive limit values are applicable at all locations except:

- Where members of the public do not have access and there is no fixed habitation;
- On factory premises or at industrial installations to which all relevant provisions concerning health and safety at work apply; and

[1] Defra, 2009, Local Air Quality Management Technical Guidance LAQM.TG(09).

- On the carriageway of roads; and on the central reservations of roads except where there is normally pedestrian access.

Assessment Criteria

2.2.5 The NAQOs for NO_2 and PM_{10} set out in the Air Quality Regulations (England) 2000 and the Air Quality (England) (Amendment) Regulations 2002, are shown in **Table 2.1**.

Table 2.1: Nitrogen Dioxide and PM_{10} Objectives

Pollutant	Time Period	Objective
Nitrogen dioxide (NO_2)	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year
	Annual mean	40µg/m^3
Particulate matter (PM_{10})	24-hour mean	50µg/m^3 not to be exceeded more than 35 times a year
	Annual mean	40µg/m^3

2.2.6 The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean nitrogen dioxide concentration is less than 60µg/m^3 then the one-hour mean nitrogen dioxide objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved[2].

2.3 Planning Policy

National Policy

2.3.1 The National Planning Policy Framework (NPPF) was published in March 2012. This sets out the Government's planning policies for England and how they are expected to be applied. In relation to conserving and enhancing the natural environment, paragraph 109 states that:

"*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.*"

2.3.2 Paragraph 124, also 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."

2.3.3 Paragraph 203 goes on to say:

"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

[2] Defra, 2009. Local Air Quality Management Technical Guidance LAQM.TG(09).

National Planning Practice Guidance (NPPG)

2.3.4 NPPG was published and updated in March 2014 to support the NPPF. Section 1 of the NPPG provides a summary as to why air quality is a consideration for planning:

"…Defra carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with EU Limit Values. It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit….The local air quality management (LAQM) regime requires every district and unitary authority to regularly review and assess air quality in their area. These reviews identify whether national objectives have been, or will be, achieved at relevant locations, by an applicable date….If national objectives are not met, or at risk of not being met, the local authority concerned must declare an air quality management area and prepare an air quality action plan…..Air quality can also affect biodiversity and may therefore impact on our international obligations under the Habitats Directive…..Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

2.3.5 Section 2 of the NPPG concerns the role of Local Plans with regard to air quality:

"….Drawing on the review of air quality carried out for the local air quality management regime, the Local Plan may need to consider:

- *the potential cumulative impact of a number of smaller developments on air quality as well as the effect of more substantial developments;*
- *the impact of point sources of air pollution..; and*
- *ways in which new development would be appropriate in locations where air quality is or likely to be a concern and not give rise to unacceptable risks from pollution. This could be through, for example, identifying measures for offsetting the impact on air quality arising from new development including supporting measures in an air quality action plan or low emissions strategy where applicable."*

2.3.6 Section 5 of the NPPG identifies when air quality could be relevant for a planning decision:

"….When deciding whether air quality is relevant to a planning application, considerations could include whether the development would:

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

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

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

2.3.7 Section 7 of the NPPG provides guidance on how detailed an assessment needs to be:

"Assessments should be proportionate to the nature and scale of development proposed and the level of concern about air quality, and because of this are likely to be locationally specific."

2.3.8 Section 8 of the NPPG provides guidance on how an impact on air quality can be mitigated:

"Mitigation options where necessary will be locationally specific, will depend on the proposed development and should be proportionate to the likely impact….Examples of mitigation include:

- *the design and layout of development to increase separation distances from sources of air pollution;*

- *using green infrastructure, in particular trees, to absorb dust and other pollutants;*

- *means of ventilation;*

- *promoting infrastructure to promote modes of transport with low impact on air quality;*

- *controlling dust and emissions from construction, operation and demolition; and*

- *contributing funding to measures, including those identified in air quality action plans and low emission strategies, designed to offset the impact on air quality arising from new development."*

2.3.9 Section 9 of the NPPG provides guidance on how considerations about air quality fit into the development management process by means of a flowchart. The final two stages in the process deal with the results of the assessment:

"Will the proposed development (including mitigation) lead to an unacceptable risk from air pollution, prevent sustained compliance with EU limit values or national objectives for pollutants or fail to comply with the requirements of the Habitats Regulations." If Yes:

"Consider how proposal could be amended to make it acceptable or, where not practicable, consider whether planning permission should be refused."

The London Plan

2.3.10 The London Plan 2011[3] and Revised Early Minor Alterations 2013 provide strategic planning guidance for Greater London. Each Borough's development plans must be in 'general conformity' with it.

2.3.11 The plan includes Policy 7.14 (Improving Air Quality) which states that development proposals should:

[3] Available at: www.london.gov.uk/priorities/planning/londonplan

- Promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils;

- Where biomass boilers are included, set out a detailed air quality assessment that should forecast pollutant concentrations. Permission should only be granted if no adverse impacts from biomass are identified; and

- Aim to be 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as AQMAs).

2.3.12 Boroughs and others with relevant responsibilities should also have policies that:

- Seek reductions in levels of pollutants referred to in the Government's National Air Quality Strategy having regard to the Mayor's Air Quality Strategy; and

- Take account of the findings of the Air Quality Review and Assessments and Action Plans, in particular where AQMAs have been designated.

2.3.13 The Mayor will work with strategic partners to ensure the spatial, transport and design policies of the London Plan support his Air Quality Strategy.

2.3.14 Supplementary Planning Guidance (SPG) on Sustainable Design and Construction has recently been adopted (April 2014) as part of the Implementation Framework for the London Plan[4]. For air pollution, the Mayor's Priorities are stated as:

- Developers are to design their schemes so that they are at least 'air quality neutral'.

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

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

- Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out in Appendix 7 (of the document).

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

2.3.15 The Sustainable Design and Construction SPG requires that air quality assessments are prepared for major developments where the development:

- is located within an AQMA:

- is likely to result in a new air pollution exceedance;

- is located within 150 metres of a sensitive receptor (schools, hospitals, care homes, nurseries, residential development);

- will bring sensitive receptors into an area of poor air quality;

- includes biomass boilers and/or combined heat and power; or

- involves waste management/treatment activities, mineral extraction or any other general industrial combustion process.

[4] Available at: www.london.gov.uk/priorities/planning/consultations/draft-sustainable-design-and-construction

2.3.16 For major developments that meet the above criteria, an air quality assessment is required to be submitted with the planning application and include:

- a review of air quality around the development site using existing air quality monitoring and/or modelling data;
- air quality dispersion modelling data carried out in accordance with the London Councils Air Quality and Planning Guidance;
- an indication of the number of people (receptors) which will be exposed to poor air quality as a result of the development, and show their location on a map;
- an assessment of the impact on air quality during the construction phase and detailed mitigation methods for controlling dust and pollution emissions in line with the emerging revised SPG on The control of dust and emissions from construction and demolition; and
- an outline and justification of mitigation measures associated with the design, location and operation of the development in order to reduce air pollution and exposure to poor air quality; and
- a maintenance regime for any combustion equipment or mitigation measures.

2.3.17 The Sustainable Design and Construction SPG provides guidance on:

- Minimising air quality emissions from location, transport, construction and demolition, and design and occupation;
- Protecting internal air quality;
- What is meant by 'air quality neutral';
- Emissions standards for combustion plant; and
- Offsetting provisions.

