373-375 Euston Road

Air Quality Assessment

Prepared by Environ
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Air Quality Assessment

373 -375 Euston Road, London

Prepared for:
S2 Estates (Euston Road) LLP
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Author (signature):	Lesley Vining 
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Contents

Executive Summary

ENVIRON UK Ltd. (ENVIRON) has been commissioned by S2 Estates (Euston Road) LLP, to carry out an air quality assessment to accompany a planning application for the redevelopment of Cambridge House at 373-375 Euston Road. The development proposals include a commercial unit at ground and basement level, with residential units on floors one to six.

The development is located within the London Borough of Camden (LBC). The whole of the borough has been declared an Air Quality Management Area due to potential exceedences of both nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}) National Air Quality Objectives (NAQO). NO_2 concentrations at road side locations immediately adjacent to the Proposed Development are currently exceeding the NAQO. Thus assurance is required by the council that due consideration has been given to air quality within the design of the proposed development.

During the construction phase, emissions of dust and exhaust gases from construction activities can impact air quality. These will be effectively controlled through the use of suitable mitigation measures implemented through the provision of a dust management plan which would be agreed with LBC prior to the start of construction.

Consideration has been given to air quality within the design of the building to ensure that potential operational impacts will be minimised as far as is practicable.

LBC planning policy requires that the residential elements of the development meets the Code for Sustainable Homes level 4 for the new units and BREEAM Domestic Refurbishment rating of Excellent. The commercial elements should achieve a BREEAM rating of very good. To meet these criteria the development will include low NOx boilers and a CHP. The CHP would be fitted with a catalyst to significantly reduce emissions of NOx to levels that would meet the emission limits included within the Draft Sustainable Design and Construction SPG. A screening assessment has indicated that emissions from the CHP will have a negligible impact on air quality at the nearest point of exposure.

Additional mitigation measures have been built into the design of the development to further reduce the exposure of future residents to poor air quality. In particular each residential unit will be provided with a mechanical ventilation system which will draw air from the roof top at the rear of the development.

1 Introduction

1.1 Overview

ENVIRON UK Ltd. (ENVIRON) has been commissioned by S2 Estates (Euston Road) LLP, to carry out an air quality assessment to accompany a planning application for the redevelopment of Cambridge House at 373-375 Euston Road. The development proposals include a commercial unit at ground and basement level, with residential units on floors one to six.

The development is located within the London Borough of Camden (LBC). The whole of the borough has been declared an Air Quality Management Area due to potential exceedences of both nitrogen dioxide (NO_2) and fine particulate matter (PM_{10}) National Air Quality Objectives (NAQO). NO_2 concentrations at road side locations immediately adjacent to the Proposed Development are currently exceeding the NAQO. Thus assurance is required by the council that due consideration has been given to air quality within the design of the Proposed Development.

1.2 Scope of the Assessment

The proposed development will be car free with no car parking spaces provided for the residential occupants, thus the impact on pollutant emissions from road traffic is considered to be negligible.

However the development will introduce residential receptors into a location where air quality is currently exceeding the annual mean NO_2 air quality objective. Whilst the objectives relate to external air, external concentrations will impact internal air quality. Information is therefore provided on the mitigation measures that have been included within the design of the development to reduce the exposure of residents to high concentrations of external pollutants.

The residential apartments have been designed to meet the Code for Sustainable Homes Level 4. To achieve the required reduction in CO_2 emissions part of the energy requirement of the apartments will be provided by a combined heat and power (CHP) plant unit. CHP plant can emit high levels of oxides of nitrogen, and thus impact local air quality, particularly where emissions arise from short stacks. Potential impacts arising from the CHP have been assessed using the screening tool produced by Environmental Protection UK (EPUK)[1].

Consideration has also been given to the potential for emissions of dust to arise during the construction phase. A qualitative assessment of the risk of dust impacts has been carried out using the Institute of Air Quality Management guidance to identify the appropriate level of mitigation that should be applied to ensure impacts can be effectively mitigated.

In summary, the assessment includes:

- Establishment of baseline air quality;
- Assessment of dust impacts during the construction phase.
- Assessment of emissions as a result of the proposed energy strategy for the proposed development; and

[1] http://iaqm.co.uk/guidance/

- Assessment of the mitigation strategy to limit residents exposure to elevated concentrations of air pollutants.

2 Site Description

2.1 Existing Site

The development site, which covers an area of 0.03 hectares, is currently occupied by Cambridge House, a four storey building with a Volvo car showroom at ground and basement level, with three storeys of vacant commercial space above.

The existing building is bound by Euston Road to the north, Cleveland Street to the west and Warren Street to the south, with adjacent buildings to the east.

2.2 Proposed Development

The development proposed retains the existing structure and floorplates and provides an additional three storey extension along the Euston Road elevation of the building and a one storey extension along the Warren Street elevation.

The development will comprise the following:

- A1/A3/B1 use at basement and ground floor (393 m^2 GEA); and
- 16 residential units located on the first to sixth floor level.

No car parking will be provided within the development. A plan of the first floor is provided as Figure 2.1, with the floor plans for the remaining floors included in Annex A.

Figure 2.1: First floor plan

3 Policy Context

3.1 International Legislation and Policy

EU Directive 2008/50/EC[2] on ambient air quality and cleaner air for Europe (the CAFE directive) sets out the ambient air quality standards for NO_2 and PM_{10}, to be achieved by 1st January 2010 and 2005 respectively. The Air Quality Standards Regulations 2010[3] implements the requirements of the Directive into UK legislation.

The Directive contains a series of limit values for the protection of human health and critical levels for the protection of vegetation.

Compliance with the EU Limit Values is mandatory. However, Member States can apply for a time extension for compliance, subject to approval of an action plan by the European Commission. The UK Government applied in autumn 2011 for a time extension for compliance with the NO_2 limit values until 2015 for a number of areas throughout England. However, the UK Government has withdrawn its application for those zones where compliance is not expected until after 2015, which includes central London.

3.2 Local Air Quality Management

Part IV of the Environment Act 1995[4], 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 Strategy[5] 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[6] and the Air Quality (Amendment) (England) Regulations 2002[7]. Table 3.1 presents the NAQOs for NO_2 and PM_{10}.

The Air Quality Strategy also introduced a new policy framework for tackling fine particles ($PM_{2.5}$) including an exposure reduction target. This pollutant is not included within LAQM, and therefore has not been considered further in this assessment.

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 Local Air Quality Management Technical Guidance 2009 (LAQM.TG (09))[8] issued by Defra for Local

[2] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[3] Air Quality Standards Regulations 2010 – Statutory Instrument 2010 No. 1001

[4] Secretary of State The Environment Act 1995 part IV Air Quality HMSO

[5] Department for Environment, Food and Rural Affairs, July 2007, Air Quality Strategy for England, Scotland, Wales and Northern Ireland

[6] The Air Quality (England) Regulations 2000 (SI 2000 No. 928)

[7] The Air Quality (England) (Amendment) Regulations 2002 (SI 2002 No. 3043) Department for Environment, Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance LAQM.TG(09)

[8] Department for Environment, Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance LAQM.TG(09)

Authorities, on where the NAQOs apply. 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 3.1: Objectives included in the Air Quality Regulations (England) 2000 for the Purpose of Local Air Quality Management

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
Particles (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

It should be noted that the EU Limit Values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and legal responsibility. The compliance date for the NO_2 Limit Values is 1 January 2010, which is five years later than the date for the NAQO.

