STANHOPE

One Mabledon Place
Energy Statement

August 2011

Planning Application Submission

Contents

1 Executive Summary

This document describes how the proposed refurbishment One Mabledon Place addresses the energy efficiency and renewable energy requirements of the London Borough of Camden's Local Development Framework and the London Plan.

The refurbishment will involve replacing all the plant and improving the facade performance. Combined with passive design features, this will significantly reduce the energy consumption. Thermal simulations were run for both the existing and proposed buildings, which show the energy consumption and carbon output will be reduced to approximately one third of those of the existing building.

An evaluation of renewable energy sources using the guidelines of the London Renewables toolkit was undertaken. A small photovoltaic or solar hot water array may be suitable; however, the proposed roof plant and screening to hide this equipment would make the installation of PV or solar thermal panels difficult. This could also lead to potential problems with overshadowing, reducing the efficiency of the panels.

2 Introduction

The design team has followed a holistic approach to sustainability and a series of measures has been incorporated in the design to reduce the carbon emissions of the building (within the constraints of the existing building). This is achieved by reducing the energy demand from the building, as well as ensuring an efficient delivery of the energy required. At this stage, the measures considered to achieve this goal include:

- Use of the existing building form and location to achieve good, passive design
- Improvement of the existing façade thermal performance
- Solar gains will be limited by replacing the existing glazing and utilising the self shading offered by the building's saw toothed facade
- Low energy lighting and enhanced lighting control
- Low energy office air conditioning systems

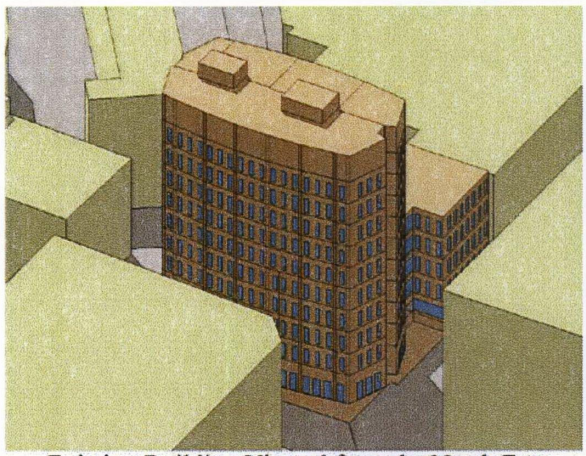
Preliminary estimates show that the carbon emissions of the proposed building are approximately a third of those for the existing building. This level of energy usage will be comparable to the latest Building Regulations Part L. These measures are in line with the approach taken by the GLA and defined in the 'Energy Hierarchy' of the Energy Strategy in the London Plan.

This document addresses the requirements of the London Borough of Camden's Local Development Framework and the London Plan and considers the feasibility of a number of renewable technologies and evaluates their impact in terms of cost and carbon emissions following the guidelines proposed in the London Renewables Toolkit.

The author of this report is an accredited CIBSE Low Carbon Consultant.

3 Existing Building

One Mabledon Place is located on the corner of Euston Road and Mabledon Place, with Flaxman Terrace to the south and 137-139 Euston Road to the west. The main axis of the building is orientated in a north/south direction.

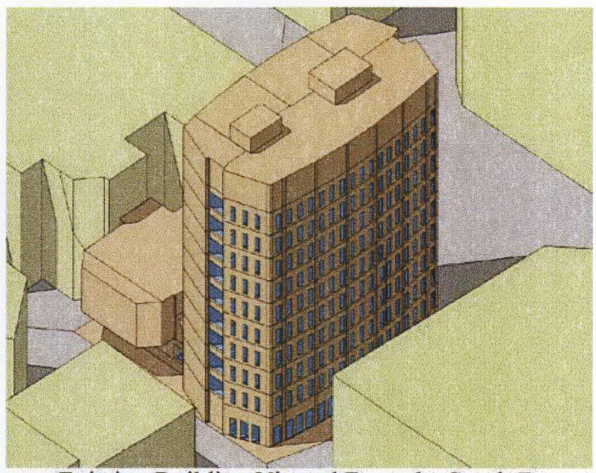


Existing Building Viewed from the North East

The existing building is formed of three independent structures: a ten story tower, a five story annex building and a conference hall located at first and second floor level. A three storey link structure connects the tower and annex building. The building has office accommodation on Levels 1 to 9. Plant is located on Level 10 (with an increased floor to ceiling height) and on the roof.

The main reception is located on the Ground Floor. The Ground Floor also accommodates ramp access to basement parking and a retail unit located within the annex building.