2.3.18 'Air quality neutral' applies across London as a whole and emission benchmarks have been proposed in terms of buildings' operation and transport emissions in order to meet this criteria. It is understood that the benchmark should be capable of being met without the need for significant additional mitigation. The emission benchmarks are summarised in **Appendix F.**

2.3.19 Where individual and/or communal gas fired boilers are installed in commercial and domestic buildings they should achieve a NO_x rating of less than 40mgNO_x/kWh. If the particular combustion equipment is not known at the time of the planning application, developers are required to provide a written statement of their commitment and ability to meet the emissions standards within their Air Quality Assessments. Emissions standards are provided for solid biomass boilers and CHP plants (see **Appendix G**).

2.3.20 Where developments do not meet the air quality neutral benchmarks, it is suggested that appropriate on-site mitigation measures will be required to off-set any excess in emissions. Measures could include:

- green planting/walls and screens;
- upgrade or abatement work to combustion plant;
- retro-fitting abatement technology for vehicles and flues; and
- exposure reduction.

2.3.21 In addition, as part of the Implementation Framework for the London Plan[5], a SPG on The Control of Dust and Emissions During Construction and Demolition has been published in July 2014.

2.3.22 The SPG requires an Air Quality Statement to be submitted at the time of a planning application; with a detailed dust risk assessment prepared at the time of detailed construction and logistics planning for the site, and submitted prior to the commencement of works.

2.3.23 The SPG provides guidance for:

- the preparation of an Air Quality Statement for construction and demolition activities, including air quality (dust) risk assessments;
- the stages of development the Air Quality Statement is to cover, that is for demolition, earthwork, construction stages and trackout (vehicles leaving the site) stages of the works;
- the identification of the potential scale (large, medium, small) of dust emissions for each stage of work;
- the identification of the level of risk due to the scale of dust emissions on soiling (dirt), health and the natural environment, depending on the duration of the activities, their intensity, the prevailing meteorological conditions, the existing levels of background pollution and the sensitivity of receptors to dust;
- best practice methods for controlling dust and pollution control on-site and to prevent trackout;
- recommendations for monitoring low, medium and high risk sites; and
- early notification of new 2015 and 2020 standards for non-road mobile machinery.

Mayor's Air Quality Strategy

2.3.24 The Mayor's Air Quality Strategy[6] (2010) sets out policies to improve air quality in London and includes the following measures:

- Ensuring that public transport becomes cleaner;
- Reducing traffic growth by improving public transport and encouraging developers to make easy access to public transport in new developments; and
- Introduction of Phase 3 of the Low Emission Zone (LEZ) in 2012 to cover PM_{10} emissions from minibuses and heavier Light Goods Vehicles (LGVs), and a LEZ nitrogen oxides (NO_x) standard from 2015.

2.3.25 Policy 7 on 'Using the planning process to improve air quality' aims to ensure that no new development has a negative impact on air quality in London. It states that the Mayor will use his planning powers to:

- Develop a check list to guide boroughs and developers in the assessment of potential emissions from new developments;

[5] Available at: www.london.gov.uk/priorities/planning/consultations/draft-the-control-of-dust-and-emissions-during-construction-and-demolition

[6] Available at: www.london.gov.uk/sites/default/files/Air%20Quality%20Strategy%20v3.pdf

- Minimise increased exposure to existing poor air quality, particularly in AQMAs and where developments are to be used by large numbers of vulnerable people;
- Ensure air quality benefits are realised through planning conditions and Section 106 agreements; and
- A package of non-transport policy measures is also proposed to reduce localised pollution sources.

Local Policy

2.3.26 The London Borough of Camden Core Strategy (2010 – 2025) sets out the key elements of the planning framework in the Borough. A draft Local Plan is being produced which will replace the Core Strategy. A draft Local Plan is expected to be released in early 2015 for comments.

2.3.27 Policy CS13 of the Core Strategy, describes the measures new developments and/or redevelopments have to adopt during construction and occupation in order to achieve higher environmental standards. It states that:

"The Council will require all development to take measures to minimise the effects of, and to adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

a) ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;

b) …minimising carbon emissions from the redevelopment, construction and occupation of buildings…"

2.3.28 Policy CS16 consider the air quality within the borough. It states that:

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

e) … 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

2.3.29 The Camden's Clean Air Action Plan (2013 – 2015) adopted in 2013, presents the actions the Borough will take in order to help reduce key pollutants in Camden - Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}) - which mainly arise from traffic and boilers. Since 2000, the whole London Borough of Camden has been designated and Air Quality Management Area (AQMA) for exceedences of NO_2 and PM_{10} concentrations.

2.3.30 Some of actions presented in the Air Action plan are the following:

- *"Require developers to undertake and Air Quality Assessment (AQA) where a new development could have a negative impact on air quality, and provide and air quality mitigation plan where necessary.*
- *Require developers to submit Construction Management Plans in accordance with the London Best Practice Guidance to Control Dust and Emissions form Construction and Demolition.*

- *Promote the adoption of fuel saving measures to residents.*
- *Continue to monitor air pollution levels across the borough and review air quality monitoring network every year.*
- *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."*

2.3.31 As part of the Clean Air Act, a "Gas CHP Information Request Form" has to be supplied to the local authority prior t, or as part of, the planning application in order for the local authority to approve the CHP.

3 Methodology

3.1 Existing Conditions

3.1.1 Information on existing air quality has been obtained by collating the results of monitoring carried out by the London Borough of Camden (LBC). Background concentrations for the site have been defined using the national pollution maps published by Defra. These cover the whole country on a 1x1 km grid[7].

3.2 Construction Impacts

3.2.1 During demolition and construction the main potential effects are dust annoyance and locally elevated concentrations of PM_{10}. The suspension of particles in the air is dependent on surface characteristics, weather conditions and on-site activities. Impacts have the potential to occur when dust generating activities coincide with dry, windy conditions, and where sensitive receptors are located downwind of the dust source.

3.2.2 Separation distance is also an important factor. Large dust particles (greater than 30µm), responsible for most dust annoyance, will largely deposit within 100m of sources. Intermediate particles (10-30µm) can travel 200-500m. Consequently, significant dust annoyance is usually limited to within a few hundred metres of its source. Smaller particles (less than 10µm) are deposited slowly and may travel up to 1km; however, the impact on the short-term concentrations of PM_{10} occurs over a shorter distance. This is due to the rapid decrease in concentrations with distance from the source due to dispersion.

3.2.3 The Greater London Authority (GLA, 2014) provides guidelines to determine the likely level of risk construction and demolition impacts will have on local dust complaints and PM_{10} concentrations. Sites are categorised into low, medium and high risk (**Table 3.1**) taking into account the general activity descriptors on site and professional judgement.

3.2.4 The sensitivity of the study area to construction dust impacts is defined based on the examples provided within the Institute of Air Quality Management (IAQM, 2014) guidance (**Table 3.2**), taking into account professional judgement.

