British Postal Museum Archive

Environmental Statements for Planning

February 2012

MAX FORDHAM

MAX FORDHAM

Max Fordham LLP
42-43 Gloucester Crescent
London
NW1 7PE

T +44 (0)20 7267 5161
F +44 (0)20 7482 0329

maxfordham.com

ISSUE HISTORY

Rev	Date	Status	Description	Engineer	Checked By
1	Jan 2012	Information	Draft	A Hutton CEng MCIBSE	
2	Feb 2012	Information	Draft	A Hutton CEng MCIBSE	
3	Feb 2012	Planning	Planning Submittal	A Hutton CEng MCIBSE	

MAX FORDHAM

CONTENTS

1.0 DESIGN CONTEXT – AIR QUALITY

1.1 Legislative Context

Air Quality Strategy for England, Scotland, Wales & N.I.
Set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) published in July 2007. The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in the UK.

The AQS sets standards and objectives for nine main air pollutants to protect health, vegetation and ecosystems. These are benzene (C6H6), 1,3 butadiene (C4H6), carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO2), particulate matter (PM10), sulphur dioxide (SO2), ozone (O3), and polycyclic aromatic hydrocarbons (PAHs).

Air Quality (England) Regulations
Many of the objectives in the AQS have been made statutory in England with the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 for the purpose of Local Air Quality Management (LAQM).

The Environmental Protection Act 1990
Section 80 states that where a statutory nuisance is shown to exist, the local authority must serve an abatement notice.

There are no statutory limit values for dust deposition above which 'nuisance' is deemed to exist. Nuisance is subjective, and its perception is dependent on the existing conditions and any change which has occurred.

Local Air Quality Management
Under Part IV of the Environment Act 1995, local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives by the years defined in the Regulations. Where the objectives of the Air Quality Regulations are not likely to be achieved by the objective year, an authority is required to designate an Air Quality Management Area (AQMA). For each AQMA the local authority is required to draw up an Air Quality Action Plan (AQAP) to secure improvements in air quality and show how it intends to work towards achieving air quality standards in the future. Camden is covered by an AQMA.

1.2 Planning Policy and Guidance

National Planning Policy

Planning Policy Statement 23 (PPS23)
Policy guidance for local planning authorities (in England only) regarding local air quality and new development is provided in PPS2315. PPS23 advises on the policies and practices that should be taken into account by those involved in the planning of any development that has the potential to cause pollution.

Appendix 1G of Annex 1 in PPS23 states that 'any air quality consideration that relates to land use and its development is capable of being a material planning consideration'. PPS23 also reminds us that the presence of an AQMA should not result in the prevention of a site from development, for example when a development may result in a beneficial impact by being in accordance with an Air Quality Action Plan.

Regional Planning Policy

The London Plan 2011

Policy 7.14 "Improving air quality" set outs three distinct key objectives for the Mayor to improve air quality – Strategic, Planning Decisions and LDF Preparation.

At a strategic level, the plan states that:

'The Mayor recognises the importance of tackling air pollution and improving air quality to London's development and the health and well-being of its people. He will work with strategic partners to ensure the spatial, climate change, transport and design policies of this plan support implementation of his air quality and transport strategies to achieve reductions in pollutant emissions and minimise public exposure to pollution.

Considering Planning Decisions, policy 7.14 states:

"Development proposals should:

- Minimise increased exposure to existing poor air quality
- Promote sustainable design and construction to reduce emissions
- Be at least air quality neutral
- Ensure that where provision needs to be made to reduce emissions from a development, this is usually made on-site.
- Where the development requires a detailed air quality assessment and biomass boilers are included, to forecast pollutant concentrations.

Policy 7.14 then requires local authorities to have appropriate air quality policies to seek reductions in levels of pollutants and take account of the findings of air quality review and assessments, particularly where Air Quality Management Areas have been designated

Local Planning Policy

Camden Core Strategy 2010

Core Strategy CS16 "Improving Camden's Health and Wellbeing" states that the council will seek to:

"Recognise the impact of poor air quality on health and implement Camden's Air Quality Action Plan which aims to reduce air pollution level"

CS16.14 states that the whole of Camden has been declared and Air Quality Management Area and that the Air Quality Action Plan, Policy DP32 sets out how developments should reduce their impact on air quality.

