9 Bedford Row, London
Energy & Sustainability Statement

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JAW Sustainability

Contents

Executive Summary

This energy statement has been prepared in order to assess the improvement in energy performance as a result of the proposed refurbishment at 9 Bedford Row. The site of the development is located within the London Borough of Camden.

The development comprises refurbishment works of the historic main house and rear building, including the demolition of the existing link between the two buildings. Both buildings are currently B1 use, but the refurbishment seeks to return the main Grade II listed house into a single family dwelling while the rear building will retain its B1 use.

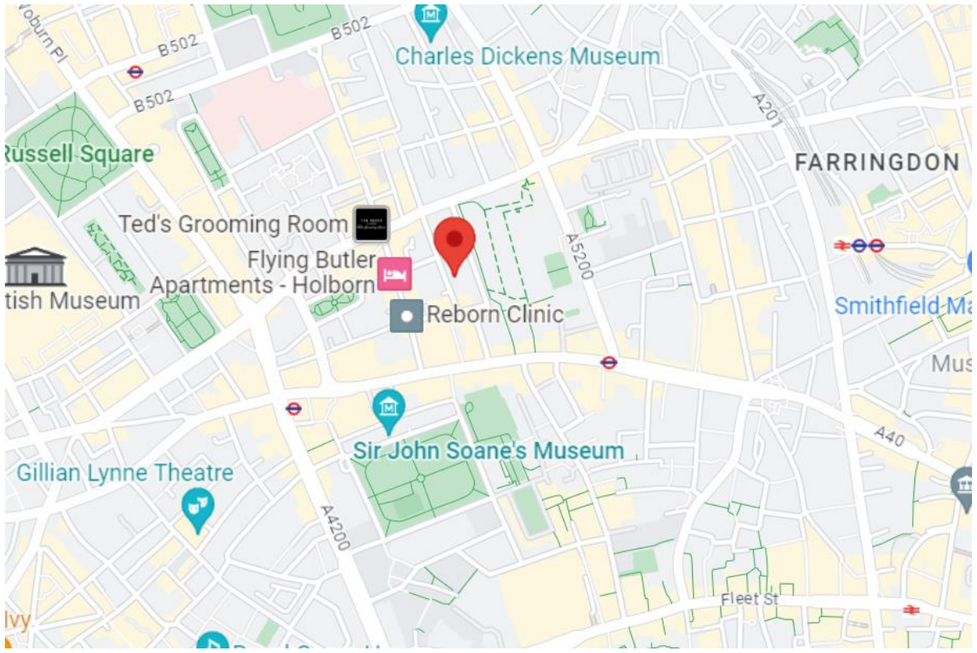
This report demonstrates how the development will address planning policies relating to energy and the energy savings associated with the refurbishment works for the proposed residential dwelling.

An energy assessment has been carried out based on design information to identify the most appropriate way to reduce CO_2 emissions and energy demand.

Following the thermal and M&E equipment upgrades described, the energy strategy for the refurbished building has been demonstrated to be capable of achieving an improvement of 18.76% CO_2 emissions.

1 Introduction

This energy statement has been prepared in order to support the planning application for the proposed development at 9 Bedford Row. The site is located in Bloomsbury within the London Borough of Camden.



1.1 Map showing the proposed development site.

The proposed development at 9 Bedford Row comprises the refurbishment of the main house and rear building. Returning the Grade II listed dwelling to residential status and retaining the B1 use of the rear building.

1.1 Assessment approach

This report summarises the work undertaken to support the development of an energy strategy for the proposed development.

Standard Assessment Procedure for the Energy Rating of Dwellings (SAP) calculations have been carried out for the residential unit in order to assess the impact on energy demand and CO_2 emissions of improvements through the hierarchy and demonstrate the most appropriate solution for the proposed development to meet the relevant planning requirements.