Table 3.1: Risk Criteria for Control of Dust and Emissions from Construction

Dust Emission Magnitude	Activity
High	**Demolition** >50,000m^3 building demolished, dusty material (e.g. concrete), on-site crushing/screening, demolition >20m above ground level
	Earthworks >10,000m^2 site area, dusty soil type (e.g. clay), >10 earth moving vehicles active simultaneously, >8m high bunds formed, >100,000 tonnes material moved
	Construction >100,000m^3 building volume, on site concrete batching, sandblasting
	Trackout >50 HDVs out / day, dusty soil type (e.g. clay), >100m unpaved roads

[7] http://laqm.defra.gov.uk/maps/maps2010.html

Dust Emission Magnitude	Activity
Medium	**Demolition** 20,000 - 50,000m^3 building demolished, dusty material (e.g. concrete) 10-20m above ground level
	Earthworks 2,500 - 10,000m^2 site area, moderately dusty soil (e.g. silt), 5-10 earth moving vehicles active simultaneously, 4m - 8m high bunds, 20,000 - 100,000 tonnes material moved
	Construction 25,000 - 100,000m^3 building volume, on site concrete batching
	Trackout 10 - 50 HDVs out / day, moderately dusty surface material, 50 -100m unpaved roads
Low	**Demolition** <20,000m^3 building demolished, non-dusty material, <10m above ground level, work in winter
	Earthworks <2,500m^2 site area, non-dusty soil, <5 earth moving vehicles active simultaneously, <4m high bunds, <20,000 tonnes material moved
	Construction <25,000m^3, non-dusty material
	Trackout <10 HDVs out / day, non-dusty soil, < 50m unpaved roads

Table 3.2: Area Sensitivity Definitions

Area Sensitivity	People and Property Receptors	Ecological Receptors
High	>100 dwellings, hospitals, schools, care homes within 50m 10 – 100 dwellings within 20m Museums, car parks, car showrooms within 50m PM_{10} concentrations approach or are above the daily mean objective.	National or Internationally designated site within 20m with dust sensitive features / species present
Medium	>100 dwellings, hospitals, schools, care homes within 100m 10 – 100 dwellings within 50m Less than 10 dwellings within 20m Offices/shops/parks within 20m PM_{10} concentrations below the daily mean objective.	National or Internationally designated site within 50m with dust sensitive features / species present Nationally designated site or particularly important plant species within 20m

Area Sensitivity	People and Property Receptors	Ecological Receptors
Low	>100 dwellings, hospitals, schools, care homes 100 - 350m away 10 – 100 dwellings within 50 – 350m Less than 10 dwellings within 20 - 350m Playing fields, parks, farmland, footpaths, short term car parks, roads, shopping streets PM_{10} concentrations well below the daily mean objective.	Nationally designated site or particularly important plant species 20 - 50m Locally designated site with dust sensitive features within 50m

3.2.5 Consideration was also given to wind and rainfall data. A wind rose from the London City weather station for 2013 was used along with average rainfall data (1981-2010) obtained from the Met Office website.

Significance Criteria

3.2.6 Based on the dust emission magnitude and the area sensitivity, the risk of dust impacts is then determined (**Table 3.3**), taking into account professional judgement.

Table 3.3: Risk of Dust Impacts

Sensitivity of Area	Dust Emission Magnitude		
	High	Medium	Low
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

3.2.1 Based on the risk of dust impacts, appropriate mitigation is selected from the GLA 2014 guidance using professional judgement.

3.3 Road Traffic Impacts – Proposed Development

Sensitive Locations

3.3.1 Relevant sensitive locations are places where members of the public might be expected to be regularly present over the averaging period of the objectives. The hotel bedrooms are therefore locations of relevant exposure for the short term objectives.

3.3.2 Four locations on the façade of the proposed building have been chosen as receptors (**Figure 1)**. Receptors were modelled at a height of 1.5m and above, representing exposure at ground floor to eighth floor levels.

3.3.3 Concentrations have also been predicted at two monitoring locations in close proximity to the site, in order to verify the modelled results (see **Appendix C** for further details on the verification method).

Impact Predictions

3.3.4 Predictions have been carried out using the ADMS-Roads dispersion model (v3.2.4.0). The model requires the user to provide various input data, including the Annual Average Daily Traffic (AADT) flow, the proportion of heavy duty vehicles (HDVs), road characteristics (including road width and street canyon height, where applicable), and the vehicle speed. It also requires meteorological data. The model has been run using 2013 meteorological data from the London City monitoring station, which is considered suitable for this area.

3.3.5 Annual Average Daily Traffic (AADT) flows, and the proportions of Heavy Duty Vehicles (HDVs), for affected roads in 2013 have been taken from the London Atmospheric Emissions Inventory. Traffic data used in this assessment are summarised in **Appendix D.**

3.3.6 Emissions were calculated using the Emission Factor Toolkit (EFT) v6.0.1, which utilises NO_x emission factors taken from the European Environment Agency COPERT 4 (v10) emission tool. The traffic data were entered into the EFT, along with speed data to provide combined emission rates for each of the road links entered into the model.

Assessment Criteria

3.3.7 The NAQOs for NO_2 and PM_{10} set out in the Air Quality Regulations (England) 2000 and the Air Quality (England) (Amendment) Regulations 2002, are shown in **Table 3.4.**

Table 3.4: Nitrogen Dioxide and PM_{10} Objectives

Pollutant	Time Period	Objective
Nitrogen dioxide (NO_2)	1-hour mean	200µg/m^3 not to be exceeded more than 18 times a year
Particulate matter (PM_{10})	24-hour mean	50µg/m^3 not to be exceeded more than 35 times a year

3.3.8 The objectives for nitrogen dioxide and PM_{10} were to have been achieved by 2005 and 2004, respectively, and continue to apply in all future years thereafter. Analysis of long term monitoring data suggests that if the annual mean nitrogen dioxide concentration is less than 60µg/m^3 then the one-hour mean nitrogen dioxide objective is unlikely to be exceeded where road transport is the main source of pollution. This concentration has been used to screen whether the one-hour mean objective is likely to be achieved (Defra, 2009).

3.4 Energy Centre Impacts

3.4.1 Predictions have been made at 6 receptors on the façade of the proposed development building and of the closest existing residential receptors (**Figure 1**) representing receptors on the upper floors of the buildings nearest the discharge stacks. Receptors on the proposed development building were located at a height of 43m and those on the closest existing residential properties are located at a height of 12 and 15m.

3.4.2 The assessment assumes that four gas fired boilers are installed, one operating all year long, and only 3 will operate in winter and 2 operate in mid-season/summer. These are low NO_x boilers which have emissions of 35mg/kWh, lower than the emissions specified in the London Mayor's Sustainable Design and Construction SPG. Two options are being considered for the CHP unit. For modelling, we assumed that the larger unit is installed. Emissions concentrations correspond to the SPG Band B requirements of 95mg/Nm^3. It is assumed that the CHP unit operates for 6,000 hours per year.

Impact Predictions

3.4.3 Predictions of the contribution of the boilers and CHP emissions to nitrogen dioxide concentrations at each of the receptors have been carried out using ADMS 5 dispersion model. The model requires the user to provide various input data, including stack parameters (height, diameter), emission rates and dimensions of buildings to take account of building downwash. The model has been run using 2013 meteorological data from the London City Airport monitoring station.

3.4.4 Emission rates have been calculated from manufacturer's data. Model input are summarised in **Table 3.5**. In accordance with the London SPG requirements for the exhaust gas heat output, a minimum exit velocity would be required for both types of equipment.