Camden DP Policy 32 - Air and Camden's Clear Zone

Policy DP32 states that

"The council will require air quality assessments where development could potentially cause significant hair to air quality. Mitigation measures will be expected in developments that are located in areas of poor air quality.

DP32.5 goes on to say

"Where mechanical ventilation is required due to poor environmental conditions we will expect developments to incorporate high standards of energy efficient design…"

2.0 POTENTIAL AIR QUALITY IMPACTS

2.1 General

Please refer to the architectural planning drawings for details of proposed ventilation exhaust louvres.

The existing building is currently used as offices. The existing and proposed uses are therefore reasonably similar and building activities are not expected to have any measurable impact on air quality.

2.2 Natural Gas Fired Heating System

The existing building is currently heated using oil-fired boiler plan, complete with a basement level oil storage tank. Heating oil is highly polluting and the existing plant is unlikely to operate at the efficiencies achieved with modern boilers. Furthermore, deliveries of heating oil to Calthorpe House has impact on air quality as a result of increasing heavy goods vehicle traffic into Camden.

At this stage, a new gas fired heating system is proposed although electrically driven air source heat pumps are being considered as a low carbon alternative.

All gas plant will be of the low NOx high efficiency condensing type with appropriate controls to maximise system efficiency. As such the heating installation will be considerably more efficient than the existing antiquated heating system, resulting in much reduced energy consumption and associated emissions.

2.3 General Ventilation Extract

The general ventilation exhausts are not expected to contain significant pollutants.

Generally the duct exhausts will be arranged in accordance with Camden Planning Guide (2006) section 38, CIBSE Guide B and CIBSE TM21 “Minimising Pollution at Air Intakes”.

2.4 Café Extract

Café supply and exhaust grilles will be located at ground/first floor levels, providing general ventilation to the café seating and servery areas.

No kitchen or food preparation facilities are planned for the development and the proposed café will be used for hot and cold drinks preparation only. Accordingly, extract ventilation will be provided to control humidity within the café area as part of the general supply and extract ventilation system.

2.5 Assessment

The development is likely to have a beneficial impact on local air quality by removing an inefficient and highly polluting oil-fired boiler and replacing it with a modern heating system, fuelled either by natural gas or grid derived electricity.

3.0 DESIGN CONTEXT – ENERGY

3.1 National Planning Policy

BPMA Calthorpe House includes the refurbishment of an existing building together with the construction of a new extension in excess of 100m2 floor area.

As such, this development will be assessed under the Building Regulations Approved Documents Part L2A2010 and Part L2B:2010.

Both include higher standards for energy efficiency than the previous 2006 version in order to reduce CO2 emissions associated with both new and existing building stock.

The extension elements of the development will be dealt with under the Buildings Regulations Approved Document Part L2A:2010 "Conservation of fuel and power in new buildings other than dwellings" and existing elements of Calthorpe House under the Buildings Regulations Approved Document Part L2A:2010 "Conservation of fuel and power in existing buildings other than dwellings"

Approved Document Part L2A:2010 of the building regulations provides a requirement for the Building Emissions Rate (BER) of the proposed building to be equal to or less than a Target Emissions Rate (TER) which is determined using a 'notional building' similar to the one being assessed, where the Emissions Rate is measured in kgCO2/m2/annum. Both the TER and BER are to be calculated using approved software.

The reduction in CO2 emissions from the TER may be met in a number of ways, which include fabric improvements, efficiency improvements to fixed building services and the inclusion of onsite renewables where practicable.

Planning Policy Statement 22 – Renewable Energy (PPS22) gives local planning authorities the discretion to impose their own renewable energy use requirements onto new developments over and above the requirements given in Part L.

Approved Document Part L2A:2010 of the building regulations requires that any new thermal elements, controlled fittings or controlled services are in accordance with the minimum standards set out in the document.

