



Energy and Sustainability Statement

384 Meadway, RG30 4NX

10th September 2018

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About *MES Building Solutions*

***MES Building Solutions* is an established consultancy practice specialising in providing building solutions throughout the UK.**

We offer a full range of services for both residential and commercial buildings from small individual properties through to highly complex mixed use developments.

We are an industry leader in delivering a professional, accredited and certified service to a wide range of clients including architects, developers, builders, housing associations, the public sector and private householders.

Employing highly qualified staff, our team comes from a variety of backgrounds within the construction industry with combined knowledge of building design, engineering, assessment, construction, development, research and surveying.

We are renowned for our creative thinking and provide a high quality, honest and diligent service.

MES Building Solutions maintains its position at the forefront of changes in planning, building regulations and neighbourly matters, as well as technological advances. Our clients, large or small are therefore assured of a cost effective, cohesive and fully integrated professional service.



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Section 1: Introduction

1.1 Executive Summary

To ensure compliance with Reading Borough Council 2008 (revised January 2015) Core Strategy a number of sustainable construction strategies will be incorporated in the design and construction of the development. These will include, amongst others, minimum standards relating to energy and water use which will reduce the developments environmental impact over its lifetime, which assists in ensuring a sustainable development for both current and future users.

To ensure compliance with Reading Borough Council 2008 (revised January 2015) Core Strategy Policy CS1 and CS2 the energy strategy proposed for the development at 384 Meadway, RG30 4NX follows the energy hierarchy and promotes a 'fabric first' approach. This ensures an energy efficient building that is not totally reliant on renewable generation to achieve a reduction in emissions. This approach results in an overall reduction in emissions (when compared to a Building Regulations baseline) of 3.08%.

The recommended LZC strategy specifies 4.8 m² of 11% efficient Polycrystalline PV to a South elevation, pitched at 20 degrees.

Table 1.a shows the reduction in tonnes of CO₂ and kWh per year through the recommended fabric improvements, energy efficiency measures and LZC technologies.

Table 1a: Total anticipated reduction in regulated emissions & energy use		
	kWh/year/m ²	Tonnes CO ₂ per year
Total Part L2A 'Baseline' annual figures	80.14	21.08
Unregulated energy figures	13.14	6.82
Total 'be lean, be clean' annual figures	79.48	20.61
Total 'be lean, be clean & be green' annual figures	79.03	20.43
Contribution from renewables	0.57%	0.87%
Total reduction over Baseline	1.39%	3.08%



1.2 Introduction

MES Building Solutions has been retained by CPL Chartered Architects to provide an energy statement in order to address the requirements of Reading Borough Council. The purpose of this Energy and Sustainability Statement is to establish the predicted energy requirements for the proposed development illustrating how energy efficiency measures in conjunction with renewable generation can be used to reduce the predicted energy consumption and associated carbon dioxide emissions.

This is achieved by following the energy hierarchy which includes:

- Calculation of baseline energy consumption & CO₂ emissions using SBEM calculations
- Implementation of the energy hierarchy (be lean, be clean, be green)
- Calculation of energy consumption & CO₂ emissions at each stage of energy hierarchy
- Calculation of final energy consumption & CO₂ emissions
- Calculation of reduction in emissions achieved
- Calculation of contribution from renewable generation

The report also addresses wider sustainability principles, looking at the following areas:

- Energy use
- Water conservation
- Materials selection
- Flood risk & surface water management
- Waste management
- Pollution mitigation
- Health & Wellbeing
- Construction & building management
- Site ecology



1.3 Planning Policy

London Plan (2016)

Policy 5.2-Minimising Carbon Dioxide Emissions

Planning decisions

- A. Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:
 - 1. Be lean: use less energy
 - 2. Be clean: supply energy efficiently
 - 3. Be green: use renewable energy
- B. The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016 and zero carbon non-residential buildings from 2019.
- C. Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.
- D. As a minimum, energy assessments should include the following details:
 - a. calculation of the energy demand and carbon dioxide emissions covered by Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations (see paragraph 5.22) at each stage of the energy hierarchy
 - b. proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services
 - c. proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power (CHP)
 - d. proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.



- E. The carbon dioxide reduction targets should be met on-site. Where it is clearly demonstrated that the specific targets cannot be fully achieved on-site, any shortfall may be provided off-site or through a cash in lieu contribution to the relevant borough to be ring fenced to secure delivery of carbon dioxide savings elsewhere.

Policy 5.3-Sustainable Design and Construction

Strategic

- A. The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime.

