

Energy Assessment

Change of Use from F1 to C3 and 2 Proposed Residential Buildings
Following Demolition of Existing Religious Building

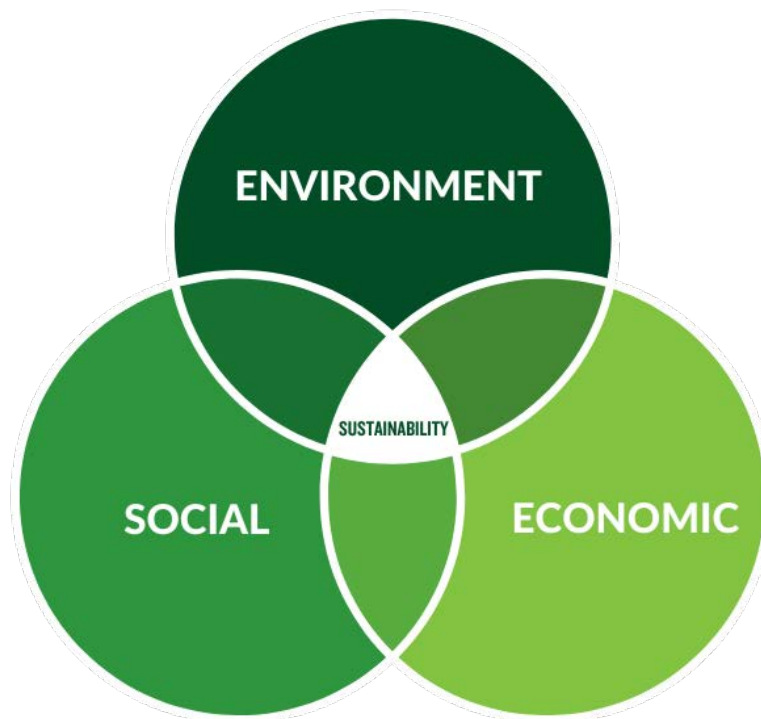
at

30a Cumberland Road

Reading

Berkshire

RG1 3LB



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1. Introduction

JE Architecture has been instructed by to prepare a Energy Statement to support the application for Change of Use from F1 to C3 and 2 Proposed Residential Buildings Following Demolition of Existing Religious Building at 30a Cumberland Road, Reading, Berkshire, RG1 3LB

Having worked for a number of large companies most notable being Huf Haus GmbH for 15 years as their Technical Director and Sustainability Advisor helping the company gain a number of Carbon Neutral Schemes as well as Passive House and Code for Sustainable Homes Level 6 schemes, JE Architecture has considerable knowledge and expertise in all issues of sustainability.

The site is in a city centre location within a sustainable location close to the centre of Reading and within 50m of the District Centre of Cemetery Junction. It faces Cumberland Road where there are residential buildings with off street parking. Kings Road and London Road are less than 500ft away which has a number of bus routes.

A 'fabric first' approach has been taken and concentrates on specifying high levels of insulation with exceptional levels of air tightness and the use of whole house mechanical ventilation in conjunction with natural ventilation via openable windows as part of an overheating prevention strategy for summertime.

The proposed scheme will see the existing building demolished and replaced with 2 new buildings to incorporate 14 1-bedroom flats. Part of the scheme also provides green spaces for the occupants of the flats.

The existing site area and location is shown in the aerial photo in Figure 1 below, with the proposed site location plan shown in Figure 2, which details the difficulties in being able to achieve the high levels of energy performance required, but through the fabric first approach this is possible.



Figure 1: Existing Aerial Photo

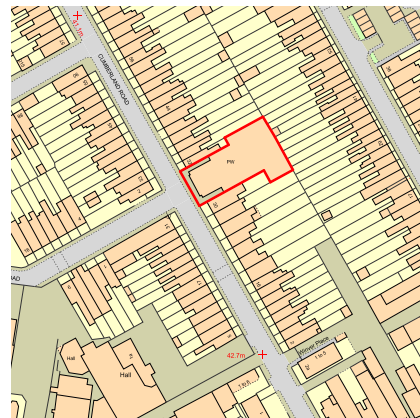


Figure 2: Site Location Plan

The proposed development has been designed to have extremely low energy consumption similar to that to be expected from a PassivHaus building.

These measures include the specification of very good (low) u-values for the building envelope elements such as walls, floors and windows, reduced air permeability, 100% low energy lighting and the minimisation of thermal bridging.

