Energy and Sustainability Report

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1 Executive Summary

Miranda House is a sympathetic refurbishment of a Grade II* Heritage building for the continued use as a Museum as part of the existing Cultural Centre.The design team have considered the impact of the design on the existing building and selected low energy environmentally friendly building systems.

The measures proposed are:

- Improve the thermal performance of the roof and windows.
- Use improved U values for new elements.
- An energy efficient air source heat pump for heating in the winter, and cooling for summer events.
- Mix mode ventilation to maintain air quality.
- Mechanical ventilation for times of peak occupancy, with potential for free night cooling.
- Low energy lighting with automatic occupancy controls.
- Water saving controls.

2 Introduction

The aim of this report is to demonstrate that the proposed design complies with Camden Council's Sustainability Design and Construction Guidance for a Grade II* Heritage building.

2.1 History

No.58 Grafton Way, also known as Miranda House, which takes it's name from it's most famous resident, Francisco de Miranda, is a Grade II* mid-terrace house. The terrace dates from 1792 and retains many fine original features, both externally and internally. Despite some bomb damage at the rear wall and a later modest rear extension, the house retains its integrity and character as a domestic space of the Late Georgian period.

The higher grade of listing, as opposed to the Grade II for the rest of the terrace, is due to its historical association with the Venezuelan hero. In this house Miranda lived with his family, met with other representatives of the movement for independence of Venezuela and Latin America, including the *Liberator* Simon Bolivar, and planned and recruited legionaries to win independence from Spain for his country. The Government of Venezuela acquired the house in 1978 with a view to establish a Museum for Miranda as part of a Latin - American Cultural Centre. Already a destination and a meeting place for resident and visiting Venezuelans, Miranda House holds in this sense, considerable communal value for the Latin American community In London.

3 Proposal

The proposed changes include the following:-

- New platform lift to the front light well to provide access from the street to the building to provide an accessible ground floor which will include the upgraded public access display and interpretation galleries set within the original rooms;
- New installations for lighting, display and furnishings will be sensitive to the original rooms;
- The first and second floor will accommodate new group meeting rooms to host seminars, talks and events which will link to other events organised by the Embassy and linked closely to Venezuelan culture;
- The Embassy’s library will be located to the lower ground floor to create an appropriate and inspiring setting for further reading and research within the historic fabric of the building;
- The third floor will accommodate staff and staff related areas for preparing events and displays to minimise the need for partial closure of publicly accessed spaces;
- New ancillary areas, such as toilets, cloakrooms, stores will be located in the existing rear extension;
- Insertion of a passenger lift within the rear courtyard.

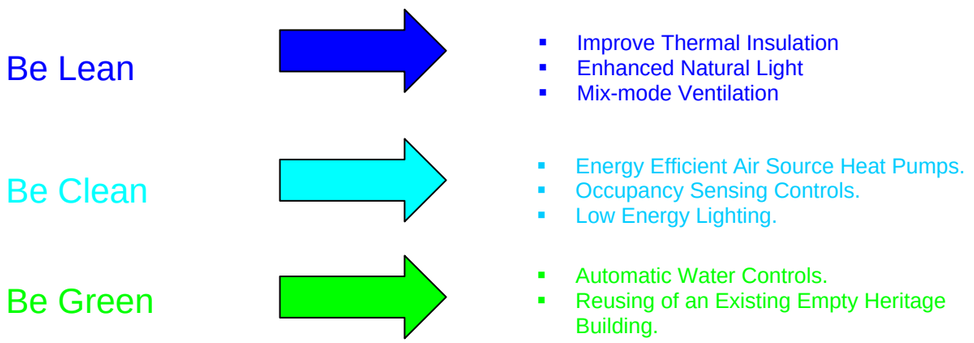
Aim of report

The aim of this report is to demonstrate how the proposed design complies with Camden's local development policy with regard to energy conservation and climate change adaptation in a Grade 2 Listed Heritage Building.

This report is to be read in conjunction with design and access statements undertaken by Studio Downie Architects

1 Sustainable design

When considering sustainable design in Grade 2* listed heritage buildings, with original features and room layouts compromises have to made.
In selecting the appropriate sustainability features the design used the Greater London Authority three steps approach.



The scheme proposes to use the above system to reduce the use of energy and water in the building. It is envisaged that the use of mixed mode ventilation help reduce summer time cooling requirements and limit the operation of mechanical cooling systems.

3.1 Thermal Improvements

The refurbishment / restoration work in Miranda House is limited to the internal services and fixtures. Some original features are intact and the internal layout remains.

The current proposed design has to have the least possible impact on the existing building, which limits the amount of thermal improvements possible.