There are 4 levels of basement which stagger on section and contain car parking, storage and plant.



Existing Building Viewed From the South East

The existing building is clad with bespoke, storey-height precast concrete panels and single glazed window units (some with internal secondary glazing). The panels and window units are narrow in width, creating a punched window effect with minimal self shading.

Conditioned air (including minimum fresh air) is ducted to the office from air handling units located on level 10. The temperature in the space is controlled using a local variable air volume system. Hot water is generated centrally by 3 gas fired boilers located on Level 10. Chilled water is generated by two reciprocating chillers also located on Level 10, with heat rejection by air cooled condensers located on the roof. There are numerous secondary systems around the building service the WCs, conference facilities and reception. Office lighting is provided by 1500 mm x 300 mm recessed fluorescent luminaires.

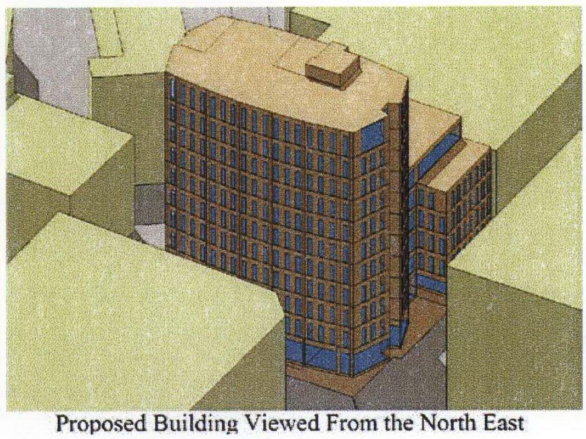
Assumptions for building envelope and plant performance have been made (based on condition and age) to allow a thermal simulation to be preformed for the existing building.

4 Proposed Building

The new building will retain as much of the existing facade and structure as feasibly possible, while upgrading the aspects that fail to meet the current regulations.

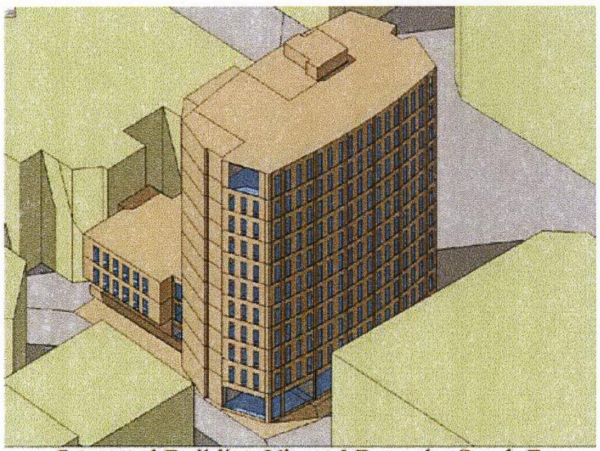
The building will be completely stripped of all finishes and equipment. Everything installed into the new building will be modern and efficient.

The main alterations between the existing and proposed buildings are:



Proposed Building Viewed From the North East

- The single glazed façade will be replaced with a modern double glazed, solar control system
- The thermal performance of envelope will be brought up to modern standards
- Adding an extra level to the annex building
- Locating all the plant on the roof and in the basement to allow Level 10 to be converted to office space. Noise attenuation will also be provided at roof level.
- The core will be enlarged with more space for toilets and lifts
- The conference hall is to be transformed into two levels of office
- The amount of glazing on the Ground Floor will be increased. A shading canopy will be installed above the new facade
- The retail unit on the ground floor will increase in size and be re-located
- Two of the three levels of car park replaced with storage space and provision for cyclists