Table 3.7: Summary of Stack Parameters used in the Assessment

Parameter	Boilers	CHP
Velocity (m/s)	10	9.5
Volume Flux (m^3/s)	1.128	0.117
Exhaust Temperature (ºC)	46	120
Stack Diameter (m)	0.379	0.125
NO_x emissions (g/s)	0.028	0.008
Stack Height (m)	+3m above roof	+3m above roof
Grid Reference (X,Y)	530201.4, 182832.6 530202.3, 182831.4	

3.4.5 Emissions from the boilers and CHP will be predominantly in the form of nitrogen oxides (NO_x). The approach recommended by the Environment Agency (2010a) was used to predict annual mean nitrogen dioxide concentrations and the 99.8th percentile of 1-hour mean nitrogen dioxide concentrations from the model predictions of nitrogen oxides. This assumes that:

- Annual mean nitrogen dioxide concentrations = Annual mean nitrogen oxides x 0.7; and
- 99.8th percentiles of 1-hour mean nitrogen dioxide concentrations = 99.8th percentiles of 1-hour mean nitrogen oxides x 0.35.

3.4.6 For the short term impacts, it is assumed that all of the installed equipment will operate continuously all year round. This is likely to over-estimate the predicted concentrations. For the annual average impacts, the predicted concentrations are factored by the anticipated operating hours.

Environment Agency Assessment Criteria

3.4.7 The Environment Agency has considered potential impacts from industrial and boiler emissions in its H1 guidance (Environment Agency, 2010b). This explains that regardless of what the baseline environmental conditions are, a process can be considered as insignificant if:

- the long-term (annual mean) process contribution is <1% of the long-term environmental standard; and

- the short-term (hourly mean) process contribution is <10% of the short-term environmental standard.

3.4.8 The approach taken in this assessment is to use detailed dispersion modelling in the first instance, and to apply the Environment Agency screening criteria to the model outputs. Where impacts are shown to be below these screening criteria, they are judged to be insignificant. Where this initial screening shows the potential for significant impacts, then an assessment of the predicted environmental concentrations (i.e. including background concentrations) has been carried out.

4 Existing Air Quality

4.1 LAQM

4.1.1 LBC has investigated air quality within its area as part of its responsibilities under the LAQM regime. The whole Borough has been declared an Air Quality Management Area (AQMA) for exceedences in nitrogen dioxide and PM_{10}.

4.2 Monitoring

Nitrogen Dioxide

4.2.1 LBC operate four automatic monitoring sites, the closest one is Euston Road (CD9) located approximately 350m from the site. LBC also monitor nitrogen dioxide concentrations using diffusion tubes. Data from those sites within approximately 350m of the development site are presented in **Tables 4.1** and **4.2**.

Table 4.1: Measured Nitrogen Dioxide Concentrations, 2009 - 2013

Site ID	Site Type	Annual Mean (µg/m^3)				
		2009	2010	2011	2012	2013
Automatic Site						
Euston Road (CD9)	Roadside	-	-	**122**	**106**	**106**
Diffusion Tubes						
Euston Road (CA4)	Roadside	**87**	**82**	**93**	**82**	**108**
Objective		**40**				

Exceedences highlighted in bold.
2009 – 2013 Data taken from the 2014 Air Quality Progress Report London Borough of Camden.
2013 automatic data taken from http://www.airqualityengland.co.uk/site/latest?site_id=SLH3

Table 4.2: Measured Exceedences of the Hourly Mean Nitrogen Dioxide Objective, 2009 - 2013

Site	Number of Hours >200µg/m^3				
	2009	2010	2011	2012	2013
Automatic Site					
Euston Road (CD9)	-	-	**726**	**295**	**296**
Objective		**18 (200)**			

Exceedences in bold.
If the data capture for the full calendar year is less than 90%, the 99.8th percentile of hourly means is in brackets.
2009 – 2013 Data taken from the 2014 Air Quality Progress Report London Borough of Camden.

4.2.2 The measured concentrations of nitrogen dioxide have been above the 60µg/m^3 since 2009 indicating that the short term objective is likely to be breached. This is confirmed by the results at the Euston Road CD9 monitoring location. There is no clear trend in concentrations over time.

Particulates

4.2.3 There are no PM_{10} monitoring stations in close proximity to the site.

4.3 Background Concentrations

4.3.1 In addition to measured concentrations, estimated background concentrations for the site have been obtained from the national maps (**Table 4.3**).

4.3.2 Background nitrogen dioxide concentrations are below 60µg/m3, this indicates that background concentrations are unlikely to breach the short term nitrogen dioxide objective.

Table 4.3: Estimated Annual Mean Background Concentrations in 2013 (µg/m^3)

Year	NO_x	NO_2	PM_{10}
2013	81.6	**46.6**	25.7
Objectives	**-**	**40**	**40**

5 Impact Assessment

5.1 Construction Impacts

5.1.1 The main potential effects during construction are dust deposition and elevated PM_{10} concentrations. The following activities have the potential to cause emissions of dust:

- Site preparation including delivery of construction material, erection of fences and barriers;
- Materials handling such as storage of material in stockpiles and spillage; and
- Disposal of waste materials off-site.

5.1.2 Typically the main cause of unmitigated dust generation on construction sites is from demolition and vehicles using unpaved haul roads, and off-site from the suspension of dust from mud deposited on local roads by construction traffic. The main determinants of unmitigated dust annoyance are the weather and the distance to the nearest receptor.

5.1.3 Based on the GLA Supplementary Planning Guidance criteria (**Table 3.1**), the site is considered to be medium risk. The study area is considered to be of high sensitivity (**Table 3.2**), due to the close proximity of residential properties. Mitigation measures set out for medium risk sites will be required in order to reduce the site classification to one of low risk.

5.2 Road Traffic Impacts

5.2.1 Predicted concentrations at the four modelled receptors are presented in **Appendix E**. Concentrations were predicted at a height of 1.5m for the ground floor, and an additional 3m for subsequent floors at all receptor locations. These represent exposure from ground floor level to 8th floor level.

5.2.2 Annual average nitrogen dioxide concentrations are predicted to exceed 60µg/m^3 from the ground floor up to fifth floor level. The short term nitrogen dioxide objective is therefore likely to be exceeded from the ground floor to fifth floor level.

5.2.3 There are no exceedences of the PM_{10} annual mean objective at any of the receptors even at ground floor level. The objective of number of days where PM_{10} concentrations are higher than 50µg/m^3 is exceeded at 2 receptors at ground floor level.

Uncertainty

5.2.4 There are many components that contribute to the uncertainty in predicted concentrations. The model used in this assessment is dependent upon the traffic data that have been input which will have inherent uncertainties associated with them. There is then additional uncertainty as the model is required to simplify real-world conditions into a series of algorithms.

5.2.5 A disparity between the national road transport emission projections and measured annual mean concentrations of nitrogen oxides and NO_2 has been identified in recent years[8]. Whilst projections suggest that both annual mean nitrogen oxides and nitrogen dioxide concentrations from road traffic emissions should have fallen by around 15-25% over the past

[8] Carslaw, D, Beevers, S, Westmoreland, E and Williams, M, 2011. Trends in NO_x and NO_2 emissions and ambient measurements in the UK. Available at: http://uk-air.defra.gov.uk/library/reports?report_id=645

6 to 8 years, at many monitoring sites levels have remained relatively stable, or have even shown a slight increase. Monitoring data compiled for this assessment indicate that measured nitrogen dioxide concentrations have remained stable in recent years.

5.2.6 In order to take account of uncertainties in future year vehicle emission factors, the assessment has been carried out for 2013, utilising 2013 traffic data, emission factors and background concentrations. This is considered to provide a conservative assessment of concentrations on site.