The Limit Values are mandatory whereas the NAQOs are policy objectives. Local authorities are not required to achieve them, but have to work towards their achievement. In addition, the Limit Values apply in 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, and on the carriageway/central reservation of roads except where there is normally pedestrian access.

Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the NAQOs, it must designate these areas as Air Quality Management Areas (AQMA) and draw up an Air Quality Action Plan (AQAP) setting out measures to reduce pollutant concentrations with the aim of meeting the NAQOs.

The LBC latest AQAP for 2013 to 2015[9] has the following overarching aims;

- Continue to meet the EU objectives for Carbon Monoxide, Sulphur Dioxide, Benzene, 1,3-Butadiene, Lead and PM_{10}.
- Continue to reduce concentrations of PM_{10}; and
- to meet the EU Objective for NO_2.

The plan includes the following key objectives to:

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

[9] London Borough of Camden, Camden's Clean Air Action Plan 2013-2015

- Improve the health and well-being of the local population.
- Work in partnership with national and regional bodies, and with local public and private organisations, to foster improvements in air quality.
- Lead by example and reduce NO_2 and PM_{10} emissions associated with the Council's own buildings and transport services.
- Ensure actions which serve to reduce NO_2 and PM_{10} emissions complement actions to mitigate CO_2 emissions, and vice-versa.

3.3 Planning Policy

3.3.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)[10] published in March 2012 sets out the Government's planning policies for England. Planning law requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise.

The NPPF is also a material consideration in planning decisions. It states that the purpose of the planning system is to contribute to the achievement of sustainable development; and that planning decisions on individual applications must reflect relevant EU obligations and statutory requirements. Specifically, in terms of air quality, it requires the planning system to prevent development from contributing to, or being put at unacceptable risk from unacceptable levels of air pollution.

Planning policies should promote compliance with or contribute towards achievement of EU limit values and NAQOs, taking into account the presence of AQMAs and the cumulative impacts on air quality from individual sites in local areas.

Planning decisions should ensure that new development within an AQMA is consistent with the Local Air Quality Action Plan.

3.3.2 The London Plan, Spatial Development Strategy for Greater London, 2011

The following policies of the London Plan[11] are of relevance to this assessment:

- Policy '5.3 - Sustainable design and construction' which states that development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:
  - *"minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems);*

[10] Department for Communities and Local Government (March 2012) National Planning Policy Framework

[11] Greater London Authority, 2011. The London Plan Spatial Development Strategy for Greater London. London. London. GLA

- *avoiding internal overheating and contributing to the urban heat island effect;*
- *efficient use of natural resources (including water), including making the most of natural systems both within and around buildings; and*
- *minimising pollution (including noise, air and urban run-off)".*

- Policy '7.14 - Improving air quality' which states that development proposals should:
  - *"minimise increased exposure to existing poor air quality and make provision to address local problems of air quality (particularly within Air Quality Management Areas (AQMAs) and where development is likely to be used by large numbers of those particularly vulnerable to poor air quality (such as children or older people) such as by design solutions, buffer zones or steps to promote greater use of sustainable transport modes through travel plans (see Policy 6.3);*
  - *promote sustainable design and construction to reduce emissions from the demolition and construction of buildings following the best practice guidance in the GLA and London Councils' 'The control of dust and emissions from construction and demolition';*
  - *be at least 'air quality neutral' and not lead to further deterioration of existing poor air quality (such as areas designated as Air Quality Management Areas (AQMAs);*
  - *ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site. Where it can be demonstrated that on-site provision is impractical or inappropriate, and that it is possible to put in place measures having clearly demonstrated equivalent air quality benefits, planning obligations or planning conditions should be used as appropriate to ensure this, whether on a scheme by scheme basis or through joint area-based approaches; and*
  - *where the development requires a detailed air quality assessment and biomass boilers are included, the assessment should forecast pollutant concentrations. Permission should only be granted if no adverse air quality impacts from the biomass boiler are identified."*

3.3.3 Revised Early Minor Alterations to The London Plan, 2013

In October 2013, the GLA published Revised Early Minor Alterations to the London Plan[12] aimed at ensuring that the London Plan is fully consistent with the NPPF. Paragraph 7.51 which supports Policy 7.14 is to be amended and in summary states the following:

- the introduction of new sensitive receptors in locations where they will be affected by existing sources of air pollution should be avoided;
- where adverse air quality impacts arise from new development mitigation will be required and could include on-site design solution, buffer zones and sustainable travel measures; and
- where on-site measures are impractical or inappropriate, off site mitigation measures can be implemented.

[12] Greater London Authority, October 2013. Revised Early Minor Alterations to the London Plan. London. GLA.

3.3.4 Clearing the Air - The Mayor's Air Quality Strategy, 2010

The Mayor of London has set out a detailed air quality strategy[13] for Greater London in order to deliver the required reductions in PM10 and NO2 concentrations to meet the EU limits. The policies and measures within the strategy are divided into transport and non-transport measures. With regard to the Proposed Development the key policies are as follows:

- Policy '6 - Reducing emissions from construction and demolition sites' which states that the Mayor will work with the London Council to review and update the Best Practice guidance for construction and demolition sites and create supplementary planning guidance to assist implementation;
- Policy '7 - Using the planning process to improve air quality - new developments in London as a minimum shall be 'air quality neutral' which states that 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' which states that the Mayor will apply emission limits for both PM and NOx for new biomass boilers and NOx 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; and
- Policy '9 - Energy efficient buildings' which states that 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 NOx emissions.

3.3.5 Sustainable Design and Construction Supplementary Planning Guidance, 2006

This Supplementary Planning Guidance[14] (SPG) which supports the London Plan, provides the following guidance on air quality in section 2.4.3:

- All new gas boilers should produce low levels of NOx; and
- Developments should take measures to reduce and mitigate exposure to air pollution.

3.3.6 Draft Sustainable Design and Construction Supplementary Planning Guidance, 2013

An update to the 2006 Sustainable Design and Construction Supplementary Planning Guidance was published for consultation in July 2013[15]. The following guidance on air quality is provided in Section 4:

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[13] Greater London Authority, 2010. Clearing the Air - The Mayors London Air Quality Strategy. London. GLA

[14] Greater London Authority, 2006, Sustainable Design and Construction, The London Plan Supplementary Planning Guidance. London. GLA .

[15] Greater London Authority, July 2013. Sustainable Design and Construction Draft Supplementary Planning Guidance Publication for Consultation. London. GLA.