3.1.1 Roof

The proposal is to upgrade the roof insulation, without damaging the building fabric. This will probably take the form adding a substantial layer (250mm) of rock wool or glass fibre blankets over the joist, providing a U value of 0.15W/m²K exceeding the building regulation by 16%.

3.1.2 Windows

The windows are not original and the sashes are removed and repaired where necessary and draught strips are added. Any original glass is to be retained.

Secondary glazing was considered but dismissed as concerns over visual impact, installation and damaging internal wooden window shutters.

Draught excluding the windows will help reduce the major heat loss to space from unintended air infiltration in winter. On cold day the wooden shutters may be deployed to shut out the effect of radiant

cooling from the cold glass surface. In summer the shutters can used to reduce solar gains in the space and still keep the natural ventilation flow paths through open windows.

Any new windows will be selected as “A” rated windows.

3.1.3 Walls

It is not proposed to add insulation to the existing walls, all new walls will be 0.25W/m²K a 12% improvement over the building regulations.

3.2 Electric Lighting and Daylight

The electric lighting will be selected with low energy light fittings sympathetic to the building, and it's diverse uses. The fittings, where required, will be selected to limit the impact on the ceiling and wall fabric.

Low occupancy areas such as washrooms will use automatic occupancy sensing lighting controls; other higher occupancy areas will probably have manual controls.

The building has large windows which provide day light into the space and occupants will be encouraged to reduce the lighting levels during day light hours.

3.3 Energy Reduction

The proposed design has been modelled using Simplified Building Energy Model (SBEM), to estimate the base energy used in the building using conventional boiler and radiator option. This model was compared with various heating and cooling options.

3.3.1 Solar thermal

The energy modelling used a profile for the museum which predicts a fairly low hot water requirement for the building. This limits the potential saving from solar energy. The proposed design is for instantaneous under counter hot water generators. These units efficiently heat the water to the required temperature (35°C) in small quantities. As a result have smaller predicated energy requirement than solar thermal with it's cylinder and distribution loss.

3.3.2 Combine heat and power (CHP)

This is not suitable technology for this building since it requires a reasonable all year heat requirement, which is not predicted for this building. It is however possible, at some future date, that the Consular at no 56 may consider CHP and the possibility of supplying heat to this building.

3.3.3 Biomass Boiler

There are number of domestic sized wood boilers on the market however this technology is not considered suitable for this project, which is located in a smokeless zone. Other factors include the requirements for fuel storage.

3.3.4 Photovoltaic’s (PV)

This is often a preferred renewable energy option, since the introduction of Feed in Tariffs. The energy savings from solar energy are relative easy to predict as the variance of the yearly sun shine is close to the average. For effective electrical generation PV requires a roof of surface at 45° from horizontal with clear south facing sky views. At Miranda House there is limited scope for positioning of PV panels and there is a potential clash with securing the panels on a listed building. For these reasons this technology is not considered appropriate for Miranda House.

3.3.5 Air Source Heat Pump.

Air source heat pumps are not considered a renewable energy system instead an energy efficiency system. The use of air source heat pumps extract low grade heat from the air and raise the heat to a higher temperature for use in the building, and as result has a typical heat efficiency of 3.5 to 1 (350%) compared to a gas boiler of 90%.

Air source heat pumps have reduced internal space requirements, as the bulky compressor and heat collection evaporator are located externally. An advantage of air source units is the ability to provide cooling in summer.

The proposal is to locate the outdoor units next to similar units on the Bolivar Hall Roof.

3.3.6 Ground Source Heat Pump (GSHP)

GSHP is very similar to an air source heat pump but collect heat energy from the ground which in winter is a fairly stable 12°C compared with average air temperature of 3°C in January / February. There are many successful GSHP systems installed in central London.

GSHP is not suitable for this site as there is not the space or the location to drill bore holes or piles.

3.4 Building Regulations and English Heritage

The approved documents are guidance on how to functionally achieve compliance with the building regulations and recommends reasonable provision for the conservation of fuel and power in buildings. These include :

(a) Limiting the heat losses and gains through the fabric of the building
(b) Limiting the heat loss
    (i) From hot water pipes and hot air ducts used for space heating
    (ii) From hot water vessels and hot water service pipes
(c) Providing space heating and hot water systems which are energy-efficient
(d) Limiting exposure to solar overheating
(e) Making provision where air conditioning and mechanical ventilation systems are installed, so that no more energy needs to be used than is reasonable in the circumstances
(f) Limiting the heat gains by chilled water and refrigerant vessels and pipes and air ducts that serve air conditioning systems
(g) Providing lighting systems which are energy-efficient
(h) Providing sufficient information with the relevant services so that the building can be operated and maintained in such a manner as to use no more energy than is reasonable in the circumstances

In the case of a listed building it is not always possible to fully comply with every aspect; instead the guidance recommends consulting English Heritage as to what measures are appropriate.