5.3 Energy Centre Impacts

5.3.1 The short-term maximum impact of emissions from the energy centre only applies to the upper floor of the building. Annual average applies at residential receptors in the vicinity of the site.

Short-term Impacts

5.3.2 The short-term impact of emissions from the energy centre gas has been predicted at the chosen proposed receptor locations (**Table 5.1**). The receptors are on the façade of the building, corresponding to the tenth floor level.

Table 5.1: Predicted Short-Term Contribution to NO_2 Concentrations from Energy Centre

Receptor	Hourly Mean Concentrations (NO_2)	Percentage Contribution to Hourly Mean Objective (%)
A	10.25	5.13
B	12.22	6.11
C	2.32	1.16
D	11.26	5.63
Screening Criteria	**20**	**10**

5.3.3 The hourly mean concentrations are insignificant at all receptors when compared to the objective.

Long-term Impacts

5.3.4 The long-term impact of emissions from the energy centre gas has been predicted at the chosen proposed receptors (**Table 5.2**). The receptors are on the façade of the closest residential properties, corresponding to the relevant floor level.

Table 5.2: Predicted Long-Term Contribution to NO_2 Concentrations from Energy Centre

Receptor	Height (m)	Annual Mean Concentrations (NO_2)	Percentage Contribution to Annual Objective (%)
E	12	0.16	0.40
F	15	0.25	0.63
Screening Criteria		**0.4**	**1**

5.3.5 The annual mean concentrations are insignificant at all receptors when compared to the objective.

6 Mitigation

6.1 Construction

6.1.1 The assessment has shown that the construction of the proposed development is unlikely to generate significant air quality effects in the surrounding area. The following mitigation measures are, however, recommended for inclusion within a Construction Environmental Management Plan (CEMP) to be agreed with the local authority, consistent with measures for medium risk sites set out in the GLA Supplementary Planning Guidance:

Communication

- Develop and implement a stakeholder communications plan;
- Display the name and contact details of persons accountable on the site boundary; and
- Display the head or regional office information on the site boundary.

Management

- Develop and implement a dust management plan;
- Record all dust and air quality complaints, identify causes and take measures to reduce emissions;
- Record exceptional incidents and action taken to resolve the situation;
- Carry out regular site inspections to monitor compliance with the dust management plan and record results;
- Increase site inspection frequency during prolonged dry or windy conditions and when activities with high dust potential are being undertaken;
- 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 at least as high as any stockpile on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site run off of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove potentially dusty materials from site as soon as possible;
- Cover, seed or fence stockpiles to prevent wind whipping;
- Ensure all vehicles comply with the London Low Emission Zone and the NRMM standards, where applicable;
- Ensure all vehicles switch off engines when stationary;
- Avoid the use of diesel or petrol powered generators where possible;

- Produce a Construction Logistics Plan to manage the delivery of goods and materials;
- Only use cutting, grinding and sawing equipment with dust suppression equipment;
- Ensure an adequate supply of water on site for dust suppressant;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use water sprays on such equipment where appropriate;
- Ensure equipment is readily available on site to clean up spillages of dry materials; and
- No on-site bonfires and burning of waste materials on site.

Trackout

- Use water assisted dust sweepers on the site access and local roads;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials;
- Record inspection of on-site haul routes and any subsequent action, repairing as soon as reasonably practicable;
- Install hard surfaced haul routes which are regularly damped down;
- Install a wheel wash with a hard-surfaced road to the site exit where site layout permits; and
- The site access gate to be located at least 10m from receptors where possible.

6.2 Operation

6.2.1 Mitigation in the form of mechanical ventilation is to be provided for all bedrooms within the hotel, with the windows sealed. The air will be drawn from the roof of the building where the predicted concentrations meet the short term objectives. As such, air of appropriate quality will be provided for the hotel guests.

7 Conclusions

7.1.1 The air quality impacts associated with the proposed conversion of Camden Town Hall Annexe have been assessed.

7.1.2 LBC has investigated air quality within its area as part of its responsibilities under the LAQM regime. The whole Borough has been declared an Air Quality Management Area (AQMA) for exceedences in nitrogen dioxide and PM_{10}.

7.1.3 The construction works have the potential to create dust. During construction, it is recommended that a package of mitigation measures is put in place to minimise the risk of elevated PM_{10} concentrations and dust nuisance in the surrounding area.

7.1.4 Pollutant concentrations in the Euston Road are high, especially nitrogen dioxide concentrations. Bedrooms within the hotel will therefore require mitigation for poor air quality up to the fifth floor level. Mechanical ventilation, with air drawn from the roof of the building, will be provided to meet this requirement.

7.1.5 An energy centre is to be installed to supply heating. Energy is to be provided by gas fired low NO_x boilers which have emissions lower than the London Mayor's SPG requirements and a CHP unit which has emissions corresponding to Band B requirements. With stacks at 3m above the building, the short-term and long-term impacts of the energy centre are considered insignificant.

Appendix A Glossary

Appendix A: Glossary

AADT	Annual Average Daily Traffic
AQMA	Air Quality Management Area
Diffusion Tube	A passive sampler used for collecting NO_2 in the air
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes Includes HGVs and buses
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides, generally considered to be nitric oxide and NO_2. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
PM_{10}	Small airborne particles less than 10μm in diameter
Receptor	A location where the effects of pollution may occur
TEA	Triethanolamine

Appendix B References

Appendix B: References

Department of the Environment, Food and Rural Affairs (Defra) (2013). *2011 Based Background Maps for NO_x, NO_2, PM_{10} and $PM_{2.5}$.* Available:http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2011.

Department of the Environment, Food and Rural Affairs (Defra) in partnership with the Scottish Executive, The National Assembly for Wales and the Department of the Environment for Northern Ireland (2009). *Local Air Quality Management Technical Guidance, LAQM.TG(09).* HMSO, London.

Department of the Environment, Transport and the Regions (DETR, 2007) in Partnership with the Welsh Office, Scottish Office and Department of the Environment for Northern Ireland (2007). *The Air Quality Strategy for England, Scotland, Wales, Northern Ireland*, HMSO, London.

Environmental Act 1995, Part IV.

Greater London Authority (2014) The Control of Dust and Emissions during Construction and Demolition: Supplementary Planning Guidance, Greater London Authority, London

Institute of Air Quality Management (2014) Guidance on the assessment of dust from demolition and construction, IAQM, London

Statutory Instrument 2000, No 921, *The Air Quality (England) Regulations 2000*, HMSO, London.

Statutory Instrument 2002, No 3034, *The Air Quality (England) (Amendment) Regulations 2002*, HMSO, London.

Statutory Instrument 2007, No. 64, *The Air Quality Standards Regulations 2007*, HMSO, London

Appendix C Verification

Nitrogen Dioxide

Most nitrogen dioxide is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides (NO_x = NO + NO_2). The model has been run to predict the 2013 annual mean road-NO_x contribution at two roadside monitoring locations (identified in **Table 4.1**).

The model output of road-NO_x has been compared with the 'measured' road-NO_x, which was calculated from the measured NO_2 concentrations and the adjusted background NO_2 concentrations within the NO_x from NO_2 calculator[9].

A primary adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (**Figure C1**). This factor was then applied to the modelled road-NO_x concentration for each monitoring site to provide adjusted modelled road-NO_x concentrations. The total nitrogen dioxide concentrations were then determined by combining the adjusted modelled road-NO_x concentrations with the predicted background NO_2 concentration within the NO_x from NO_2 calculator. A secondary adjustment factor was finally calculated as the slope of the best fit line applied to the adjusted data and forced through zero (**Figure C2**).