- developers should design schemes to be air quality neutral;
- developments should be designed to minimise the generation of air pollutants;
- developments should be designed to minimise exposure to poor air quality;
- energy plant, including boilers and CHP plant should meet the relevant emission limits; and
- developers and contractors should follow the relevant guidance on minimising impacts from construction and demolition.

The draft SPG states that where developers are unable to meet the 'air quality neutral' benchmark, consideration should be given to off-site NO_x and PM_{10} abatement measures.

3.3.7 The Control of Dust and Emissions During Construction and Demolition Draft Supplementary Planning Guidance, 2013

This draft guidance[16] updates the previous London Council's guidance to control dust and emissions from construction and demolition activities by identifying appropriate levels of mitigation. The methodology proposed is broadly in line with that provided by the Institute for Air Quality Management (see below).

3.3.8 Local Policy

London Borough of Camden Local Development Framework

There are three development policies contained within LBC Local Development Framework[17] which are relevant to air quality:

- Policy DP22 - Promoting sustainable design and construction, requires development to incorporate sustainable design and construction measures to be resilient to climate change and to reduce air pollution.
- Policy DP26 - Managing the impact of development on occupiers and neighbours states that planning permission will only be granted for development that does not cause harm to amenity. Factors that would be considered as potentially impacting amenity include emissions of odour, fumes and dust.
- Policy DP32 - Air quality and Camden's Clear Zone, states that the council will require an air quality assessment for all development which could potentially cause significant harm to air quality, and that mitigation measures will be expected in developments that are located in areas of poor air quality.

3.4 Additional Guidance

3.4.1 Environmental Protection UK Guidance

Environmental Protection UK has produced 'Development Control: Planning for Air Quality (2010 Update)[18] which provides guidance on when an air quality assessment is required. It also incorporates guidance on operational significance criteria produced by the Institute of Air Quality Management (IAQM).

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[16] Greater London Authority, 2013. The Control of Dust and Emissions During Construction and Demolition.

[17] London Borough of Camden, 2010, Local Development Framework

[18] Environmental Protection UK, 2010. Development Control: Planning for Air Quality (2010 Update).

3.4.2 Institute of Air Quality Management Guidance

The IAQM has produced 'Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance'[19] to assist in the assessment of air quality impacts from construction activities. This guidance is considered to supersede the London Councils construction dust guidance[20].

[19] Institute of Air Quality Management, 2012, Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance

[20] London Councils, 2006. The control of Dust and Emissions from Construction and Demolition: Best Practice Guidance.

4 Existing Air Quality

LBC monitor existing air quality at a number of locations throughout the borough of Camden. The closest monitoring site to the development site is located on Euston Road near the junction with Gower Street, approximately 500 m to the east of the development site.

In addition, LBC monitor NO_2 concentrations using diffusion tubes at a site adjacent to Camden Town Hall, also on the Euston Road, approximately 1.3 km from the development site.

A summary of the results from these two sites is presented below.

Table 4.1: Annual mean NO_2 monitoring results µg/m^3

Site	Type	Classification	2008	2009	2010	2011	2012
Euston Road	Automatic Monitor	Roadside	NR	NR	NR	122	106
Camden Town Hall	Diffusion Tube	Roadside	93.3	87.1	82.	93.1	82.1

Whilst traffic flows at the automatic site would be expected to be greater than those at the development site, they would be expected to be broadly similar to those at the Town Hall site. The monitoring data therefore clearly shows that existing air quality would be expected to exceed the annual mean air quality objective at the development site. Given that the annual mean concentrations exceed 60 µg/m^3 there is also potential that the short term one hour objective may also be exceeded.

A slight decrease in concentrations would be expected away from the façade as NO_2 concentrations decrease rapidly away from the roadside. Concentrations would also be expected to decrease with height.

PM_{10} concentrations are not monitored at either of the sites located on Euston Road. However the monitoring data recorded at other sites in the borough show that air quality is currently meeting both the annual mean and 24 hour objectives.

5 Construction Phase Impacts

5.1 Introduction

It is inevitable that with any development, construction activities would cause some disturbance to those nearby. Disruption due to construction is a localised phenomenon and is temporary in nature. In general, only people living and working within 100m of construction activities are likely to be seriously impacted by nuisance dust[21] .

Dust arising from most construction activities tends to be of coarse nature. Deposition of coarse dust can lead to soiling of property including windows, cars, external paintwork and laundry.

The ability of dust particles to remain suspended in the air depends on its shape, size and density. Coarse particles (>30µm) tend to be deposited within 100 m of source[22]. Finer particles, between 10-30µm, are generally deposited within 200 to 500 m of source, while very fine particles (<10 µm), which remain suspended for longer, can travel up to 1 km from source. The greatest proportion of construction dust is made up of coarse particles, thus the majority of dust emissions are deposited within 100 m of source.

Only a small proportion of the dust generated would be fine in nature (e.g. PM_{10}) which can enter the human respiratory system and result in adverse health effects. High emissions of fine dust typically arise from specialist activities, such as stone finishing. These should be subject to individual emission controls.

Construction effects as a result of the Proposed Development have been assessed using the recent guidance provided by the IAQM. This supersedes the guidance produced by the London Councils.

5.2 Assessment of Impacts

The development will comprise the refurbishment of the existing four storey building to provide commercial units at ground floor, with residential above. In addition, three additional floors will be added to the building. There will be no change to the building footprint.

The risk categories for the two construction activities, as outlined in the IAQM guidance, which are likely to take place at the site, have been determined in Table 6.1 below. The site is deemed to be 'medium risk' during construction and trackout due to the close proximity of receptors.

There are no ecological receptors or habitats that would be sensitive to dust impacts within 100 m of the proposed site boundary therefore, no ecological effects are predicted to occur.

[21] Baughan C J, 1980. Nuisance from Road Construction: A study at the A31 Poulner Lane Diversion, Ringwood. TRRL Supplementary Report 562, from DTLR (1994) Design Manual for Roads and Bridges.

[22] Arup Environmental/Ove Arup Partners on Behalf of the Department of the Environment (1995) The Environmental Effects of Dust from Surface Mineral Workings

Table 5.1: Demolition and Construction Risk Categories			
Activity	**Dust Emission Class**	**Distance to Nearest Receptor**	**Risk Category for Dust Soiling and PM_{10}**
Demolition	NA	<20 m	NA
Earthworks	None anticipated as footprint will not change	<20 m	NA
Construction	Small – mostly refurbishment work with construction of three additional floors	<20 m	Medium
Trackout	Small < 25 HDV trips per day	<20 m	Medium
[1] Assumed as no information on construction vehicle movements currently available			

5.3 Mitigation of Construction Impacts

The control of dust emissions from construction sites relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended in the IAQM guidance to reduce impacts from medium risk sites is provided in Table 5.2. It is recommended that these are implemented through a planning condition requiring the applicant to submit a dust management plan prior to construction commencing on the site.