Heating, ventilation, hot water and heating is proposed by the use of individual exhaust air heat pumps. A range of enhanced energy efficiency measures above and beyond Building Regulations 2023 are proposed as the first step of the energy hierarchy.

Table 1 below is a summary of the maximum building air permeability and building fabric elements permissible under Building Regulations 2023.

Table 4.1 Limiting U-values for new fabric elements and air permeability in new dwellings	
Element type	Maximum U-value ⁽¹⁾ W/(m ² ·K)
All roof types ⁽²⁾	0.16
Wall ⁽²⁾	0.26
Floor	0.18
Party wall	0.20
Swimming pool basin ⁽³⁾	0.25
Window ⁽⁴⁾⁽⁵⁾	1.6
Rooflight ⁽⁶⁾⁽⁷⁾	2.2
Doors (including glazed doors)	1.6
Air permeability	8.0m ³ /(h·m ²) @ 50Pa
	1.57m ³ /(h·m ²) @ 4Pa

2. Proposed Approach to Sustainability

This statement sets out the approach that the applicant is proposing to adopt to ensure that the proposal meets high standards of sustainability. The report includes a discussion of the full range of sustainability issues as shown below:

- Energy & carbon emissions
- Water conservation
- Flood risk, surface & waste water management
- Ecology & biodiversity
- Waste & pollution
- Materials selection and sustainable construction methods

This will demonstrate that this proposed development will meet the requirements of policies CS1 & CS2 of the Reading Core Strategy.

The Local Plan has been prepared in accordance with the National Planning Policy Framework (NPPF), which sets out the overall national approach to planning. The Local Plan should be consistent with the principles and policies in the NPPF, including the presumption in favour of sustainable development.

Sustainable Design and Construction

Policy CC2: 'Sustainable Design and Construction'. Proposals for new development, including the construction of new buildings and the redevelopment and refurbishment of existing building stock, will be acceptable where the design of buildings and site layouts use energy, water, minerals, materials and other natural resources appropriately, efficiently and with care and take account of the effects of climate change.

Adaptation to Climate Change

Policy CC3: 'Adaptation to Climate Change'. All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change. The following measures shall be incorporated into development:

- Wherever possible, new buildings shall be orientated to maximise the opportunities for both natural heating and ventilation and reducing exposure to wind and other elements.
- Proposals involving both new and existing buildings shall demonstrate how they have been designed to maximise resistance and resilience to climate change for example by including measures such as solar shading, thermal mass, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc.
- Use of trees and other planting, where appropriate as part of a landscape scheme, to provide shading of amenity areas, buildings and streets and to help to connect habitat, designed with native plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions.
- All development shall minimise the impact of surface water runoff from the development in the design of the drainage system, and where possible incorporate mitigation and resilience measures for any increases in river flooding levels as a result of climate change

Decentralised Energy

Policy CC4: 'Decentralised Energy'. In meeting the sustainability requirements of this plan, developments of the sizes set out below shall demonstrate how consideration has been given to securing energy for the development from a decentralised energy source.

- Any development of more than 20 dwellings and./ or non-residential development of over 1,000 sq. m shall consider the inclusion of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable, feasible or viable for this form of energy provision.
- Where there is existing decentralised energy provision present within the vicinity of an application site, further developments of 10 dwellings or more or non-residential development of 1,000 sq. m or more will be expected to link into the existing decentralised energy network or demonstrate why this is not feasible.

Standards for New Housing

Policy H5: 'Standards for New Housing'. New build housing should be built to the following standards, unless it can be clearly demonstrated that this would render a development unviable:

- a. All new build housing outside the 'Central Area' as defined on the Proposals Map will comply with the nationally-described space standard.
- b. All new build housing will be built to the higher water efficiency standard under Regulation 36(3) of the Building Regulations.
- c. All major (10 dwellings or more) new-build residential development should be designed to achieve zero carbon homes or if unachievable, a minimum 35% improvement in the dwelling emission rate over the target emission rate, as defined in the 2013 Building Regulations.
- d. All other new build housing (minor – fewer than 10 dwellings) will achieve at a minimum a 19% improvement in the dwelling emission rate over the target emission rate, as defined in the 2022 Building Regulations.
- e. All new build housing will be accessible and adaptable in line with M4(2) of the Building Regulations, unless it is built in line with M4(3).