2 Policy

2.1 Building Regulations Part L 2021

Renovating thermal elements

11.2 Renovation of a thermal element means one of the following.

a. Providing a new layer through cladding or rendering the external surface of a thermal element.

b. Providing a new layer through dry-lining the internal surface of a thermal element.

c. Replacing an existing layer through stripping down the element to expose basic structural components (e.g. bricks, blocks, rafters, joists, frame) and then rebuilding.

d. Replacing the waterproof membrane on a flat roof.

e. Providing cavity wall insulation.

11.3 If a thermal element is renovated and one of the following applies, then the whole of the thermal element should be improved to achieve at least the U-value given in Table 4.3, column (b).

a) More than 50% of the surface of the individual thermal element is renovated (see paragraph 11.4).

b) The work constitutes a major renovation. A major renovation is when more than 25% of the surface area of the external building envelope is renovated.

If paragraph 4.13 applies, Appendix C provides examples of renovation of an existing thermal element that are technically, functionally or economically feasible.

11.4 When assessing the percentage area that will be renovated of an individual thermal element, consider whether the element is being renovated from the outside or the inside, following Diagram 11.1 and Diagram 11.2, respectively.

Material change of use and change to energy status

11.5 A material change of use, in relation to dwellings, is when a building satisfies any of the following:

a. is used as a dwelling, where previously it was not

b. contains a flat, where previously it did not

c. contains a greater or lesser number of dwellings than it did, having previously contained at least one dwelling.

11.6 A change to energy status is when a dwelling was previously exempt from the energy efficiency requirements but now is not. The change to energy status applies to the building as a whole or to parts of the building that have been designed or altered to be used separately. For example, when a previously unheated space becomes part of the heated dwelling in a garage or loft conversion, a change to energy status applies to that space. A material change of use may result in a change to energy status, for example if a previously unheated loft is converted into a flat.

11.7 If there is a material change of use and/or a change to energy status, elements should satisfy all of the following.

a. Existing thermal elements should meet the limiting standards in Table 4.3, following the guidance in paragraphs 4.11 and 4.12.

b. If both of the following apply to existing windows, roof windows, rooflights and doors (controlled fittings), they should be replaced to meet the limiting standards in Table 4.2.

i. They separate a conditioned space from an unconditioned space or the external environment.

ii. They have a U-value higher than either of the following.

- For windows, roof windows and doors – 3.30W/(m2·K).
- For rooflights – 3.80W/(m2·K), calculated by following paragraph 4.5.

In addition, all of the following should be met.

a. New or replaced thermal elements should meet the standards in Table 4.2, following the guidance in paragraphs 4.7 and 4.8.

b. New or replaced windows, roof windows, rooflights and doors (controlled fittings) should meet the standards in Table 4.2.

c. The area of openings in the newly created dwelling should not be more than 25% of the total floor area. In buildings that contain more than one dwelling a larger percentage area of openings may be achieved by following the guidance in paragraph 11.8.

d. Any fixed building services including building automation and control systems and/or on-site electricity generation that are provided or extended should meet the standards in Sections 5 and 6.

11.8 As an alternative to paragraph 11.7, in buildings that contain more than one dwelling, the Standard Assessment Procedure may be used to show that the dwelling primary energy usage and total CO_2 emissions from all dwellings in the building, after completion of the building work, would be no greater than if each dwelling had been improved following the guidance in paragraph 11.7.

Consequential improvements to energy performance

28. (1) Paragraph (2) applies to an existing building with a total useful floor area over 1,000m2 where the proposed building work consists of or includes—

(a) an extension;

(b) the initial provision of any fixed building services; or

(c) an increase to the installed capacity of any fixed building services.

(2) Subject to paragraph (3), where this paragraph applies, such work, if any, shall be carried out as is necessary to ensure that the building complies with the requirements of Part L of Schedule 1.

(3) Nothing in paragraph (2) requires work to be carried out if it is not technically, functionally or economically feasible.