Table 5.2: Dust Mitigation Measures for Medium Risk Sites	
Communications	Develop a stakeholder communication plan; Display name and contact details of responsible person for dust issues on Site boundary; and Display office contact information
Dust Management	Implement a dust management plan to be approved by the local authority; Record all complaints and incidents
Monitoring	Undertake daily on and off site visual inspections
Preparing and Maintaining the Site	Use site layout to locate activities away from sensitive receptors; Erect solid screens and barriers around the Site; Avoid site runoff of water and mud; Reduce storage of dusty materials to a minimum; and Minimise emissions from stockpiles by covering, seeding, fencing or damping down
Operating Vehicle/Machinery and Sustainable Travel	Ensure vehicles switch of engines when stationary; Avoid use of generators where possible; Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas; and Implement a sustainable travel plan for site workers

Operations	Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques; Ensure adequate water supply for effective dust and particulate matter suppression; Use enclosed chutes, conveyors and covered skips; Minimise drop heights of materials; and Ensure suitable cleaning material is available at all times to clean up spills
Waste Management	Avoid bonfires
Measures Specific to Construction	Ensure aggregates are stored in bunded areas and are not allowed to dry out; and Ensure bulk cement and other fine materials are delivered in enclosed containers and stored in silos
Measures Specific to Trackout	Use water-assisted dust sweepers to clean access and local roads; Avoid dry sweeping of large areas; Ensure vehicles entering and leaving the Site are appropriately covered; Install hard surfaced haul routes; and Implement a wheel washing system

5.4 Sensitivity

The site is located on Euston Road/Cleveland Street and is surrounded by existing residential and commercial properties to the west and south. As a result the sensitivity of the surroundings to dust impacts during the construction phase is considered to be 'high'. No ecological receptors that are considered sensitive to dust impacts have been identified within 100 m of the site.

5.5 Residual Effects

The significance of the potential impact of construction activities on surrounding receptors has been assessed assuming the mitigation measures outlined above are appropriately implemented. The overall significance of residual effects is therefore anticipated to be 'negligible', as shown in Table 5.3.

Table 5.3: Significance of Residual Effects from Demolition and Construction Assuming Appropriate Mitigation is Implemented

Phase	Risk of Activity	Sensitivity of Surrounding Area	Risk of Site giving rise to Dust and PM_{10} Effects
Construction	Medium	High	Negligible
Trackout	Medium		Negligible
Overall Significance of Effects			**Negligible**

6 Operational Impacts

6.1 Introduction

The proposal includes ambitious sustainability targets to reduce the development's environmental impact through design and sustainable operation. The following targets are proposed which demonstrate high levels of sustainability:

- To achieve the minimum requirements for Code for Sustainable Homes Level 4 for the new build residential, with aspirations to improve on the minimum requirements where possible;
- BREEAM Domestic Refurbishment Excellent for the conversion of the existing parts of the building to residential;
- BREEAM New Construction Very Good for the commercial;
- Approximately 25% CO_2 improvement on 2010 Building Regulations, achieved through a combination of passive design, energy efficiency, and Low and Zero Carbon technologies.

To deliver these targets an Energy Strategy has been included as part of the planning submission, produced by the Mechanical Engineer Consultants, Hoare Lee.

The strategy first concentrated on delivering energy efficiency measures to make the building as efficient as possible. Through the effective design of the building and the use of energy efficiency measures the percentage reduction in carbon emissions is estimated as 42% when compared with the existing building performance.

The second stage of the process was to review a number of low or zero carbon technologies to reduce the overall energy consumption and carbon emissions of the development. This process concluded that the inclusion of a gas fired combined heat and power (CHP) unit was the most appropriate technology to reduce site wide CO_2 emissions to meet the relevant targets.

6.2 Combined Heat and Power Unit

Calculations have been carried out using energy benchmark data to determine the daily, monthly and annual energy profiles for the development. From this data, the appropriate size of CHP plant and matched thermal storage has been established.

It has been estimated that the Proposed Development would require a CHP with a 4 kWe electrical output and 8 kWth thermal output CHP unit to act as the lead heat source to serve all areas of the building. This system would then be supplemented by high efficiency, low NO_x, gas fired condensing boilers to provide additional heat and hot water, with mains electricity to provide the additional electrical requirement.

Analysis has been carried out to maximise the size of CHP plant that can feasibly be installed within the correct operating parameters of the equipment. An oversized CHP unit or one which is not provided with adequate thermal storage will frequently turn on and off, thus diminishing the performance and reliability of the equipment and potentially resulting in higher emissions of pollutants.

The size of the CHP plant has been calculated based on the thermal base load (primarily domestic hot water) that is available all year round to enable its operation for approximately 3102 hours per year. This equates to an average daily operation of 8.5 hours per day. These operating hours shall incorporate an availability factor to allow for planned and unplanned maintenance periods.

To enable the CHP plant to run continuously when it is operating, thermal storage vessels shall be used so that excess CHP capacity can be used to generate hot water for use at a later time, when there is a demand for heat in the building.

It is estimated that the CHP combined with suitably sized thermal storage will provide heat for approximately 60% of the building's thermal energy requirements, with gas fired boilers being used to meet peak demands and provide top up heat in winter months.

6.3 Impact Assessment

At this stage in the design process, the choice of the CHP has yet to be finalised and thus it is not possible to carry out a detailed assessment of impacts.

However, the chosen unit will comply with the emission limits set out in the draft Sustainable Design and Construction SPG and would therefore be provided with a catalytic converter on the flue exhaust to provide a significant reduction in NO_X emissions.

Emissions from the CHP would be emitted from a stack located on the highest point of the roof and at a height of approximately 1.5 m above roof height.

The screening tool, produced by EPUK[23], to assist local authorities in assessing whether impacts from CHPs are likely to give rise to significant air quality impacts, has been used to provide an initial assessment to determine whether the air quality impacts from a CHP would be acceptable at the nearest point of exposure. For the proposed development this is considered to be the roof garden and the air intake located at fifth floor.

The tool has indicated that at a worst case the operation of the CHP may give rise to an increase in annual mean NO_2 of 0.39 µg/m^3 (see Annex B). Using the EPUK/IAQM methodology for assessing the significance of air quality impacts, an increase of this magnitude is considered to be 'imperceptible' and result in a **negligible impact** to air quality. It should be noted that this is a worst case screening assessment, assuming continual operation of the CHP on a 24/7 basis and total conversion of NO_x to NO_2. Actual concentrations would therefore be expected to be lower.

It is recommended that this assessment is repeated once the choice of CHP has been finalised and full details available to verify the conclusions of the screening assessment.

6.4 CHP Operation and Maintenance

Regular planned preventative maintenance by a trained engineer will be carried out at regular service intervals, as recommended by the CHP manufacturer, to ensure the continued correct and efficient operation of the unit.

[23] http://iaqm.co.uk/guidance/

6.5 Gas CHP Information Request Form

LBC require additional information to be supplied regarding the choice and operation of the CHP to be supplied as part of the planning application, which should be submitted on the Gas CHP information request form. Whilst the majority of the information requested by the form is included within this report, as the choice of CHP is yet to be finalised it is not possible to supply all of the required information at this time. It is therefore recommended that the provision of this information and the completion of the form are secured by an appropriately worded planning condition.