- f. On developments of 20 or more new build dwellings, at least 5% of dwellings will be wheelchair user dwellings in line with M4(3) of the Building Regulations. Any market homes provided to meet this requirement will be 'wheelchair adaptable' as defined in part M, whilst homes where the Council is responsible for allocating or nominating an individual may be 'wheelchair accessible'.

Sustainable Design and Construction Supplementary Planning Document Adopted November 2019

This Supplementary Planning Document (SPD) explains planning requirements with regards to energy, climate change, water management and waste reduction. It is intended to supplement the policies of the Local Plan, particularly:

- CC2: Sustainable Design and Construction
- CC3: Adaptation to Climate change
- CC4: Decentralised Energy
- CC5: Waste Minimisation and Storage
- EN18: Flooding and Drainage
- H5: Housing Standards

This SPD provides a sustainable design and construction checklist that should be completed and submitted as part of the planning application in order to demonstrate how the proposals respond to a range of sustainability issues including energy / CO₂, water, materials surface water run-off, waste, pollution, health and well-being, management ecology and transport.

Energy Efficiency

This section outlines some of the methods that may be used to meet the requirements of policies CC2, CC3, CC5 and H5. The elements are not absolute requirements, but should nonetheless be considered by applicants.

- Fabric Improvements
- Solar Gain
- Natural Day Lighting
- Ventilation
- Thermal Mass
- Insulation
- Green and Brown Roofs
- Green Wall and Living Walls
- Landscaping and Energy Efficiency
- Energy Efficiency Appliances

Decentralised Energy and District Heating

This is not relevant, as the application proposal is not over 20 dwellings plus there is no decentralised energy provision present within the vicinity of the application site.

Sustainable Design and Construction Checklists

This SPD provides a sustainable design and construction checklist that should be completed and submitted as part of the planning application in order to demonstrate how the proposals respond to a range of sustainability issues including:

- Energy / CO₂
- Water
- Materials
- Surface Water Run-off
- Waste
- Pollution
- Health and Well-being
- Management
- Ecology

The requirements of the 'Sustainability Checklist' has been addressed within other documentation supporting this application, however as the design evolves, further construction and operational information will be issued.

Summary of Requirements

In summary, for new planning applications (major - 10 dwellings or more) the following key sustainability and energy/CO₂ targets apply to this development.

- Minimum of 35% reduction in CO₂ emissions from energy efficiency measures and on-site low/zero carbon energy generation.
- Completion of Reading Borough Council's Sustainability Checklist.

3. Energy Conservation and Carbon Emissions

It is recognised that the generation of energy to heat, light and cool buildings is responsible for approximately half of the total CO₂ emissions of the UK. Part L of the Building Regulations requires a minimum standard of energy efficiency in new and refurbishment development, however, it is the intention with this development to go beyond this.

As a first step in dealing with carbon emissions arising from energy use within buildings it is important to consider designing in energy efficiency measures as part of the construction and refurbishment of the buildings as these can be difficult and/or disruptive to retrofit in the future and this will also reduce the amount of energy required by a building.

Reduction of heat loss is a key element of this and it is proposed that insulation within floors, roofs and walls will exceed the minimum standards required under Part L1 (Conservation of Fuel and Power) of the Building Regulations, as will the U-Values for replacement glazing and doors (within the context of permissions required under the Listed Building context).

Initial thoughts are to aim for U-values below minimum Part L compliance and these will be confirmed once detailed design commences, should planning permission and listed building consent be granted.

An air tight building will also play a major part in the reduction of heat loss via the external envelope and coupled with adequate ventilation to ensure internal air quality, is an important element in energy efficient building design. Accordingly, attention will be given to potential areas of air ingress, such as where services enter the residential unit and seals around window units.

The exact heating and hot water system for the proposed flats has yet to be finalised, however, current thought is to install high efficiency gas based heating in each flat, with full time and temperature zone controls for both heating and hot water delivery, meaning energy is only used as and when its required. Additional smart control systems such as a weather compensation unit may also be incorporated into the heating specification.

The use of passive solar design is important, but in this context will neither be improved or reduced as the orientation due to site constraints cannot be changed. Where artificial light is required, the focus will be on the provision of the energy efficient lighting systems as appropriate to locational requirements.

Finally, White Goods within the proposed flats attention will be paid to the energy specification of all electrical equipment to be installed within the flats.