12.1 For an existing dwelling with a total useful floor area of over 1000m2, additional work may be required to improve the overall energy efficiency of the dwelling if proposed work consists of or includes any of the following.

a. An extension.

b. Providing any fixed building service in the dwelling for the first time.

c. Increasing the capacity of any fixed building service (which does not include doing so on account of renewable technology).

Consequential improvements should be carried out to ensure that the dwelling complies with Part L of the Building Regulations, to the extent that they are technically, functionally and economically feasible.

12.2 Technical guidance on consequential improvements is given in Approved Document L, Volume 2: Buildings other than dwellings.

Limiting standards in existing dwellings – new and replacement elements

4.7 New fabric elements in existing dwellings should meet the limiting standards in Table 4.2.

4.8 The U-value of a replacement fabric element in an existing dwelling should both:

a. be no worse than that of the element being replaced

b. meet the limiting standards in Table 4.2.

4.9 Guidance on when a new element must meet the standards in Table 4.2 is given in Section 10. Elements that should meet the standards include both of the following. a. Elements in extensions to existing dwellings.

b. New or replacement elements in existing dwellings.

4.10 If windows or fully glazed external pedestrian doors cannot meet the requirements of Table 4.2 because of the need to maintain the character of the building, either of the following should be met.

a. These fittings should not exceed a centre pane U-value of 1.2W/(m2·K).

b. Single glazing should be supplemented with low-emissivity secondary glazing.

Renovated and retained elements

4.11 The U-value of an existing thermal element that is being renovated should both:

a. be no worse than that of the element before it was renovated

b. meet the limiting standards in Table 4.3.

4.12 Guidance on when an existing element should meet the standards in Table 4.3 is given in Section 11. Elements that should meet the standards include both of the following.

a. Thermal elements being renovated in existing dwellings. Renovated elements should achieve the U-values in Table 4.3, column (b).

b. Elements being retained in existing dwellings, for example through a loft or garage conversion. Retained elements with a U-value that is higher than the threshold value in Table 4.3, column (a) should be upgraded to achieve the U-values in Table 4.3, column (b).

4.13 If achieving the U-value in Table 4.3, column (b) either:

a. is not technically or functionally feasible or

b. would not achieve a simple payback of 15 years or less then the element should be upgraded to the lowest U-value that both:

a. is technically and functionally feasible and

b. can achieve a simple payback not exceeding 15 years.

Generally, a thermal element once upgraded should not have a U-value greater than 0.7W/(m2·K). A lesser standard for the thermal element may be acceptable where work complies with Part C of the Building Regulations on protection from the harmful effects of interstitial and surface condensation.

Thermal bridging in existing dwellings

4.19 When carrying out work in existing dwellings, care should be taken to reduce unwanted heat loss through thermal bridging. Thermal bridges can be limited in an existing dwelling by following the junction details from a reputable non-government database containing independently assessed thermal junction details, such as Local Authority Building Control's Construction Details library. Follow the guidance in paragraph 4.17 where appropriate.

Air tightness in existing dwellings

4.23 When carrying out work in existing dwellings, care should be taken to reduce unwanted heat loss through air infiltration by doing all of the following.

a. When installing pipework or services, taping and sealing around service penetrations.

b. When installing or renovating thermal elements, the element being installed should be draught-proofed, and air-leakage gaps should be filled.

c. When installing windows, roof windows, rooflights or doors (all of which are controlled fittings), the controlled fitting should be well fitted and reasonably draught-proof.

Replacement building services in existing dwellings

5.4 A replacement fixed building service should be at least as efficient as the value set out in Section 6 and should comply with either of the following.

a. Use the same fuel as the service being replaced and have an efficiency that is not worse than that of the service being replaced.

b. Use a different fuel than the service being replaced. The system should both: i. not produce more CO2 emissions per kWh of heat than the appliance being replaced

ii. not have a higher primary energy demand per kWh of heat than the appliance being replaced.