Furthermore, where the existing floor area of the building exceeds 1000m2, there is a requirement to provide consequential improvements to the existing building in order to reduce the energy consumption of existing building stock.

In particular, there is a requirement to improve retained thermal elements and to replace existing controlled fittings and controlled services where technically, practically and economically feasible.

Compliance with this requirement is demonstrated by allocating at least 10% of the construction cost to such consequential improvements.

3.2 London Plan 2011

The London Mayor is responsible for strategic planning in London, with requirements set out within the London Plan. All policies within the plan promote sustainable development, including mitigating and adapting to the impacts of climate change, as well as promoting health and equality within London.

A number of policies directly related to energy use within buildings and energy generation have been developed, which form an integral part of the London Plan.

> Policy 5.1 Climate Change Mitigation: The Mayor expects all developments to make the fullest contribution to the mitigation of climate change and seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025
>
> Policy 5.3 Sustainable Design & Construction: The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.
>
> Policy 5.4 Retrofitting: The environmental impact of existing urban areas should be reduced through policies and programmes that bring existing buildings up to the Mayor's standards on sustainable design and construction. In particular, programmes should reduce carbon dioxide emissions, improve the efficiency of resource use and minimise the generation of pollution and waste from existing building stock.
>
> Policy 5.7 Renewable Energy: "The Mayor seeks to increase the proportion of energy generated from renewable sources" and "within the framework of the energy hierarchy, major development proposals should provide a reduction in expected carbon dioxide emissions through the use of on-site renewable energy generation, where feasible.
>
> Policy 5.9 Overheating and Cooling: The major seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

In practice, the design of all new buildings in London must where possible adhere to the following hierarchy;

- using less energy, in particular by adopting sustainable design and construction measures,
- supplying energy efficiently, in particular by prioritising decentralised energy generation, and
- using renewable energy
- use less water and generate less waste and surface water

3.3 Camden Local Planning Policy

Camden's Core Strategy Policy CS13

"Minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy: 1. ensuring developments use less energy, 2. making use of energy from efficient sources…3. generating renewable energy on-site…d) ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions."

[Para 13.11]"…Council will expect developments to achieve a reduction in carbon dioxide emissions of 20% from on-site renewable energy generation (which can include sources of site-related decentralised renewable energy) unless it can be demonstrated that such provision is not feasible."

Development Policy DP22

"Schemes must…demonstrate how sustainable development principles…have been incorporated into the design and proposed implementation;

The Council will promote and measure sustainable design and construction by:…expecting non-domestic developments of 500sqm of floor space or above to achieve "very good" in BREEAM assessments and "excellent" from 2016 and encouraging zero carbon from 2019."

Camden Planning Guidance "CPG3 – Sustainability"

This document contains further detail on the Council's expectations for energy analyses. Section 4 describes the approach to historic buildings. Section 6 states the following 'key message':

> "All developments are to target at least a 20% reduction in carbon dioxide emissions through the installation of on-site renewable energy technologies. Special consideration will be given to heritage buildings and features to ensure that their historic and architectural features are preserved.
>
> When assessing the feasibility and viability of renewable energy technology, the Council will consider the overall cost of all the measures proposed and resulting carbon savings to ensure that the most cost-effective carbon reduction technologies are implemented in line with the energy hierarchy."

Camden Planning Guidance 2006

This document is superseded since early 2011, but is still referred to by CPG3 above and section 17 contains lots of useful information on Sustainable design and renewable energy provision.

4.0 SUSTAINABLE USE OF ENERGY AND WATER

4.1 Overview:

The operational energy consumption of a building is one of its greatest environmental impacts. This section discusses how the energy use is minimised by reducing the basic energy demand as far as practicably possible.

It then goes on to review the appropriateness of renewable energy sources and the role they might take in reducing energy demand further still.

Measures will be implemented wherever practically and economically feasible, but remaining mindful of the need for the building to operate as an archive for national heritage items.

The following measures are proposed:.