7 Mitigation

A number of measures have been incorporated within the design of the development to reduce the exposure of future residents to poor air quality including:

- residential units are not proposed at ground floor level;
- those units facing onto Euston Road are to be provided with enclosed winter gardens rather than open balconies, and these units will be dual aspect;
- the development will be car free, and will encourage the use of sustainable transport modes through providing secure bicycle storage;
- each residential unit will be fitted with a whole house heat recovery mechanical ventilation system. Each system will comprise a fan unit with filter, heat exchanger and inlet and extract fans. Filtered and pre-heated fresh air will be ducted to living rooms and bedrooms, and extracted from kitchens and bathrooms. In the summer months, the pre-heater will be turned off via a by-pass in the heat exchanger;
- the air inlet will be located at sixth floor level and has been located as far back from Euston Road as feasible;
- exhaust gas emissions from the CHP and boilers will be emitted from combined flues some 1.5 m above the final roof height i.e. above the sixth floor to ensure adequate dispersion of flue gases and to avoid entrainment into the air intake;
- consideration will be given to the inclusion of a NO_x filter on the air intake, such as those supplied by AAC Swiftpack which include Nitrosorb media to remove oxides of nitrogen from the incoming air; and
- all cooking appliances will be electric to reduce the potential for exposure from internal sources of NO_x.

8 Summary and Conclusions

The proposed development will introduce residential receptors into a location where air quality is likely to exceed the air quality objective for annual mean NO_2 at external locations.

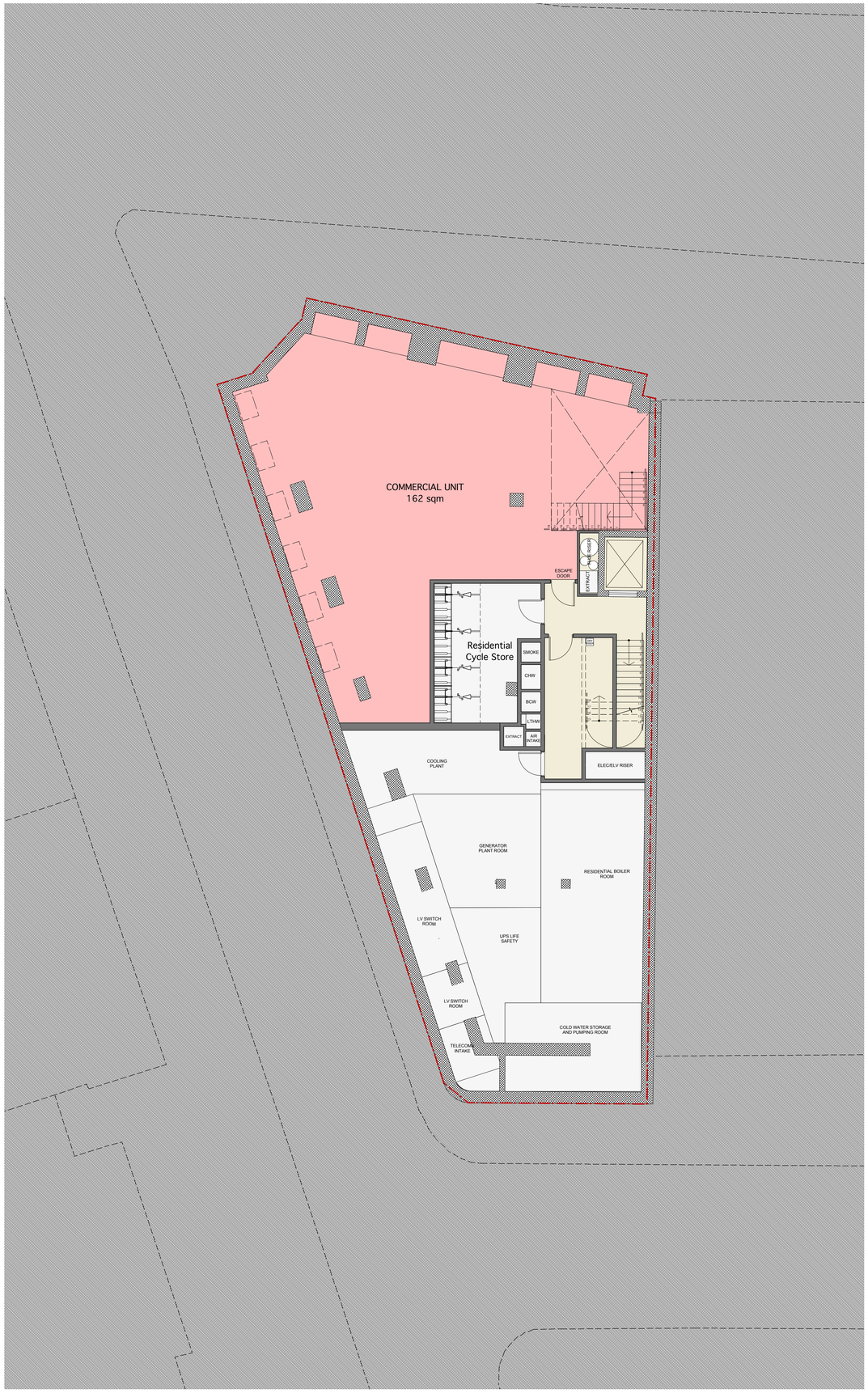
During the construction phase, emissions of dust and exhaust gases from construction activities can impact air quality. These will be effectively controlled through the use of suitable mitigation measures implemented through the provision of a dust management plan which would be agreed with LBC prior to the start of construction.

Consideration has been given to air quality within the design of the building to ensure that potential operational impacts will be minimised as far as is practicable.