The following primary and secondary adjustment factors have been applied to all modelled nitrogen dioxide data:

Primary adjustment factor:	4.4653
Secondary adjustment factor:	1.0004

The results imply that the model was under-predicting the road-NO_x contribution. This is a common experience with this and most other models. The final NO_2 adjustment is minor.

Figure C3 compares final adjusted modelled total NO_2 at each of the monitoring sites, to measured total NO_2, and shows the 1:1 relationship, as well as ±10% and ±25% of the 1:1 line. All data points lie within ±10%.

[9] http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html

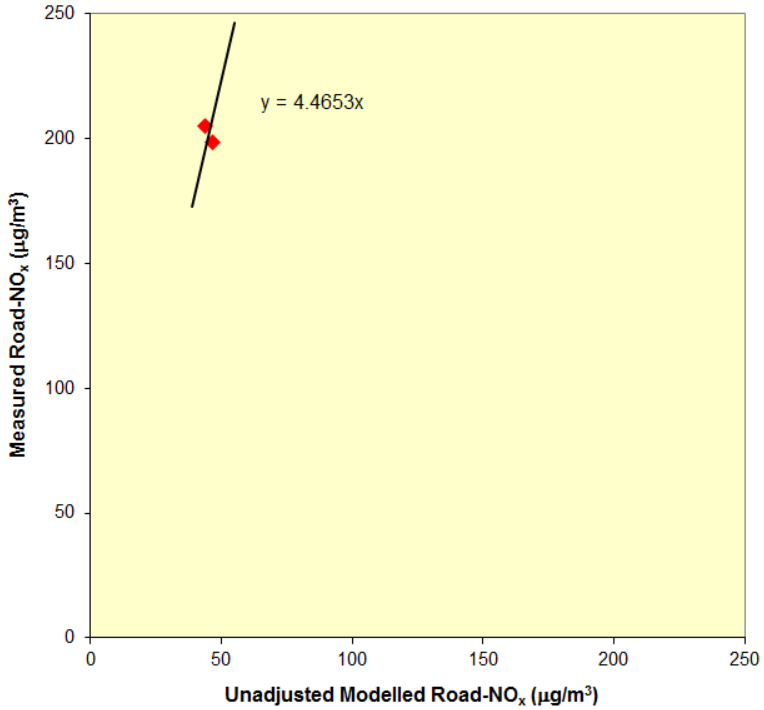


Figure C1: Comparison of Measured Road-NO_x with Unadjusted Modelled Road-NO_x Concentrations

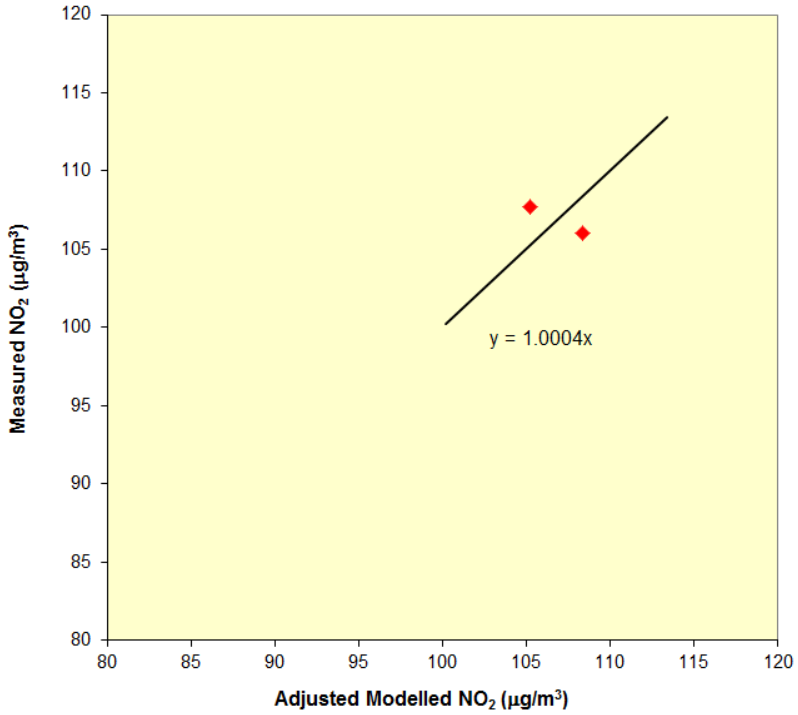


Figure C2: Comparison of Measured NO_2 with Primary Adjusted Modelled NO_2 Concentrations

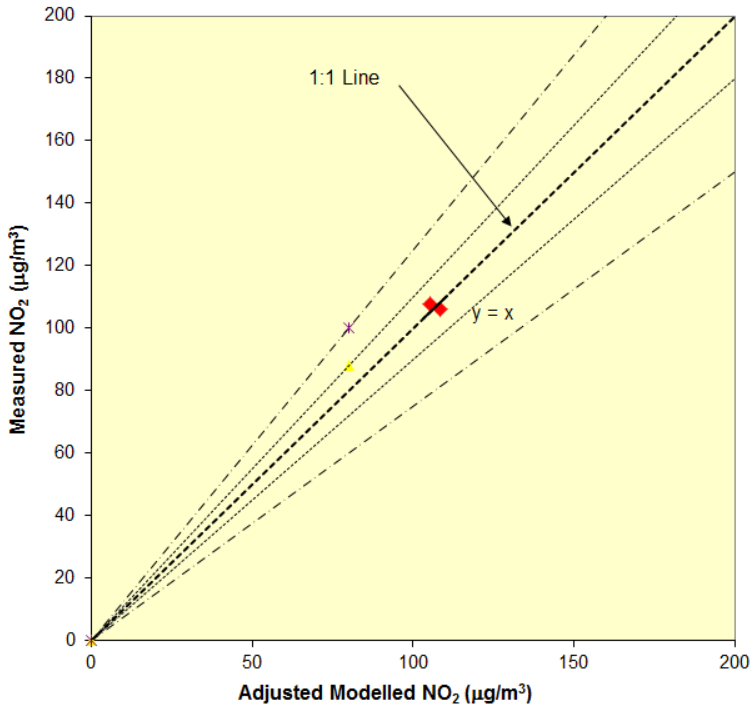


Figure C3: Comparison of Measured NO_2 with Fully Adjusted Modelled NO_2 Concentrations

PM_{10}

No monitoring of PM_{10} is carried out in proximity adjacent to the road network in proximity to the development site. The primary adjustment factor calculated for nitrogen dioxide concentrations has therefore been applied to the modelled road-PM_{10} concentrations.