4.2 Passive Energy Reduction:

- improved thermal insulation to the existing roof,
- net reduction in the wall area of high U-value existing external facades, as some external façade become internal,
- Heavy weight (high thermal mass) construction of the new archive areas in order to reduce fluctuations in internal conditions and minimise mechanical plant intervention.
- Replacement of existing single glazed rooflights and external windows
- Maximising the use of natural day light in appropriate spaces
- Provision of fixed solar shading to South/ South West office glazing to minimise solar gain.

4.3 High Efficiency Plant, Equipment and Controls

- Use of modular central plant in a cascade arrangement to most closely match plant operation with building demand
- replacement of existing boiler and heating system with modular condensing high efficiency boiler s and improved heating controls,
- replacement of existing air conditioning systems with new modular air cooled chiller and space specific VRV refrigerant units
- Mechanical ventilation will be demand based to avoid unnecessary operation of ventilation plant.
- Mechanical ventilation fans will generally be variable speed to dramatically reduce electrical energy consumption.
- Use of heat and hygroscopic recovery on mechanical ventilation where feasible.

4.4 High Efficiency Lighting and Controls:

- New high-efficiency lighting to replace existing installations
- Lighting circuits arranged to compliment natural daylighting
- Sensible lighting controls to encourage natural daylighting and extinguish artificial lighting when sufficient day light exists or a space is no longer occupied

4.5 Energy Management in Use:

- New intelligent metering system encompassing electrical and gas consumption.
- Master “kill” switch to isolate non-essential power supplies when the building is unoccupied.

4.6 Water Conservation:

- Water consumption will be integrated into the new intelligent metering system, with end use metering provided as appropriate.
- Water leak detection will be provided as part of the metering package
- Motorised isolating valves will be provided to toilet and welfare areas to enable hot and cold water supplies to be isolated out of occupied hours or when a particular space is unoccupied.
- Taps and fittings will generally be of the “low flow” type to reduce water consumption. Where such fittings are not available, DEFRA approved flow regulators will be provided to limit water consumption to accepted flow rates.

Despite the close environmental control requirements of the new development, the measures outlined above are anticipated to result in a net reduction in annual energy use for the development in comparison to the existing building.

4.7 Using Less Energy

4.7.1 Improving Thermal Performance

The development will significantly reduce overall heat loss from the site as a result of making existing external walls internal as a result of “wrapping” the new archive and exhibition extension around the perimeter of Calthorpe House. The benefit is twofold. Not only is existing poorly insulated external wall and existing glazing replaced with new wall construction compliant with 2010 Building Regulations, but unwanted air infiltration through the existing walls will also be reduced.

The insulation of the second floor roof will also be improved in order to reduce heat loss from the space. As a consequence, unwanted heat gain through the roof finish will also be reduced, and a net decrease in energy consumption associated with heating and cooling is expected.

Existing, poorly performing windows, doors and roof lights will be replaced in order to reduce heat loss, control heat gain and improve the internal acoustic environment for occupants.

The new archive and exhibition extension will generally be of high thermal mass, slow thermal response construction in order to minimise fluctuations in internal conditions. As a result, once the space achieves the design set points, little mechanical intervention will be required in order to maintain the archive conditions. The location does not lend itself to a purely passive archive design, but by implementing passive design techniques, it is expected that the mechanical systems will be more complementary and result in exemplar energy consumption performance.

4.7.2 Building Orientation

The building orientation will not be changed due to the primarily refurbishment focused nature of the development.

MAX FORDHAM

Nonetheless, much of the existing South-West glazing at the rear of Calthorpe House will be removed through construction of the archive building, resulting in a reduction of solar gain over the current building. Furthermore, fixed external solar shading will be provided to the existing second floor office windows in order to reduce undesirable solar gain during the summer months.

The windows will also be replaced to improve their solar performance. The intended measures will reduce solar gain to within the criteria permitted by the Building Regulations where new cooling systems are proposed.

New glazing is generally orientated to avoid solar gain as far as practicable, being located on the North East façade.

4.8 Centralised Plant Installations

New high efficiency boilers, air cooled chiller plant and intelligent plant controls will be provided to replace the existing systems installed at Calthorpe House.