Exemptions for listed buildings, buildings in conservation areas and scheduled monuments

0.8 Work to the following types of dwellings does not need to comply fully with the energy efficiency requirements where to do so would unacceptably alter the dwelling's character or appearance.

a. Those listed in accordance with section 1 of the Planning (Listed Buildings and Conservation Areas) Act 1990.

b. Those in a conservation area designated in accordance with section 69 of the Planning (Listed Buildings and Conservation Areas) Act 1990.

c. Those included in the schedule of monuments maintained under section 1 of the Ancient Monuments and Archaeological Areas Act 1979.

0.9 Work to a dwelling in paragraph 0.8 must comply with the energy efficiency requirements where this would not unacceptably alter the dwelling's character or appearance. The work should comply with standards in this approved document to the extent that it is reasonably practicable.

2.2 London Borough of Camden

Policy CC1 Climate Change Adaptation

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

a) promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;
b) require all major development to demonstrate how London Plan targets for carbon dioxide emissions have been met;
c) ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
d) support and encourage sensitive energy efficiency improvements to existing buildings;
e) require all proposals that involve substantial demolition to demonstrate that it is not possible to retain and improve the existing building; and
f) expect all developments to optimise resource efficiency

3 Energy Strategy

An energy strategy has been developed for the refurbishment using a fabric first approach. Where possible, measures have been taken to improve the energy performance of the building as much as feasibly possible, which is set out in the report.

Energy calculations using Building Regulations approved and accredited software have been undertaken to calculate the savings associated with the measures incorporated.

The energy consumption and carbon emission figures within this report have been calculated using the approved Standard Assessment Procedure for the Energy Rating of Dwellings (SAP).

3.1 Passive Design

As part of the passive design approach, passive design measures have been considered to reduce initial energy demand. Energy efficient equipment has then been addressed to further reduce the energy demand of the proposed development.

Site and Orientation

The development comprises the refurbishment of an existing building. As such, the orientation is fixed.

Solar Gain Control and Daylight

Solar gains are a passive form of heating from the sun's radiation and are beneficial to a building during winter months as they provide an effective source of heat and reduce internal heating requirements. However during summer months they must be controlled in order to mitigate the risk of overheating. They can be controlled through glazing and shading design in order to allow low level winter sun to enter the building and to limit access to high level summer sun.

As a refurbishment, the orientation of the building with glazing predominantly to the west and east facades is fixed. However, due to being a listed building, the windows will still be single glazing.

Building Fabric

The basement floor and roofing will be reinsulated in order to meet Building Regulations standards and improve on the current thermal performance. Due to the listed status of the building and retention of period features, it is not feasible to upgrade all fabric elements of the development without potentially altering the dwellings character or appearance, which would be problematic in terms of heritage.

Tables 3-1 and 3-2 below provide details of the existing thermal envelope and upgrades due to the refurbishment.

Fabric Component	Specification Existing	Minimum Upgrade Specification	Efficient Specification Proposed
Existing External Walls	1.7 W/m^{2}K	-	-
New External Wall	-	0.18 W/m^{2}K	0.16 W/m^{2}K
Roof	2.3 W/m^{2}K	0.16 W/m^{2}K	0.13 W/m^{2}K
Basement Floor	1.2 W/m^{2}K	0.25 W/m^{2}K	0.16 W/m^{2}K
Existing Windows	4.8 W/m^{2}K	-	4.8 W/m^{2}K
New Windows	-	1.4 W/m^{2}K	4.5 W/m^{2}K
External Doors	3 W/m^{2}K	-	3 W/m^{2}K
Air Tightness	No test	-	No test
Thermal Bridging	Default	-	Default

Table 3-1 Existing and proposed thermal fabric values

These are based on existing solid brickwork walls, existing single glazed windows and the anticipated roof buildup.