Proposed Building Viewed From the South East

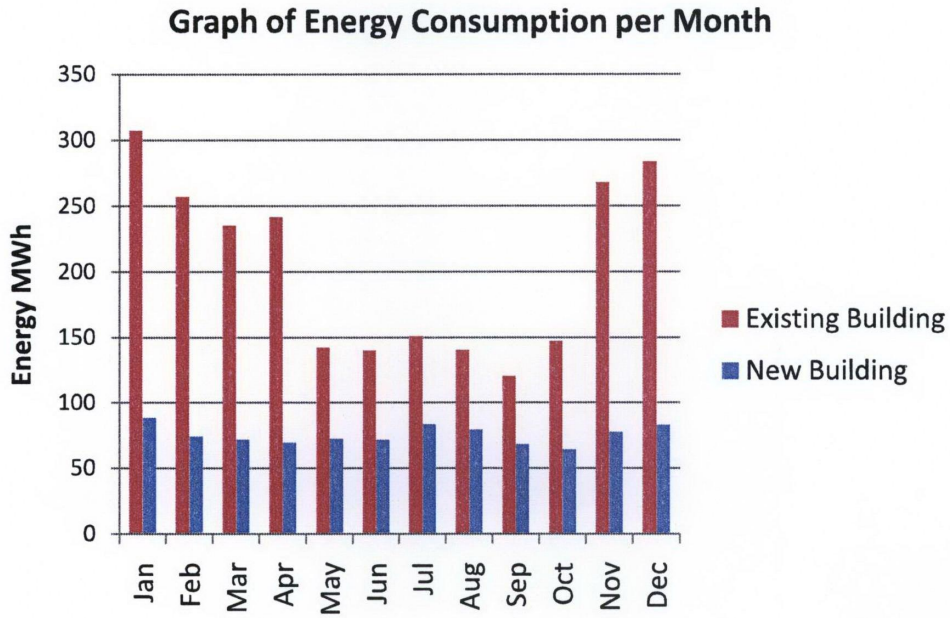
The office space will be provided with minimum fresh air from on-floor air handling units. The space will be conditioned using four pipe, variable volume, DC fan coil units. Hot water will be generated by 3 gas fired condensing boilers, located in a plant room on the roof. Chilled water will be generated by two packaged air cooled chillers located on the roof.

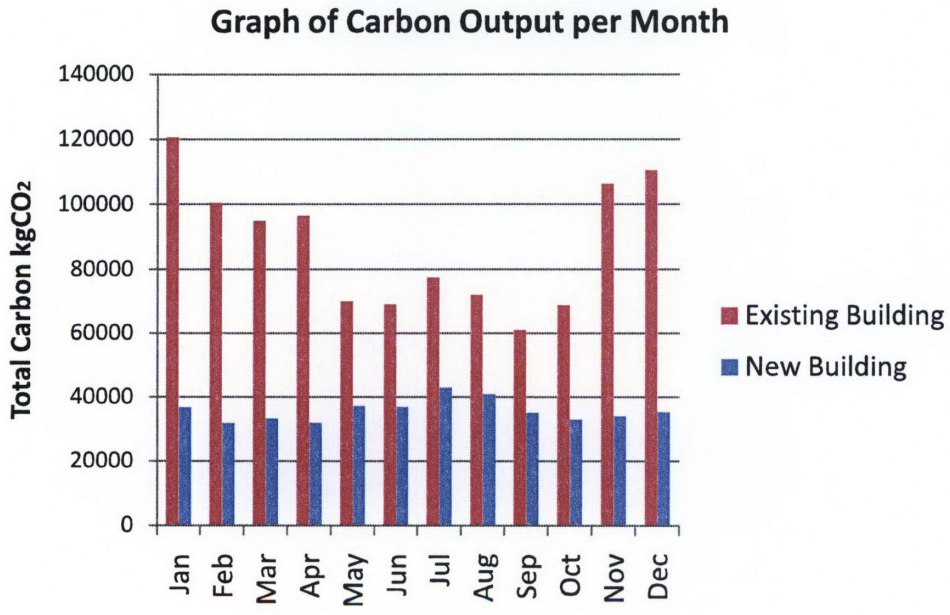
Efficiency assumptions have been made for all the proposed systems, based on current industry performance. All elements of the building envelope are assumed to meet the current regulations.

5 Comparison

5.1 Simulation Results

Thermal simulations have been performed for both buildings using the IES 'Virtual Environment' version 6.2.0.1. The results of both simulations are shown below.





The graphs show that the proposed building is significantly more efficient than the existing building, despite having a 7% increase in useable floor area. The annual

energy consumption reduces from 2,430 MWh to 900 MWh and the annual carbon output reduces from 1,152 kgCO_2 to 428 kgCO_2. Both of these figures for the proposed building are approximately 37% of those of the existing building. This is a significant carbon reduction at 63% and demonstrates the magnitude of the improvements proposed to the facade and systems.

5.2 Part L 2010

The building is a refurbishment and would be assessed under Approved Document L2B of the Building Regulations 2010. However, the team has also expressed a desire to comply with Criterion 1 of AD L2A. To demonstrate compliance an SBEM model was run in the IES 'Virtual Environment'. The results of the simulation were:

Target Emission Rate (TER)	30.3 kg.CO_2/m^2
Building Emission Rate (BER)	30.2 kg.CO_2/m^2

The pass margin is extremely narrow, but demonstrates that the proposed building can pass. The SBEM model also confirms that an EPC Grade B should be achievable.