4.8.1 Ventilation:

Natural ventilation is not proposed for this particular building given the environmental and security considerations associated with the archive.

Nonetheless, all mechanical plant will be demand based, operating only as required to maintain room conditions or to satisfy air quality requirements.

4.8.2 Heat Recovery

Wherever cost effective the heat from warm air extract ventilation will be recovered into the incoming fresh air flows via rotary or plate heat exchangers or runaround coils. A facility to bypass the heat recovery device will be provided where recovery might impose a greater load on the system i.e. during summer months.

4.8.3 Free Cooling

Mechanical ventilation systems will be arranged such that outside air is used directly to condition spaces without mechanical heating or cooling where appropriate.

Furthermore, where a benefit can be demonstrated, a night cooling strategy will be implemented whereby cooler night time air is used to pre-cool spaces in summer prior to building occupation.

The use of such strategies along with a modular approach to central plant will result in heat rejection plant operating less frequently, reducing the impact on any local heat island effect.

4.8.4 Insulation

All pipework and ductwork containing heated or cooled media will be insulated to minimise heat loss or gain and avoid the formation of condensation on material surfaces.

4.8.5 Variable Speed Drives

Variable speed drives will be provided to all pumps and mechanical ventilation plant with a motor exceeding 0.5kW in order to offer significant energy consumption savings over similar fixed speed devices.

Where small room conditioning units are provided (fan coils etc) EC motors will be selected where available in order to improve the efficiency of small motors.

4.9 Daylighting and Artificial Lighting

The development will utilise daylight through glazing on the facades and through replacement rooflights at Second Floor Level.

Good daylighting combined with appropriate artificial lighting controls, including daylight linking and absence detection will allow artificial lighting to be used less of the time, reducing heat gains in summer and electrical consumption generally.

The light sources selected for artificial lighting will be the most efficient available.

4.10 Metering:

Electricity, gas and water metering will be provided in order that the consumption of at least 90% of end-use activities can be separated, recorded and monitored.

The system will be arranged such that “out of normal range” consumption raises an alarm so that the building occupier can take the appropriate measures to rectify any problems.

But providing useful information on energy and water consumption, the building user is normally empowered to take a more proactive role in energy conservation.

4.11 Material Selections:

Wherever practicable, materials used in the building and associated building services installations will be responsibly sourced and be low environmental impact and/or of low embodied energy.

Generally uPVC will be avoided as will multilayer materials where future recycling of constituent parts may be difficult due to a composite construction.

Low VOC and zero CFC substances will be specified where practicable.

5.0 LOW OR ZERO CARBON (LZC) AND RENEWABLE ENERGY:

5.1 Low and Zero Carbon and Renewable Energy

Our approach is to maximise the use of passive techniques to reduce the buildings energy demand. However, where energy demand exists, the use of Low or Zero Carbon (LZC) and renewable energy sources will be considered to further reduce the environmental impact of the building development.

The options for LZC and renewable energy sources are considered on the following pages.

5.2 Photovoltaics (PV cells)

PVs require little maintenance and have relatively low visual impact. They are therefore considered a safe option as a Low/Zero Carbon (LZC) technology for use in urban areas. However, compared to other LZCs they are expensive and therefore not very cost-effective (in terms of £/kWh), leading to long payback times.

The amount of energy produced by solar PV cells remains relatively modest and typically lies in the region of around 5% of total electricity demand for most buildings, even when orientation is optimised.

For optimum performance in the UK PVs should be installed around 30-40º and south facing. However other orientations are able to achieve between 70-99% of the optimum performance. Although it has recently been reviewed and reduced, the Feed-in Tariffs (FITs) could reduce payback times. The existing roof light profile of Calthorpe House also lends itself to the installation of photovoltaic cells.

For these reasons, the inclusion of PV cells will be assessed in further detail as the design progresses.

5.3 Ground/Air Source Heat Pumps (GSHP/ASHP)

Ground source heating involves extracting heat from the ground to heat the building, by circulating water through buried pipes. The pipes may run horizontally in trenches (as in the picture), or vertically as U-tubes. On a restricted urban site, the vertical arrangement of ground loops allows a higher output.

