

Queen Victoria Street

Reading

RG1 1SY



Energy (SAP) Analysis Report

March 2017

Issue Register

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SUMMARY

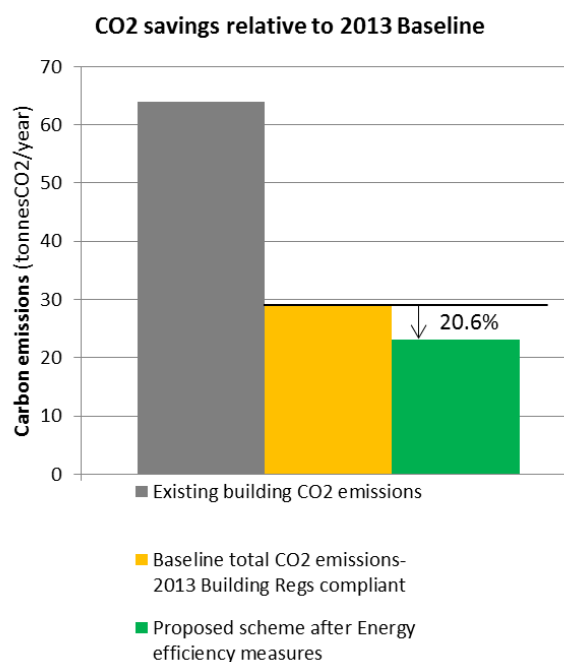
This report outlines the sustainability strategy for the proposed Queen Victoria Street development containing 19 flats, in line with the requirements set out by the Reading's Council. It describes the measures that have been adopted to achieve the carbon reduction required from Reading's Council, as defined in the next paragraph.

The analysis has been undertaken using SAP (Standard Assessment Procedure) in accordance with Building Regulations Part L1B 'Conservation of fuel and power in existing dwelling' to demonstrate compliant conditions and it sets out Reading Council's approach.

The following table summarizes the results of the SAP calculation and highlights a **20.6%** CO₂ reduction compared with the 2013 Part L compliant baseline.

Emissions Summary

	CO2 Emissions (kgCO2/yr)	CO2 Emission savings (%)
2013 Part L1B compliant Baseline scheme / Notional building	29,150	
Proposed scheme after Energy efficiency measures	23,140	
Total savings against Baseline	6,010	20.6



INTRODUCTION

This report shows the Energy analysis of the new development for Queen Victoria Street in Reading. The proposal consists of the internal change of use from office to residential. No. 19 units will be designed from the 1st to 3rd floor of the historical building at 17-23 Queen Victoria Street.

The development of the existing building presents an opportunity to add value and reduce the carbon emissions through improvement energy efficient design. The energy study has been conducted in accordance with Reading Core Strategy without affecting the character of the listed building and keeping to a minimum the impact on the whole building.

The energy demands of the refurbished building were calculated using SAP adopted by the UK government as part of the national methodology for demonstrating compliance with building regulations and for providing energy ratings for dwellings.



Figure 1: Google Earth view

The project consists of the conversion of the interior plans of the buildings from commercial to residential units. It is proposed to retain the existing historical building while amending the internal plan of the upper floors. The new development includes 19 flats that will be located from the first to the third floor. This energy study does not include the ground floor and neither the common stairwells.

The SAP assessment has been carried for all the dwellings of the development. The following pictures shown all the unit types identified for each floor. The flats highlighted with the same colour have been modelled as 'identical homes' because they have been identified having the same internal floor area, window area and orientation.

Please note that the plans might still change following any comments from the Council.