The architects have already consulted with Tina Garratt of Camden Planners and Richard Parish and Alessandra Perrone of English Heritage with an aim to agreeing the scope of works and improvements for Miranda House.

- Strengthening the floors,
- Up grading roof insulation
- New lighting sensitive to the original rooms
- Repair and replacement of the building services
- The installations of a passenger lift at the rear of the building

English Heritage has suggested careful consideration should be given to detailing of the proposed alterations. They have also agreed to limited exploratory works/enabling works to confirm whether more historic fabric remains hidden, in particular in the rear walls of the building.

3.5 Climate change

It is general accepted that climate change is happening and will cause the following.

- Hotter dryer summers
- Colder wetter winters
- Increased occurrence of extremely heavy rainfall

Camden council has asked for schemes to include appropriate climate change adaption measures. It is not possible to include the full range of measures in a building that has already stood for nearly 300 years.

The proposal is for a mixed mode ventilation scheme, using the existing air ducts located in the chimney with an air handling unit located in the roof space of no. 56, and sash opening windows with cross ventilation to the courtyard. This allows for the widows to be opened on warmer days and the heating and ventilation system switched off. In peak summer or winter the windows are closed and the mechanical ventilation system provides fresh air.

The mechanical ventilation system can be used to remove heat from the structure and internal rooms in spring and autumn (to a lesser extent summer) by purging the room with cold night air. This purging reduces the internal space temperatures increasing the time taken to heat the space up.

The proposed design is for a reversible air source heat pump, which can provide cooling in very hot weather. This enables the space to continue its function as a cultural centre when there may be a higher number of occupants.

In years to come additional free cooling methods may include the use of external wooden shutters limiting solar gains to the inside while allowing air movement.

The proposed lift enclosure involves a limited increase to roof area and the surface water can be accommodated within the existing drainage systems . No ground work involves the new foundations for the lift enclosure and there is limited scope for reducing surface water runoff.

3.5.1 Water Reduction measures

The energy modeling has predicted relatively low water use, it is still important to have water saving measures which include, the use of, low water using aerated spray in the wash hand basins, with low dual flush WC's. To avoid loss of water from leaking cisterns and taps it is proposed to connect a water shut off sensor to the washroom lighting controls. This simple measure is designed to stop wasting water when the washrooms are not in use and prevent loss from leaking water fitting's while waiting for the repair.

3.5.2 Air Pollution

This refurbishment / restoration will not contribute to increasing local levels of air pollution as it uses a clean energy source (electricity is clean at the point of use).

4 Conclusion

This report has set out to demonstrate the low energy and sustainability elements of the proposed refurbishment of Miranda House, an existing Museum, with associated meeting and office space.

The measures proposed are:

- Improve the thermal performance of the roof and windows.
- Use improved U values for new elements.
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Appendix Planning Policy

Promoting sustainable design and construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must:

a) Demonstrate how sustainable development principles have been incorporated into the design and proposed implementation; and
b) Incorporate green or brown roofs and green walls wherever suitable.

The Council will promote and measure sustainable design and construction by:
c) Expecting new build housing to meet Code for Sustainable Homes Level 3 by 2010 and Code Level 4 by 2013 and encouraging Code Level 6 (zero carbon) by 2016.;
d) Expecting developments (except new build) of 500 sq m of residential floor space or above or 5 or more dwellings to achieve “very good” in EcoHomes assessments prior to 2013 and encouraging “excellent” from 2013;

e) 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. The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:
f) Summer shading and planting;
g) Limiting surface water run-off;
h) Reducing water consumption;
i) Reducing air pollution; and
j) not locating vulnerable uses in basements in flood-prone areas.

Energy Performance Certificate

Non-Domestic Building

HM Government

58 Grafton Way
London
W1T 5DL

Certificate Reference Number:
0049-9999-9392-9499-9994

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information on the Government's website www.communities.gov.uk/epbd.

Energy Performance Asset Rating

More energy efficient

Less energy efficient

Technical information

Main heating fuel:	Grid Supplied Electricity
Building environment:	Mixed-mode with Mechanical Ventilation
Total useful floor area (m^2):	321
Building complexity (NOS level):	4
Building emission rate ($kgCO_2/m^2$):	87.17

Benchmarks

Buildings similar to this one could have ratings as follows:

47 If newly built

90 If typical of the existing stock

Mechanical and Electrical services strategy

1. Mechanical services

1.1 Heating & Hot Water services

The scheme comprises the following high quality heating and HWS system:

Boiler	Wall hung fully condensing boiler located in a lower ground services room.
Radiators	High spec radiators in all lower ground floor and circulation areas
Hot water heater	Unvented point of use electric water heater in bathroom area

Design room temperature in winter conditions is 21°C at -3°C ambient temperature.