Appendix D Traffic Data

Table D.1: Predicted Annual Mean NO_2 Concentrations at Proposed Receptors, 2013

Road	AADT	%HDV
Euston Road – Between Midland Road and Pancras Road	47,543	9.29
B504 – Judd Street – North of Bidborough Street	10,214	5.29
B504 – Judd Street – South of Bidborough Street	12,465	5.58
Bidborough Street	2,257	6.78
Mabledon Place	2,110	7.25
St Pancras Road	5,892	16.11
Euston Road – East of Pancras Road	49,470	21.84
York Way	14,203	10.89
Gray's Inn Road	25,511	8.47
Pentonville Road – West of Caledonian Road	30,336	7.12
Pentonville Road – East of Caledonian Road	17,620	10.65
Midland Road	13,479	6.03
Eversholt Street	13,430	9.96
Upper Woburn Place	13,811	12.60
Euston Road – West of Upper Woburn Place	50,332	9.23

Appendix E Predicted Concentrations

Table E.1: Predicted Annual Mean NO_2 Concentrations at Proposed Receptors, 2013

Receptor	Annual Mean (µg/m^3)								
	Ground Floor	First Floor	Second Floor	Third Floor	Fourth Floor	Fifth Floor	Sixth Floor	Seventh Floor	Eighth Floor
PR1	**101.4**	**92.1**	**80.2**	**71.0**	**64.9**	**60.8**	**57.9**	**55.7**	**54.1**
PR2	**102.0**	**91.9**	**79.3**	**70.1**	**64.3**	**60.4**	**57.7**	**55.7**	**54.1**
PR3	**74.8**	**73.0**	**70.1**	**66.6**	**63.2**	**60.2**	**57.7**	**55.7**	**54.1**
PR4	**73.0**	**71.5**	**68.9**	**65.8**	**62.7**	**59.9**	**57.5**	**55.6**	**54.1**
Objective	**40**								

Exceedences in bold.

Table E.2: Predicted PM_{10} Concentrations at Proposed Receptors, 2013

Receptor	Annual Mean (µg/m^3)								
	Ground Floor	First Floor	Second Floor	Third Floor	Fourth Floor	Fifth Floor	Sixth Floor	Seventh Floor	Eighth Floor
PR1	33.1	31.6	29.7	28.4	27.7	27.2	26.9	26.6	26.5
PR2	33.4	31.7	29.7	28.4	27.6	27.2	26.9	26.6	26.5
PR3	28.9	28.7	28.3	27.9	27.5	27.1	26.8	26.6	26.5
PR4	28.8	28.6	28.3	27.8	27.5	27.1	26.8	26.6	26.5
Objective	**40**								

Table E.3: Predicted Number of Days where PM_{10} Concentrations >50 µg/m^3, 2013

Receptor	Annual Mean (µg/m^3)								
	Ground Floor	First Floor	Second Floor	Third Floor	Fourth Floor	Fifth Floor	Sixth Floor	Seventh Floor	Eighth Floor
PR1	**40**	34	26	22	20	18	17	17	16
PR2	**42**	34	27	22	20	18	17	17	16
PR3	24	23	22	20	19	18	17	17	16
PR4	23	23	21	20	19	18	17	17	16
Objective	**35**								

Exceedences in bold.

Appendix F Emissions Benchmarks

F.1 Air Quality Neutral Emissions Benchmarks for Buildings

F.1.1 The following table provides the Building Emissions Benchmarks based on the gross floor area for each type of development class.

Table F.1: 'Air Quality Neutral' Emissions Benchmarks for Buildings (BEBs)

Land Use Class	NO_x (g/m^2/annum)	PM_{10} (g/m^2/annum)
Class A1	22.6	1.29
Class A3 – A5	75.2	4.32
Class A2 and Class B1	30.8	1.77
Class B2 – B7	36.6	2.95
Class B8	23.6	1.90
Class C1	70.9	4.07
Class C2	68.5	5.97
Class C3	26.2	2.28
D1 (a)	43.0	2.47
D1 (b)	75.0	4.30
Class D1 (c - h)	31.0	1.78
Class D2 (a - d)	90.3	5.18
Class D2 (e)	284	16.3

F.2 Air Quality Neutral Emissions Benchmarks for Transport

F.2.1 The following table provides the Transport Emissions Benchmarks based on the gross floor area and the location of the development.

Table F.2: 'Air Quality Neutral' Emissions Benchmarks for Transport (TEBs)

Land Use	CAZ	Inner	Outer
NO_x (g/m^2/annum)			
Retail (A1)	169	219	249
Office (B1)	1.27	11.4	68.5
NO_x (g/dwelling/annum)			
Residential (C3)	234	558	1553
PM_{10} (g/m^2/annum)			
Retail (A1)	29.3	39.3	42.9
Office (B1)	0.22	2.05	11.8
PM_{10} (g/dwelling/annum)			
Residential (C3,C4)	40.7	100	267

Appendix G Emissions Standards

G.1.1 Developments are to meet these emission standards along with the 'air quality neutral' benchmark values. Where meeting these emission standards still does not allow the air quality neutral benchmarks to be met, further reduction or offsetting measures would be required.

G.1.2 The emission standards are 'end-of-pipe' concentrations expressed at specific reference conditions for temperature, pressure, oxygen and moisture content. Compliance with these standards should be demonstrated based on monitoring undertaken on the actual installed plant or, where this does not exist at planning application stage, based on manufacturer guaranteed performance levels supported by type approval monitoring undertaken by the equipment supplier. At the very least, a statement of intent to only include combustion plant within the development that meets these standards must be made at application stage. Providing further details on actual installed combustion plant and emissions performance prior to full operation of the development should be made compulsory by way of planning condition. It is not permissible for emission factors (e.g. g/kWh, g/GJ etc.) to be converted into an equivalent concentration for compliance purposes.

G.1.3 To deliver both reductions in carbon dioxide emissions and improve air quality a tiered approach has been developed for applicable emission standards. This approach is based upon differentiation according to the baseline air quality in the area of development and will be dependent upon whether or not the development falls into the two tiers defined below.

Table F.1: Emission Standards for Solid Biomass Boilers and CHP Plant in the Thermal Input range 50kWth – 20 MWth

Band	Applicable Range	
	Baseline Annual Mean NO_2 and PM_{10}	Baseline 24-Hour Mean PM_{10}
Band A	>5% below national objective	>1-day less than national objective
Band B	Between 5% below or above national objective	1 day below or above national objective

G.1.4 The emission standards below are target minimum standards. If an assessment indicates that significant air quality effects may occur even when meeting the emission standards, additional measures (such as stack height increase, enforcement of more stringent standards etc.) should be considered in order to produce an acceptable level of impact.

Table F.2: Emission Standards for Solid Biomass Boilers and CHP Plant in the Thermal Input Range 50kWth to less than 20MWth for development in Band A

Combustion Applicance[A]	Pollutant / Parameter	Emission Standard at Reference O_2 (mg Nm^{-3})	Equivalent Concentration at 0% O_2 (mg Nm^{-3})	Likely Technique Required to Meet Emissions Standard
Spark ignition engine (natural gas/biogas)[B]	NO_x	250	329	Advanced lean burn operation (lean burn engines) NSCR (rich burn engines)
Compression ignition engine	NO_x	400	526	SCR

Combustion Applicance[A]	Pollutant / Parameter	Emission Standard at Reference O_2 (mg Nm^{-3})	Equivalent Concentration at 0% O_2 (mg Nm^{-3})	Likely Technique Required to Meet Emissions Standard
(diesel / bio-diesel)[B]				
Gas turbine[C]	NO_x	50	177	None above standard technology for modern turbines
Solid biomass boiler (including those involved in CHP applications)[D]	NO_x	275	386	Modern boiler with staged combustion and automatic control
	PM	25	35	Modern boiler with staged combustion and automatic control including cyclone / multicyclone
All (stack heat release less than 1MW)[E]	Stack discharge velocity	10 ms^{-1}	N/A	Appropriate design of stack discharge diameter to achieve required velocity
All (stack heat release greater than or equal to 1MW)[E]	Stack discharge velocity	15 ms^{-1}	N/A	Appropriate design of stack discharge diameter to achieve required velocity