6 Renewable Options

The following evaluation of renewable technologies, estimates of energy demand, carbon emissions and costs constitute a planning stage assessment and should not be relied on as a detailed design assessment.

6.1 Renewable Technologies Shortlist

The Mayor's Energy Strategy sets a target of 20% of the base energy demand to be generated from renewable sources where feasible, and proposes a list of renewable energy technologies to be considered for new London developments:

- Wind generators
- Photovoltaic cells
- Solar water heating
- Biomass heating
- Biomass CHP
- Ground source heat pumps

Whilst this building is a refurbishment it should consider the use of renewables wherever feasible. The following is an evaluation of the technologies listed above.

6.1.1 Wind Generators

Wind power is best captured by large wind turbines and their output is a function of the square of the wind speed. The strongest winds are found at height, in coastal regions away from any features that break up the flow of wind. This development is in a city centre and away from the coast.

The size of any generators would be limited by the structural capacity of the existing building to carry the load from the generators.

For these reasons the use of wind generators is discounted.

6.1.2 Photovoltaic Cells

The energy output of photovoltaic (PV) cells depends greatly on their orientation and is a maximum for south facing arrays not subject to overshadowing from nearby buildings. The highest roof of the building is un-shaded and has an unobstructed view to the south.

A 100 m^2 array of PV cells could fit on the highest roof of the building. This would reduce the buildings carbon emissions by approximately 0.4 $kg.CO_2/m^2$ or 1.3%.

A small array of PV cells could be feasible for this building.

6.1.3 Solar Water Heating

Domestic hot water will be used by the office tenants and by the retail unit operator, although their usage is currently undefined. Solar hot water is a more

efficient renewable than PV cells and requires the same provision of roof space, ideally horizontal or south-facing.

A 100 m^2 array of solar water heaters could fit on the roof (if no PV were present). This would reduce the buildings carbon emissions by approximately 0.16 kg.CO_2/m^2 or 0.5%.

A small array of solar water heaters could be feasible for this building. Alternatively, a combination of PV and solar hot water could be used.

It is currently intended not to include PV or solar thermal panels in the development. The proposed plant and screening on the highest roof would make the installation difficult and could lead to problems with overshadowing. The lower roofs would also incur problems with overshadowing, reducing the efficiency and these spaces are allocated for green roofs.

6.1.4 Biomass Heating

A small biomass boiler could be used for generating heating for the offices, or for the retail unit hot water use. However the office heating load is small and seasonal and the retail hot water use is highly variable over the day. Biomass boilers function best when given even base loads against which to work, and such a load is not available on this building.

Further, the biomass installation on this building would be less the 500 kW. Boilers of this size struggle to meet the emission targets set out in the London Plan. As a result, biomass boilers have been not been considered for this building.

6.1.5 Ground source heat pumps for heating and cooling

Ground source heat pumps require a loop of pipework to be buried in the ground. This pipework can either be deep bored vertically under the footprint of the building, or laid out horizontally under a large flat area, like a car park. The building has no opportunity for horizontal pipework due to the site boundary and no opportunity for vertical pipes as foundation work is unnecessary.

For these reasons the use of a ground source heat pump is discounted.

7 De-centralised Energy

The Site is located on the south side of Euston Road and does not currently have access to a local energy network. The existing Euston Road network currently serves the north side of Euston Road only. However, the Site is located in close proximity to the King's Cross and Euston Growth Areas and a number of strategic sites, which are identified for the provision of plant or equipment to support a decentralised energy network. Hence, it is expected that there will be potential to connect to a scheme in the future.

Therefore, the Scheme will provide space in the plant room for a heat exchanger and other necessary plant, connections and pipes from the plant room to the property boundary where the decentralised energy connection is most likely to be located.

8 Conclusion

The simulations performed show that the proposed building has approximately a third of the energy consumption and carbon output of the existing building. Further, the proposed building will pass Criterion 1 of AD Approved Document L2A despite being a refurbishment. The energy strategy for the development is in line with the approach taken by the GLA and defined in the 'Energy Hierarchy' in the London Plan, gaining these energy savings and reduced carbon output through reducing the demand for the building (Be Lean) and supplying energy efficiently (Be Clean).

There is little opportunity for renewable technologies in the proposed building, as the majority of the existing building will be retained. Re-using the structure and solid areas of the facade is a strong sustainable feature of the building as new concrete has a large amount of embodied carbon.