Figure 2: First floor



Figure 3: Second floor

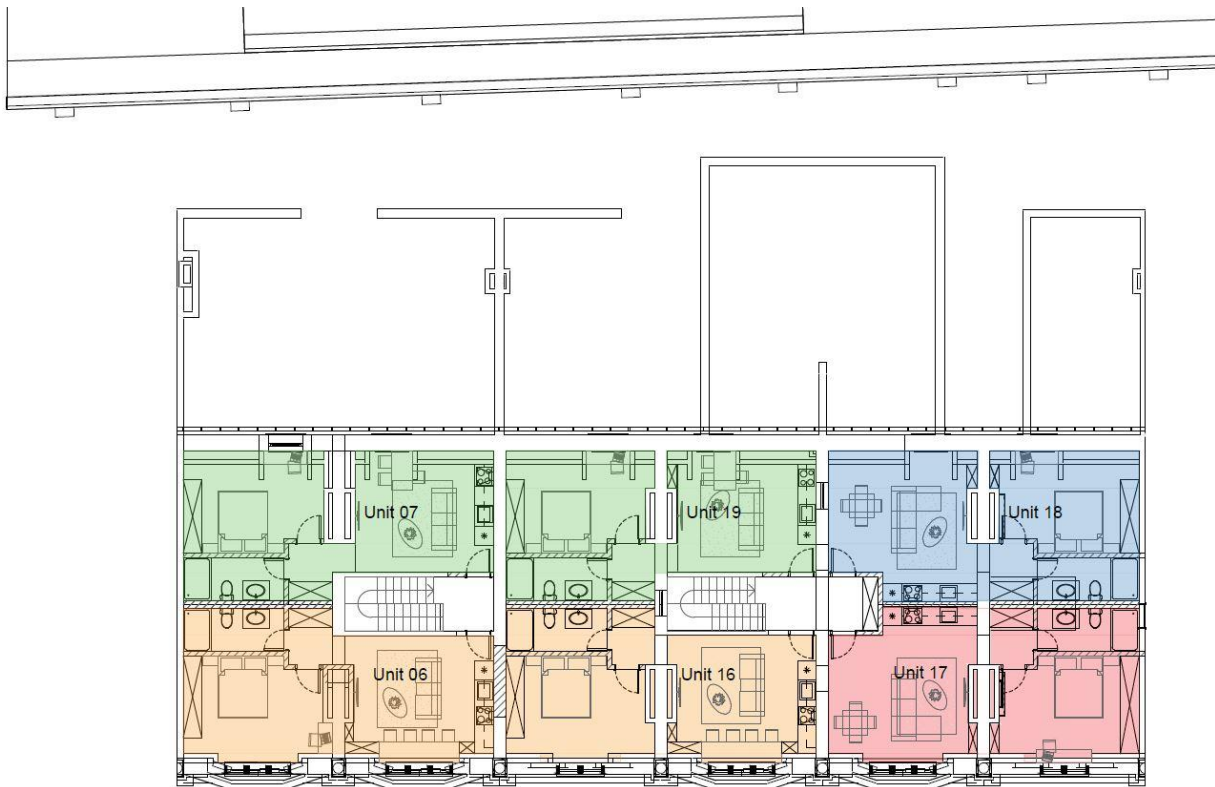


Figure 4: Third floor

Sustainability Policy

The Council is no longer using EcoHomes and it is in the process of updating its sustainability policies to reflect this. The requirements on the Core Strategy have been superseded by changes in National Regulations but the process has not been finalized yet. For that reason the energy analysis of this building refers to Reading Borough council's officers.

Under the RBC advices, the energy study reflects the following requirements:

'At least 50% of the development shall demonstrate that is achieved a 19% reduction in carbon emissions over and above the minimum requirements of Part L of the Building Regulations 2013 OR 9.5% for the whole development'.

This requirement may be achieved through energy efficient design measures, a form of decentralised energy provision or the use of renewable energies, or a combination of these measures. There are no specific requirements to incorporate renewables if the necessary improvement is achieved in other ways.

Application of Part L to historic buildings

The building is a listed building subjected to a 'Material change of use'.

Paragraph 3.8 in Approved Documents L1B lists three classes of buildings where *special considerations* apply when making reasonable provision for the conservation of fuel or power:

Historic and traditional buildings where special considerations may apply

3.8 There are three further classes of buildings where special considerations in making reasonable provision for the conservation of fuel or power may apply:

- a. buildings which are of architectural and historical interest and which are referred to as a material consideration in a local authority's development plan or local development framework;
- b. buildings which are of architectural and historical interest within national parks, areas of outstanding natural beauty, registered historic parks and gardens, registered battlefields, the curtilages of scheduled ancient monuments, and world heritage sites;
- c. buildings of traditional construction with permeable fabric that both absorbs and readily allows the evaporation of moisture.

When a building is to be subjected to a 'change of use', that triggers the need to comply with Part L. Please find an extract from the Historic England Guide which all the historic buildings should refer to:

'EXEMPTIONS' AND 'SPECIAL CONSIDERATIONS'

Buildings which are 'exempt' from the energy efficiency requirements are clearly defined in the Regulations, as is the extent to which their conditional exemption actually applies.

For these buildings the exemption applies only to the extent that compliance with the energy efficiency requirements would unacceptably alter their character or appearance.

It should be noted from the above statement that this exemption is **not unconditional**. The regulations therefore require that these buildings should be upgraded in accordance with the energy efficiency requirements set out in Approved Documents L1B and L2B up to, but not necessarily beyond, the point at which the relevant alterations would become unacceptable.

The definition of this point requires an understanding of what qualities of character and appearance are significant in each case, as well as an effective assessment of the degree to which alterations to these qualities will be unacceptable.

For all the above and below designations, where consent is required, the local authority is required to assess proposals for any impacts on the significance of the heritage asset using the criteria set out in *Planning Policy Statement 5, Planning for the Historic Environment*.

The aim of the proposed new development is to improve energy efficiency as far as is reasonably practicable. The work will not prejudice the character of the building and it will support the conservation of the building historical asset protecting the natural environment.

The character and integrity of listed buildings will be preserved, seeking to enhance the settings of Listed Buildings wherever appropriate.

ENERGY AND SUSTAINABILITY

The project has been assessed as a Refurbishment Change of use and the Carbon Emission Reduction has been set against the minimum values for fabric improvements identified under the requirements of Building Regulations Part L1B: Conservation of fuel and power in existing dwellings.