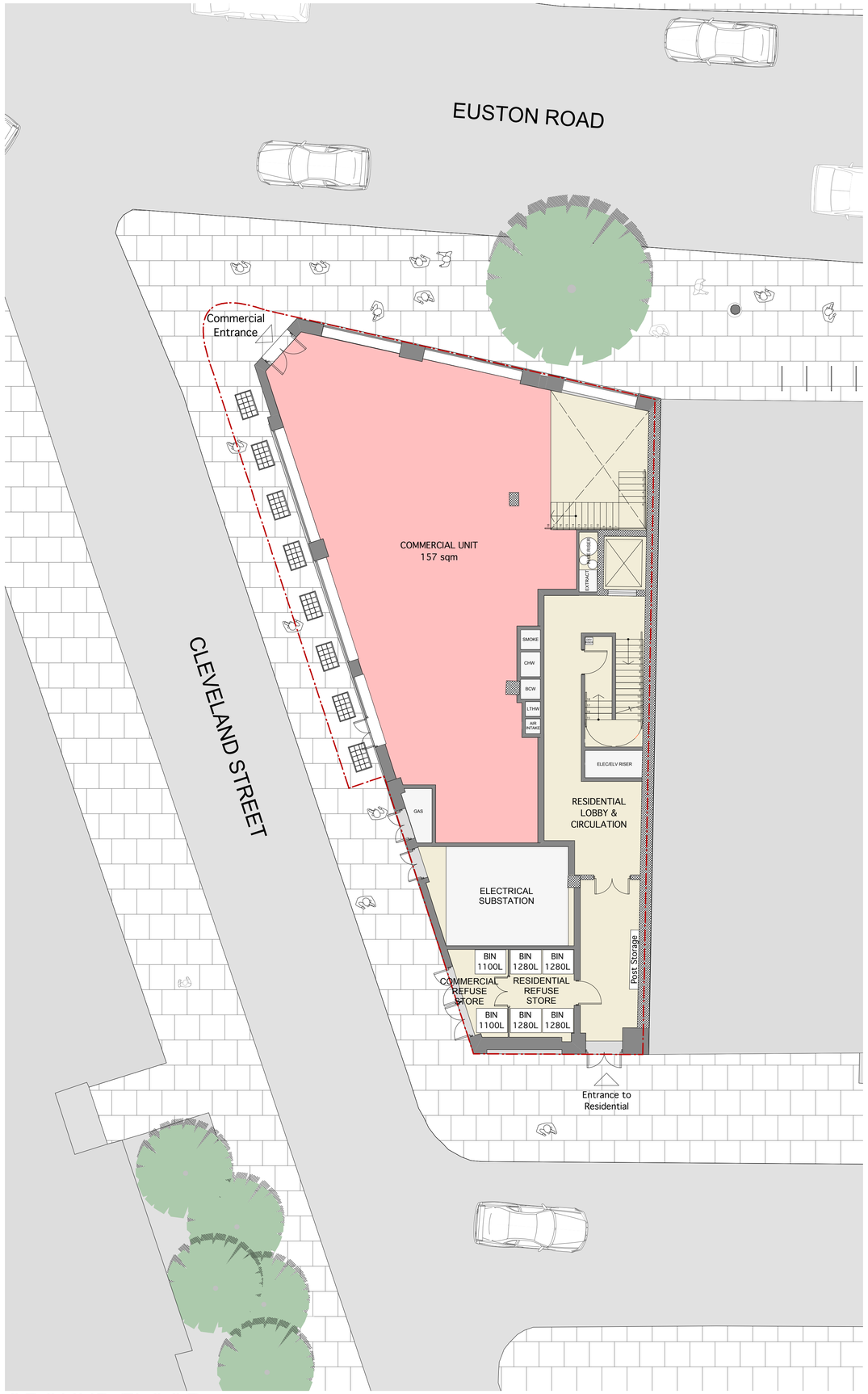
LBC planning policy requires that the residential elements of the development meets the Code for Sustainable Homes level 4 for the new units and BREEAM Domestic Refurbishment rating of Excellent. The commercial elements should achieve a BREEAM rating of very good. To meet these criteria the development will include low NO_x boilers and a CHP. The CHP would be fitted with a catalyst to significantly reduce emissions of NO_x to levels that would meet the emission limits included within the Draft Sustainable Design and Construction SPG. A screening assessment has indicated that emissions from the CHP will have a negligible impact on air quality.

Additional mitigation measures have been built into the design of the development to further reduce the exposure of future residents to poor air quality. In particular each residential unit will be provided with a mechanical ventilation system which will draw air from the roof top at the rear of the development.

Annex A: Plans



BASEMENT



GROUND FLOOR

GENERAL NOTES

All setting out must be checked on site
All levels must be checked on site and refer to Ordnance Datum Newlyn unless alternative Datum given
All fixings and weatherings must be checked on site
All dimensions must be checked on site
This drawing must not be scaled
This drawing must be read in conjunction with all other relevant drawings and specification clauses
This drawing must not be used for land transfer purposes
Calculated areas in accordance with Assael Architecture's Definition of Areas for Schedule of Areas
This drawing must not be used on site unless issued for construction
Subject to survey, consultation and approval from all statutory Authorities

Revision Status:
P=Preliminary C=Contract

DRAWING NOTES

E-FILE REF N° A2413 Cambridge House Working Plans

STATUS	REVISION	DATE	DRN	CHK	CDM
P15	PLANNING SUBMISSION	20.06.13	LW	JB	--

KEY

- EXISTING WALLS
- PROPOSED WALLS
- APPLICATION BOUNDARY

KEY

CLIENT

S2 Estates (Euston Road) LLP

PROJECT TITLE

Cambridge House Euston Road

DRAWING TITLE

Proposed Basement and Ground Floor Plans

SCALE @ A1 SIZE / A3 SIZE	DATE
1:100 / 1:200	June '13
DRAWING N°	STATUS & REVISION
A2413 221	P15

Assael

Assael Architecture Limited
Studio 13
50 Carnwath Road
London SW6 3EG

T +44 (0) 20 7736 7744
F +44 (0) 20 7736 6677
E info@assael.co.uk
W www.assael.co.uk

FIRST FLOOR

SECOND FLOOR

GENERAL NOTES

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E-FILE REF N° A2413 Cambridge House Working Plans

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KEY

- EXISTING WALLS
- PROPOSED WALLS
- APPLICATION BOUNDARY

KEY

CLIENT

S2 Estates (Euston Road) LLP

PROJECT TITLE

Cambridge House Euston Road

DRAWING TITLE

Proposed First and Second Floor Plans

SCALE @ A1 SIZE / A3 SIZE	DATE
1:100 / 1:200	June '13
DRAWING N°	STATUS & REVISION
A2413 222	P15

Assael

Assael Architecture Limited
Studio 13
50 Carnwath Road
London SW6 3EG

T +44 (0) 20 7736 7744
F +44 (0) 20 7736 6677
E info@assael.co.uk
W www.assael.co.uk

THIRD FLOOR

FOURTH FLOOR

GENERAL NOTES

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- PROPOSED WALLS
- APPLICATION BOUNDARY