The low grade heat extracted from the ground is passed through a heat pump, which provides higher grade heat (in the form of hot water) to the building. The system can also be used in reverse to provide cooling in summer. By coupling the heat pump with the ground, a higher Coefficient of Performance (COP – similar to efficiency) is achieved than the air source heat pumps commonly used in cooling systems.

The main issue with GSHP is the location and expense of vertical boreholes or a horizontal array. There is no space on site for an effective horizontal array, and a borehole-fed system is expected to attract an initial capital cost of at least 8-10 times more than an equivalent boiler installation (not accounting for possible RHI payments).

Air source heat pumps (ASHP) do not require connection to the ground, however their efficiency in winter is generally significantly worse than GSHP systems (as less heat is available from cold air than from the ground) and noise and visual planning issues become more significant as well as the structural issues of roof support.

Nonetheless, the use of an air source heat pump to provide a proportion of the heating demand for the building will be considered, particularly for the third floor office areas where a heat pump based heating and cooling system could offer cost effective energy savings over traditional water based systems.

5.4 Wind

Wind turbines are available in a wide range of sizes, from large 'wind-farm' scale turbines to small domestic roof-mounted versions. The output of a turbine is proportional to the area swept by the rotor, and therefore to the square of rotor diameter, so larger turbines can produce a lot more power.

The wind environment in cities is generally poor, with low average wind speeds and intense turbulence. A large-scale turbine in London is expected to run at about 5% capacity factor, whereas a turbine in a commercial wind farm would be at more like 30%. Despite this, wind power is usually the most cost-effective option for generating energy on site.

The installation of wind turbines in the urban environment is still relatively novel. Although available, building mounted turbines are limited by the wind loading imposed on the structure. Free standing turbines require a relatively large amount of land around them to operate efficiently without obstructions.

In addition to the high visual impact of wind turbines (people tend to either love them or hate them), there are a number of issues specific to urban sites which need to be addressed if a turbine is to be installed successfully in a city, including the acoustic concerns with locating turbines close to residential properties.

Given the built up urban environment surrounding Calthorpe House, we do not believe a wind turbine would be able to operate efficiently for a suitable amount of time or adhere to the background acoustic criteria to warrant inclusion in the scheme.

5.5 Biomass

A typical biomass installation includes a large storage area for the fuel, a hopper to deliver the fuel from the store to the boiler, a boiler, and a buffer vessel to take the excess heat if demand drops off when the boiler is hot and there is no demand for heat. Fuel is delivered weekly or fortnightly, and the boiler must be emptied of ash regularly. This imposes significant maintenance and logistical demands on the building operator.

The feasibility of using biomass for heating depends largely on the fuel availability and the heat demand of the building.

With a suitable local fuel source, biomass heating can be a cost-effective way to save significant amounts of CO_2.

However, we expect the development to have a relatively low heating demand and, although schemes exist within London, we are yet to be convinced about the long term role of imported biomass in the urban environment for a number of reasons:

- Imports of fuel from outside of London strip supply from where it can be sensibly used in the regions.
- Transporting fuel by truck has a significant impact on CO2 emissions and impacts air quality in towns
- A large storage area for fuel is required, even for a modest period of heating.
- Ash deposits have to be transported from site.
- Sulphur Dioxide emissions as a result of wood burning systems have in the past lead to problems with Smog in urban environments.

For the reasons given above, biomass heating is not being considered further for this project.

5.6 Solar Thermal Hot Water

Like PVs, solar thermal systems require little maintenance and have relatively low visual impact. They are more efficient than PVs at converting solar energy into a useful form, and are therefore more cost-effective. This cost is also potentially offset by the Renewable Heat Incentive (RHI) subject to government decisions on the future of the scheme.

However, hot water represents a small proportion of the buildings energy demand and the potential for making CO_2 savings using solar thermal is limited, and only a domestic scale of system would be appropriate.

For this reason, we do not propose solar thermal water heating is investigated further.