Option 1 (discarded)

In first instance a first analysis has been carried out including electric underfloor heating and electric water heaters within all the flats.

This option would not comply with Building Regs as the Dwelling CO₂ Emission Rate would be higher than the Target Emission Rate of the Notional building.

In specific:

-Average Proposal CO₂ emissions = 1.83 tCO₂/yr

-Baseline 2013 Notional Building CO₂ emissions = 1.53 tCO₂/yr

We have then tried to mitigate the high energy consumption including PV panels - No.60 panels would be needed to achieve that (assuming roof-mounted West orientated 345W panels with 19% efficiency). A total area of 98m² would be necessary but the roof area of the front building is insufficient and it would strike Planning implications.

For the reasons described above this option has been discarded.

Option 2

Condensing gas-fired boilers using a cascade flue system have been allowed to provide heating and hot water per each flat. The following paragraph summarises the strategy which has been used for this energy assessment.

Building Fabric

The first stage of reducing the overall carbon and energy consumption of the building is to reduce the demand in the first instance. By minimising the heat losses through the fabric during the winter period the overall energy required to heat the building will be reduced.

The thermal elements performance used for the SAP analysis is highlighted in the table below.

Element	Description	Minimum U-value for Retained elements (W/m ² K)	Proposed U-value (W/m ² K)
External wall	500mm Brick wall + insulated plasterb	0.30	0.29
External wall	300mm Brick wall + insulated plasterb	0.30	0.28
Floor (to heated space)	Floating floor on existing timber floor	n/a	n/a
Roof	Pitched roof insulated slopes	0.18	0.18
Windows/Roof-lights	Double glazing	1.6	1.6
	Secondary glazing	-	2.4

Air permeability has been assumed as 15 m³/m²/hr @50Pa.

The following build-ups have been allowed for the external brickwalls:

- **External 500mm brickwall + 62.5mm insulated plasterboard**

Layers							610 mm
Layer	Description	Thickness	Conductivity	Resistance	Bridging	Density	Sp
Ext surface	Horizontal heat flow direction			0.0400			
Layer 1	Brick, outer leaf	500 mm	0.7700	0.6494			
Layer 2	Standard cavity	35 mm	0.3182	0.1100	17.65 % Timber		
Layer 3	Prefab timber frame panels	12 mm	0.1200	0.1000			
Layer 4	Kooltherm K18 Insulated Plasterboard	62.5 mm	0.0245	2.5500			
Int surface	Horizontal heat flow direction			0.1300			

- **External 300mm brickwall + 62.5mm insulated plasterboard**

Layers							410 mm
Layer	Description	Thickness	Conductivity	Resistance	Bridging	Density	Sp
Ext surface	Horizontal heat flow direction			0.0400			
Layer 1	Brick, outer leaf	300 mm	0.7700	0.3896			
Layer 2	Standard cavity	35 mm	0.3182	0.1100	17.65 % Timber		
Layer 3	Prefab timber frame panels	12 mm	0.1200	0.1000			
Layer 4	Kooltherm K18 Insulated Plasterboard	62.5 mm	0.0245	2.5500			
Int surface	Horizontal heat flow direction			0.1300			

Heating and Controls

The current heating space is provided by electric heaters in all rooms.

Within the proposal Heating and Hot Water are provided by gas condensing combi boiler per each flat. The following assumptions have been included within the energy analysis for the proposal:

- Condensing combination boiler with automatic ignition
- Heat emitter: Radiators
- Flow temperature >45°C
- Heating controls: Programmable room thermostat and TRVs

Ventilation

A natural ventilation strategy has been proposed, together with a Mechanical Ventilation system to provide fresh air. MVHR system will be selected on the basis of the internal floor area and Part G Ventilation Guide.

Lighting

Lighting fittings have been assumed to be replaced and high efficiency lighting has been used as the design standard. A number of 20 luminaires have been assumed in each flat so far.

RESULTS

SAP software has been used to assess the proposal for Queen Victoria new development under Building Regulation Part L1B 2013.

The energy model of the proposed building has been create and compared with the Notional dwelling (a building modelled with the same dimensions and orientation of the actual building which meets the regulation minimum requirements for thermal elements, controlled fittings and controlled services).

All of the information provided within above chapter shows a compliant case for this building under Building Regulation Part L1B 2013. The new development achieves an Average **20.6%** CO₂ reduction above the Notional building which meets the Council's Planning requirements.

	Energy Demand (kWh/yr)	Energy Consumption savings (%)	CO ₂ emissions (kg/yr)	CO ₂ emission savings (%)
2013 Part L1B compliant Baseline scheme/Notional building	116,302.00		29,150.00	
Proposed scheme after energy efficiency measures	103,391.70		23,140.00	
Proposed scheme after renewable savings			n/a	
Total savings (against baseline)	12,910	11.1	6,010	20.6