KEY

CLIENT

S2 Estates (Euston Road) LLP

PROJECT TITLE

Cambridge House Euston Road

DRAWING TITLE

Proposed Fifth and Sixth Floor Plans

SCALE @ A1 SIZE / A3 SIZE	DATE
1:100 / 1:200	June '13
DRAWING N°	STATUS & REVISION
A2413 223	P15

Assael

Assael Architecture Limited
Studio 13
50 Carnwath Road
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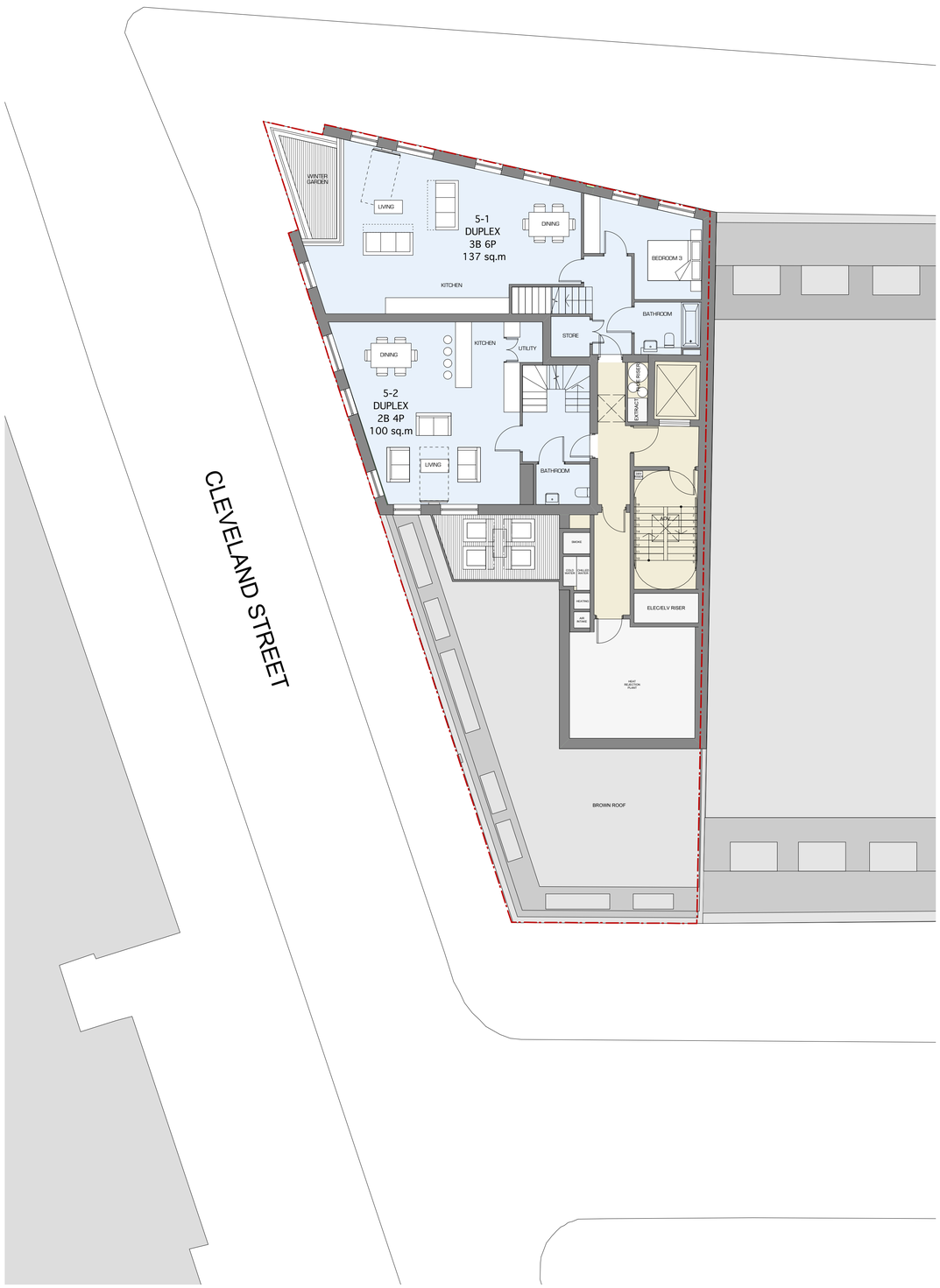

FIFTH FLOOR

SIXTH FLOOR

GENERAL NOTES

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P15	PLANNING SUBMISSION	20.06.13	LW	JB	--

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KEY

CLIENT

S2 Estates (Euston Road) LLP

PROJECT TITLE

Cambridge House
Euston Road

DRAWING TITLE

Proposed Fifth and Sixth Floor Plans

SCALE @ A1 SIZE / A3 SIZE	DATE
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A2413 224	P15

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Assael Architecture Limited
Studio 13
50 Carnwath Road
London SW6 3EG

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E info@assael.co.uk
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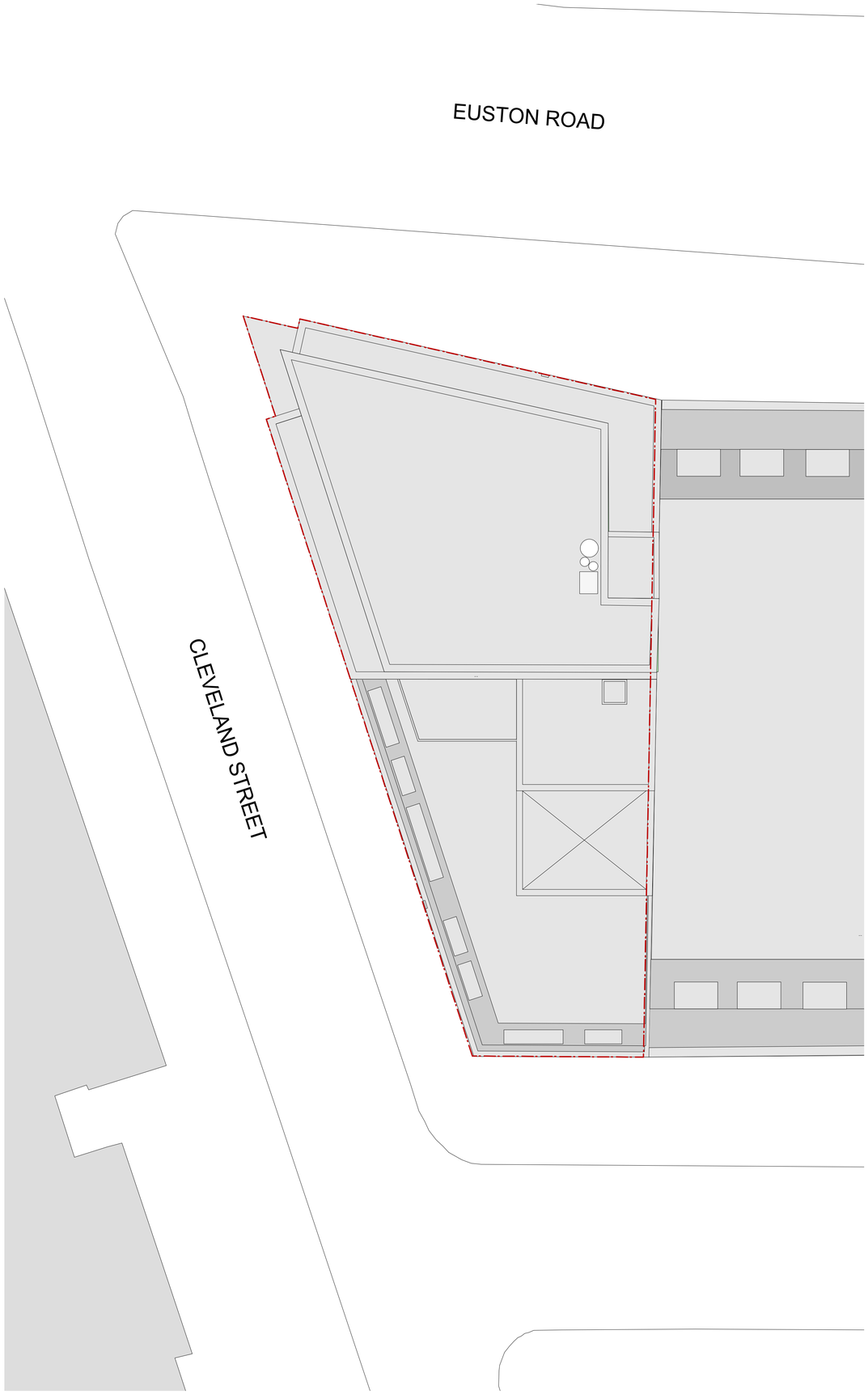