The use of energy conscious design principles and a fabric first approach means that the building should remain energy efficient for its entire lifetime, within the context of the Listed status and the overall requirement for energy input is reduced for heating and hot water.

4. Low/Zero Carbon Energy Options

The following low / zero carbon energy technology options have been considered and assessed as part of the energy strategy for the development.

Solar Thermal for Domestic Hot Water

Domestic Hot Water (DHW) production can be generated via solar panel systems, with plate solar collectors widely used. Plate solar collectors have a highly transparent, virtually unbreakable polycarbonate cover, which has been treated to ensure long life. Behind this is the solar absorber, which is made of a metal sheet, covered with a black chromium oxide selective layer.

The solar heated water flows through a heat exchanger, warming the water stored in an internally mounted hot water cylinder. The hot water in the cylinder can then be used for domestic use as normal, with the main heat source providing backup heating when needed.

Whilst solar thermal hot water collectors can sometime have higher energy generation yields per m² than PV panels; for the development, it has been considered that greater advantage can be obtained using the roofs for PV generation rather than solar thermal.

This is due to the fact that heating and hot water production will be electrically generated, hence electrical energy savings are more advantageous. For this reason, PV is considered a better renewable technology.

Photovoltaic Panels

Photovoltaic (PV) cells convert the sun's light energy into electricity, which can be used to supplement the development's energy requirements. The most common types of PV cells available are polycrystalline silicon; monocrystalline silicon and amorphous silicon.

These silicon-based cells are electrically linked to form modules, which are then connected to DC to AC inverters to generate useful electricity for building use.

PV modules are rated by the power they generate in kilowatt-hours peak (kW_p).

Monocrystalline silicon panels are generally the most efficient type of panel with an efficiency of approximately 15% in good light conditions.

Solar Photovoltaic Panels are well suited for the development, as they provide electricity, which suit the demands of the site. There is also a significant south west facing pitched roof area providing un-shaded accessible space with potential to site a significant number of panels on the roofs of the buildings.

Ground Source Heat Pump

Ground Source Heat Pumps (GSHP's) use pipes which are buried within the ground to extract heat from the surrounding soil strata.

This heat can then be used for space heating: i.e. radiators, underfloor or warm air heating systems and also domestic hot water generation. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground is constantly being renewed naturally.

Heat from the ground is absorbed at low temperatures into a fluid inside a loop of pipe (a ground loop) buried underground. The fluid then passes through a compressor that raises it to a higher temperature, which can then heat water for heating and hot water circuits within the development.

The cooled ground-loop fluid passes back into the ground where it absorbs further energy in a continuous process as long as heating is required. Below a certain depth, the ground remains at a fairly constant temperature, so the heat pump can be used throughout the year.

Ground loops can either be horizontal (trenches) or vertical (boreholes), with the linear length of pipework being selected to match the heating needs of the development.

Due to the geotechnical demands of excavation and drilling of boreholes, GSHP systems can be significantly more costly than other heating systems.

Preliminary designs indicate that due to the restricted area of the site, and comparatively high capital cost of installing ground loops, it is considered GSHP is a viable LZC technology for this development.

Air Source Heat Pump

Air Source Heat Pumps (ASHP's) are similar to Ground Source Heat pumps with the main difference being that heat is absorbed from the external air instead of the ground. Air Source Heat Pumps come in two categories, either as 'air-to-air' or 'air-to-water' depending on whether the heat distribution system in the building uses air or water.

The main advantage of Air Source Heat pumps over Ground Source Heat Pumps is their lower capital installation cost, hence they are becoming widely used throughout the UK.

With water to water heat pumps, heat is absorbed from the external air via an externally located unit (evaporator). The internally located (condenser) unit then heats water where it is supplied to the building.

The main disadvantages of ASHP is the space needed for the external plant, plus potential noise nuisance caused by the fans within the external units.

At the development a reasonable space would be needed externally at ground level to site the external plant, with risers running through the building to incorporate interconnecting refrigerant pipework. This will pose a challenge Architecturally and acoustically.

5. Summary

In summary, this development demonstrates a strong commitment to sustainability, albeit within the confines of the site.

It incorporates many sustainable features that are consistent with achieving a high level of overall sustainability and, subject to confirmation of certain issues that can only be resolved post the granting of planning permission, will exceed the requirements of Part L and Part O of the building regulations

In short, given the nature of the scheme, along with the intentions outlined within this report, the proposed development is deemed to meet the levels of sustainability required by RBC.