Local room sensors will be provided to control the heating. *[Option to control the system via the building automation system to be advised].* Radiators will be fitted with thermostatic valves for individual control.

Heating pipework distribution will rise vertically within new service riser and distribute within floor trench or pipe in pipe system within solid floor construction on lower ground floor level and within joisted floor voids on the upper floors.

1.2 Cold water services

A new mains water metered supply will be provided to serve the building. Water treatment will be provided to the cold water feed to the equipment as required.

1.3 Gas supply

The existing connection to the mains gas supply and the gas meter will be retained. The gas distribution system will supply the condensing boiler. Pipework run will be buried within solid floor at lower ground floor level.

1.4 Heat pump/heat recovery system

Domestic heat pump VRF/VRV air-conditioning units will provide heating and comfort cooling to all seminar rooms and office areas. Fan coils will generally be floor standing vertical discharge. Fan coils within museum and library areas will be enclosed within an joinery casing, fan coils in office and seminar areas will be provided with standard factory supplied casings.

Design room temperature in summer conditions is 21°C at 30°C ambient temperature.

Local wall mounted controllers will be provided to control the system on a room by room basis. *[Option to control the system via the building automation system to be advised].*

The heat recovery VRV outdoor units will be installed on the roof of the adjacent auditorium. The installation will be acoustically treated to comply with the local authority planning consent conditions.

Refrigerant pipework distribution will rise vertically within new service riser and distribute within floor within joisted floor voids.

1.5 Ventilation

The existing heating air heating unit will be modified to provide fresh air ventilation to all habitable rooms. Air will be distributed via the existing ductwork running within the two chimney stacks. Additional ventilation will be achieved by openable windows on the front building elevation.

Specific rooms (bathrooms, toilets and utility rooms) will be mechanically ventilated in accordance with the requirements of Part F of the Building Regulations. Discharge locations (airbricks or wall louvered grilles) will be on the nearest façade.

1.6 Drainage

Drainage will be HDPE, conventional copper and cast iron connected into existing foul and rainwater stacks.

2. Electrical services specification

2.1 Power

The existing main electricity supply will be retained and reused.
Sub mains cabling shall be routed at low level within the basement level and routed up within the M&E services riser to serve new local distribution boards, lift supply and supply to mechanical equipment etc.

Local sub metering shall be provided to separate lighting and power use.

Distribution boards shall be surface mounted painted metal enclosures, painted finish. Manufactured to comply with BS 5486

All electrical services sockets, accessories etc. on finished areas shall generally be recessed mounted.

Design power allowances on LV distribution.
25W/m^2 office areas.
20W/m^2 seminar rooms and library areas.
10W/m^2 office area lighting.
9W/m^2 office area lighting.
9W/m^2 seminar rooms and library area lighting.

2.2 Lighting

The lighting scheme throughout shall comprise of low energy compact fluorescent/LED, linear fluorescent luminaires. Ceiling suspended (or direct mounted) arranged to provide lighting in compliance with latest building regulations, Part L (2010).

Notional lighting level (within the lighting array) shall be in compliance with the CIBSIE lighting guides.

Emergency escape lighting and exit signage is provided as required to comply with BS5266, relevant regulations and building control requirements.

Lighting controls throughout the office, library and seminar rooms shall generally shall generally be served by local manually operated switches, with the luminaires located next to the windows being separately switched .Lighting controls within corridors, circulation spaces and WC’s shall generally be controlled via PIR movement detectors.

External lighting shall be provided to final exit points and the rear areas.

2.2 Fire alarm and detection system

An category L1, Analogue Addressable Fire Detection and Alarm system shall be provided to all areas to comply with BS5839.

2.3 Door entry system

Ground floor main reception entrance will be provided with an audio/visual access control/door entry system. System to link to site access gate and front door.

A video door entry system shall be provided, which shall generally consist of a audio/visual access control panel located at the ground floor main entrance and the door entry audio/visual handsets located at the reception desk and third floor office area.

2.3 Security systems

An individual intruder alarm system shall be provided which shall comprise of dual technology presence detectors and door/window contacts (magnetic contacts and glass-break detectors).

2.3 Data and Communications systems

Containment only shall be provided throughout for the data and communications cables

NOTE

This report must also be read with the 24 hour noise level survey included with the application.

The following services drawings set out the principles and scope of the services proposal for the requirements of each space. For the final design layouts and intended positions of items such as radiators, fan coil units/FCU, rooflights please refer to the architect Studio*downie*'s drawings.