ROOF PLAN

GENERAL NOTES

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Revision Status:
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DRAWING NOTES

E-FILE REF N° A2413 Cambridge House Working Plans

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P15	PLANNING SUBMISSION	20.06.13	LW	JB	--

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PROJECT TITLE

Cambridge House Euston Road

DRAWING TITLE

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1:100 / 1:200	**June '13**

DRAWING N°	STATUS & REVISION
A2413 224	**P15**

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Assael Architecture Limited
Studio 13
50 Carnwath Road
London SW6 3EG

T +44 (0) 20 7736 7744
F +44 (0) 20 7736 6677
E info@assael.co.uk
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Annex B: CHP Assessment

CHP TOOL

You can record details of your CHP Here:	**Cambridge House, Euston Road**
Additional comments:	

CHP AQ Tool v1.3

This tool is in 4 Sections. Please complete each section as required by entering information in the yellow cells.
Yellow cells will appear as you make your selections.
If you wish to change your selections part way through, it is recommended you clear the contents from yellow cells manually as only yellow cells are used in the calculations.
You can also click the Clear AQ Tool Button on the right (you must have macros enabled - see Info on Macros)

Info on Macros:
This tool used Macros to clear cells but they are not required for calculations. Macros may have been automatically disabled and will need to be enabled to use the Clear buttons. Please contact your IT deparment or use the Help functions.

Section 1

		Help Column
Select CHP Technology	Gas Engine	Select Type of CHP from Drop Down Menu. Gas Engine is same as Internal Combustion Engine
Select Engine Type	Spark Ignition	
Select Fuel Type	Natural Gas	
Select to specify ELV or use assumptions based on Power Output Range of Gas Engine CHP (kWe)	Using installation specific data or have an ELV	Select from Drop down list. If compliance with an ELV can be guaranteed, inputting the ELV will ensure the most reliable result. If no ELV is available, impact will be estimated based on the review of UK CHP emissions
	Please go to Section 2	

Your Notes:

Section 2

For users wishing to input installation specific information on Exhaust flow-rate and/or NOx in-stack concentrations.

Please complete the yellow cells as they appear based on your choices.

Enter the Power Output of your CHP (kWe)	4	Enter a number from 1 to 20000 kWe (20MWe)
Please select which data you wish to provide	ELV (Actual or Ref conditions)	Select from Drop Down List. Choose emission factor , tonnes/year, or Emission Limit Value
How is the concentration expressed?	Concentration (mg/Nm3) @ Ref Conditions - Dry	Ref conditions assumed as 273K, 101.3KPa, 11% O2, Dry
Enter Concentration at Ref (Nmg/m3)	150	
How is the flow rate expressed? You can use tool defaults if you don't know the flow rate.	Flow rate unknown - use default assumptions	Ref conditions assumed as STP (273K, 101.3KPa), 11% O2, Dry Gas
This default exhaust flow-rate (as a function of KWe) is estimated from a review of the prevalent Internal	**0.0**	This parameter is needed to calculate the installation-specific NOx emisson rate, if you have installation-specific NOx in-

Summary of Installation Specific Flow Rate and Concentration:

Flow Rate (m3/sec)	0.00
NOx Emission Concentration (mg/m3)	104.2

Section 3: Determination of Emissions factors and Emissions based on Section 1 or 2

CHP TOOL

CHP AQ Tool v1.3

You can record details of your CHP Here:	**Cambridge House, Euston Road**	
Additional comments:		

Based on sections 1 or 2, the following are calculated for the CHP

Your Notes:

NOx Emission Factor (grams/kWh)	Installation specific data selected	
NOx Emission Rate (grams/second/kWe Output)	Installation specific data selected	
NOx Emission Rate (g/sec)	0.00	Based on the installation specific information provided in Section 2.
Annual Emissions NOx (tonnes/year)	0.02	Based on the intallation specific information provided in Section 2.
	Please go to Section 4 Air Quality Impacts Calculator.	

Section 4: Air Quality Impacts Calculator

This calculator is based on LAQM.TG(09) Industrial Nomograms for NO_2. The CHP screening tool calculates only with the annual mean NO_2 impact, and is based on the relevant nomograms for industrial sources in LAQM.TG(09) – Figures 5.2 and 5.3 - which in turn are based on ADMS2 dispersion modelling runs for both tall stacks and near-ground level releases (i.e. when a nearby building renders the effective stack height as less than 10 m). The result of the Excel-based spreadsheet is the maximum, annual mean ground level NO_2 concentration; therefore, re-iterative runs of the tool would be necessary to derive a minimum permissible stack height to achieve a given ground level NO_2 concentration.

Please complete the yellow cells as they appear based on your choices.

If you wish to change your selections part way through, it is recommended you clear the contents from yellow cells manually as only yellow cells are used in the calculations. You can also click the Clear Impacts tool on the right . (you must have macros enabled - see Note: Info on Macros)

Enter Stack Height (m)	24.2	If your stack height is more than 10m you may enter building information below. If your stack height is =<10m (i.e.Ground Level/Fugitive) then building height is not applicable.
Enter Building Height (m). This the height of the dominant large building near the stack. It can be the building on which the stack sits.	22.7	Enter height of the tallest building within 5 stack heights of the stack. If no building then leave blank or enter 0.
Enter Stack Diameter (m)		Enter Stack Diameter between 0.5m and 11.9m. Leaving blank assumes a short stack/fugitve source.
Calculated Effective Stack Height (m). This method for calculating the effective stack height is consistent with that as set out in LAQM.TG(09)	2.49	
	A short stack/ground level source will be assumed by impacts calculator.	
The effective stack height is less than 10m, a low stack height will be assumed. Therefore you need to enter the distance to the nearest receptor (m)	6.6	Enter the distance to nearest receptor between 1 and 200m

Results

CHP Tonnes NOx per Annum (based on Sections 1,2 or 3)	0.02	The tool includes all the assumptions/limitations inherent in LAQM.TG(09) i.e. a 10 – 25 m/s efflux velocity
Estimated Maximum Annual Mean NO_2 Contribution from CHP (ug/m^3), or Contribution from CHP at nearest receptor (ug/m3) for short stacks	**0.39**	The CHP screening tool does not take account of background NO_2 level; it calculates only the contribution of the stack to the maximum NO_2 annual mean concentration at the worst-case location. This locations will be different for varying stack heights and diameters.

The result from this tool is conservative, and errs on the side of caution. Only ground level impacts are considered. It is likely that the application of a detailed dispersion model using installation-specific values for exit velocity, volumetric flow-rate and flue gas temperature, and local meteorological data, would give a lower result.