Specifying new double glazed windows for the development would damage the character and appearance of a listed historic building, as they would not be in line with the existing single glazed sash windows. As such, in accordance with section I of the Planning (Listed Buildings and Conservation Areas) Act 1990, the new windows to be specified will be single glazed, in line with the existing glazing.

Material Change of Use

Part L material change of use criteria also require that where the glazing to floor area ratio is more than 25% that this is compensated for. Table 3-2 demonstrates the ratio of the total openings' area to the total floor area of the proposed development.

Unit Number	Glazed to floor area ratio
9 Bedford Row	17.67%

Table 3-2 Glazing to floor area ratio

The development is under the 25% glazing threshold and therefore no further compensation measures are required.

Building Services

Space Heating and Hot Water

The existing gas boilers are to be replaced with gas boilers with higher efficiencies. Hot water tanks will be installed to distribute heating and hot water.

The rest of the existing equipment is to be removed as part of the refurbishment in order to allow for the installation of efficient services.

The system will be provided with specific time and temperature zone controls.

To minimise hot water demand, the dwelling will be fitted with reduced water consumption sanitary ware such as low flow taps.

The development will target a water consumption of 105 litres or less per person/day in line with Policy SI5 of the London Plan.

Ventilation

The building benefits from large openable windows and adequate cross ventilation. As such, a natural ventilation strategy is provided. Additionally, the building benefits from Air Conditioning. It is proposed that the existing air conditioning units are stripped out and replaced with more efficient units.

Centralised ventilation will be installed to provide extract to the kitchens and bathrooms.

Lighting

All lighting internally and externally will be energy efficient and provided with adequate controls.

Metering

New energy and water meters will be installed, fitted by the utility provider.

White Goods

All white goods provided will be energy and water efficient with a high Energy Label Scheme rating to reduce unregulated energy use to reduce electrical loads and water consumption.

Table 3-3 shows a comparison between the existing and proposed services strategy and energy efficiency measures for the building.

Services Component	Efficient Specification Existing	Efficient Specification Proposed
Space Heating & hot water	Potterton Profile gas boiler 74.8% efficiency in winter 64.7% efficiency in summer Radiators & Underfloor Heating	Centralised gas boiler 88% efficiency in winter 79% efficiency in summer Radiators & Underfloor Heating
Heating Controls	Thermostat Time and temperature zone control	Thermostat Time and temperature zone control

Ventilation	Natural Mechanical extract in wet rooms Air conditioning (EER 3.29)	Natural Mechanical extract in wet rooms Air conditioning (A++)
Lighting & Controls	0% low energy lighting No controls	100% low energy lighting Controls
Metering	Metering	Metering

Table 3-3 Existing and proposed building services measures

3.2 Energy and Carbon Savings

Energy Use

The breakdown of carbon and energy use has been identified for the existing building.

Table 3.6 provides a summary of the energy performance of the building before and after development, showing the improvements achieved as a result of the proposed building envelope and M&E services upgrades.

	Residential		
	CO_2 Emissions (tonnes /annum)	CO_2 Savings (tonnes /annum)	% Saving
Existing Building	25.49		
Proposed Building	20.71	4.78	18.76%

Table 3.6: Summary of SAP results

The results show that in comparison to the existing building the upgrades would improve the building CO_2 emission rate by 18.76% overall.

4 Conclusion

Following the thermal and M&E equipment upgrades described, the energy strategy for the refurbished building has been demonstrated to be capable of achieving an improvement of 18.76% CO_2 emissions.

The thermal fabric of the proposed development has been designed to meet or exceed Building Regulations, where it does not alter the character of the listed building and energy efficient equipment has been specified.

The savings represented in this report demonstrate that all reasonable measures will be employed within the proposed development in order to improve the building's environmental performance.

The findings and proposed energy strategy presented in this report are based on preliminary planning drawings and should be updated at detailed design in order to confirm the specification of the proposed equipment.