[A] Combustion appliances operating less than 500 hours per annum are exempt from these standards
[B] Emission standard quoted at reference conditions 273K, 101.3kPa, 5% O_2, dry gas
[C] Emission standard quoted at reference conditions 273K, 101.3kPa, 15% O_2, dry gas
[D] Emission standard quoted at reference conditions 273K, 101.3kPa, 6% O_2, dry gas
[E] The stack heat release can be calculated as per equation (3) in the D1 guidance note:

$$Q = \frac{V\left(1-\frac{283}{T}\right)}{2.9}$$

Where:
Q= Stack heat release (MW)
V = Volume flow of stack gases at discharge conditions (Am^3s^{-1})
T = Discharge temperature (K)

N.B. Stacks should discharge vertically upwards and be unimpeded by any fixture on top of the stack (e.g., rain cowls, 'China-man Hats')

Table F.3: Emission Standards for Solid Biomass Boilers and CHP Plant in Thermal Input Range 50kWth to less than 20MWth for development in Band B

Combustion Applicance[A]	Pollutant / Parameter	Emission Standard at Reference O_2 (mg Nm^{-3})	Equivalent Concentration at 0% O_2 (mg Nm^{-3})	Likely Technique Required to Meet Emissions Standard
Spark ignition engine (natural gas/biogas)[B]	NO_x	95	125	SCR (lean burn engines) NSCR (rich burn engines)
Compression ignition engine (diesel / bio-diesel)[B]	NO_x	400	526	SCR
Gas turbine[C]	NO_x	20	71	Latest generation DLN burners and / or SCR
Solid biomass boiler < 1MW_{th} input (including those involved in CHP applications)[D]	NO_x	180	252	Modern boiler with staged combustion and / or SNCR
	PM	5	7	Fabric / ceramic filter
Solid biomass boiler ≥ 1MW_{th} input (including those involved in CHP applications)[D]	NO_x	125	175	Modern boiler with staged combustion, automatic control and / or SNCR
	PM	5	7	Fabric / ceramic filter
All (stack heat release less than 1MW)[E]	Stack discharge velocity	10 ms^{-1}	N/A	Appropriate design of stack discharge diameter to achieve required velocity
All (stack heat release greater than or equal to 1MW)[E]	Stack discharge velocity	15 ms^{-1}	N/A	Appropriate design of stack discharge diameter to achieve required velocity

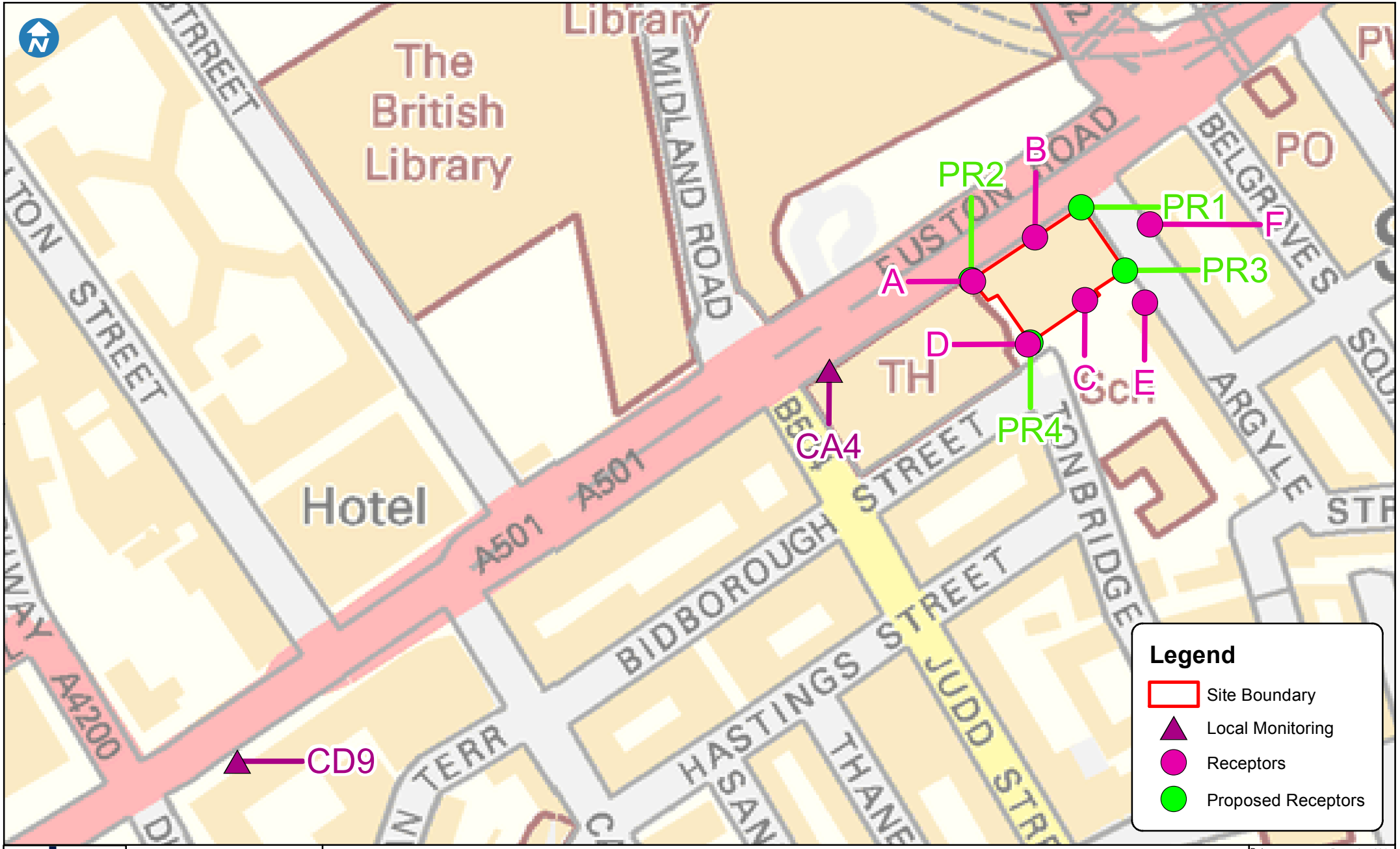
[A] Combustion appliances operating less than 500 hours per annum are exempt from these standards
[B] Emission standard quoted at reference conditions 273K, 101.3kPa, 5% O_2, dry gas
[C] Emission standard quoted at reference conditions 273K, 101.3kPa, 15% O_2, dry gas
[D] Emission standard quoted at reference conditions 273K, 101.3kPa, 6% O_2, dry gas
[E] The stack heat release can be calculated as per equation (3) in the D1 guidance note:

$$Q = \frac{V\left(1-\frac{283}{T}\right)}{2.9}$$

Where:
Q= Stack heat release (MW)
V = Volume flow of stack gases at discharge conditions (Am^3s^{-1})
T = Discharge temperature (K)

N.B. Stacks should discharge vertically upwards and be unimpeded by any fixture on top of the stack (e.g., rain cowls, ‘China-man Hats’)

Appendix H Figures



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Client

Tower 8

Camden Town Hall Annexe

Local Monitoring and Receptor Locations

Date	December 2014
Scale	N.T.S.
Drawn By	CB
Checked By	GH
Figure Number	Figure 1

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