Planning decisions

- B. Development proposals should demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.
- C. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:
 - a. minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)
 - b. avoiding internal overheating and contributing to the urban heat island effect
 - c. efficient use of natural resources (including water), including making the most of natural systems both within and around buildings
 - d. minimising pollution (including noise, air and urban runoff)
 - e. minimising the generation of waste and maximising reuse or recycling
 - f. avoiding impacts from natural hazards (including flooding)
 - g. ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions
 - h. securing sustainable procurement of materials, using local supplies where feasible, and
 - i. promoting and protecting biodiversity and green infrastructure.



Policy 5.6-Decentralised Energy in Development Proposals

Planning decisions (Minor Developments)

- A. Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites.

Reading Core Strategy Policy CS1- Sustainable Construction and Design

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.

To meet these requirements:

- All new housing is required to meet the most up to date Eco-Homes 'Very Good' as a minimum standard, and all new commercial developments are required to meet the most up to date BREEAM 'Very Good' as a minimum standard;
- On larger developments of more than 10 dwellings or 1,000 m² of floor space, ensure that 50% of the provision meets the most up to date Eco-Homes and BREEAM 'Excellent' standards;
- All new developments maximise the use of energy efficiency and energy conservation measures in their design, layout and orientation to reduce overall energy demand;
- All developments of more than 10 dwellings or 1000m² floor space incorporate on-site generation of energy from renewable sources and energy efficient design measures (including the use of CHP where appropriate) to off-set at least 20% of predicted carbon dioxide emissions from the estimated energy usage of the completed and occupied development;
- All developments reduce mains water use and demonstrate that water conservation measures are incorporated so that predicted per capita consumption does not exceed the appropriate levels set out in the Code for Sustainable Homes or BREEAM Standards
- Developments incorporate sustainable urban drainage facilities and techniques as part of the layout of a development as appropriate and as advised by the Environment Agency, including minimising the size of impermeable areas so that peak run-off and annual water run-off is



reduced where possible and in any case is no greater than the original conditions of the site. Particular care will be needed in areas of flood risk where different solutions may be required.

Reading Core Strategy Policy CS2 – Waste Minimisation

Development should demonstrate measures to minimise the generation of waste in the construction, use and life of buildings and promote more sustainable approaches to waste management, including the reuse and recycling of construction waste and the promotion of layouts and designs that provide adequate space to facilitate waste storage, reuse, recycling and composting.

Reading Sites and Detailed Policies (Oct 2012) DM1 – 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:

- 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, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, etc;
- Use of trees and other planting, where appropriate as part of a landscape scheme, to provide shading of amenity areas, buildings and streets, designed with plants that are carefully selected, managed and adaptable to meet the predicted changed climatic conditions; and
- All development shall minimise the impact of surface water runoff from the development in the design of the drainage system.

Reading Sites and Detailed Policies (Oct 2012) DM2 – Decentralised Energy

In meeting the most up to date Ecohomes (including Code for Sustainable Homes for new build residential) or BREEAM standard, 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, including CHP.



Any development of more than 20 dwellings and/ or non-residential development of over 1,000 sq m shall consider the inclusion of a CHP plant, or biomass-fuelled heating scheme, or other form of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable or feasible for this form of energy provision.

Where there is existing decentralised energy provision, including a CHP plant or a district energy network present within the vicinity of an application site, further developments of over 10 dwellings or non-residential development of 1,000 sq m will be expected to link into the existing decentralised energy network or demonstrate why this is not feasible.

Reading Revised Sustainable Design and Construction SPD (July 2011)

	Size of development	Required Level of which standard
New build residential development (including flats)	Minor	CfSH Level 3
	Larger developments of more than 10 dwellings	Minimum 50% CfSH Level 4 and remainder with CfSH Level 3
Creation of new residential units through conversion and/ or major refurbishment of residential buildings	Minor	BREEAM (EcoHomes) level 'Very Good'.
	Larger developments of more than 1,000sqm non-residential floorspace	Minimum 50% BREEAM (EcoHomes) level 'Excellent' and remainder BREEAM level 'Very Good'.
Non-residential development	Minor	BREEAM level 'Very Good'.
	Larger developments of more than 1,000sqm non-residential floorspace	Minimum 50% BREEAM level 'Excellent' and remainder BREEAM level 'Very Good'.
Non-residential refurbishment	Minor	BREEAM level 'Very Good'.
	Larger developments of more than 1,000sqm non-residential floorspace.	Minimum 50% BREEAM level 'Excellent' and remainder BREEAM level 'Very Good'.

Table 1b: Reading Borough Council requirement checklist



Section 2: Description of development

2.1 Location

The development site is to be located at 384 Meadway, RG30 4NX. The surrounding area is predominantly residential with some commercial amenities to the North West on School Road.



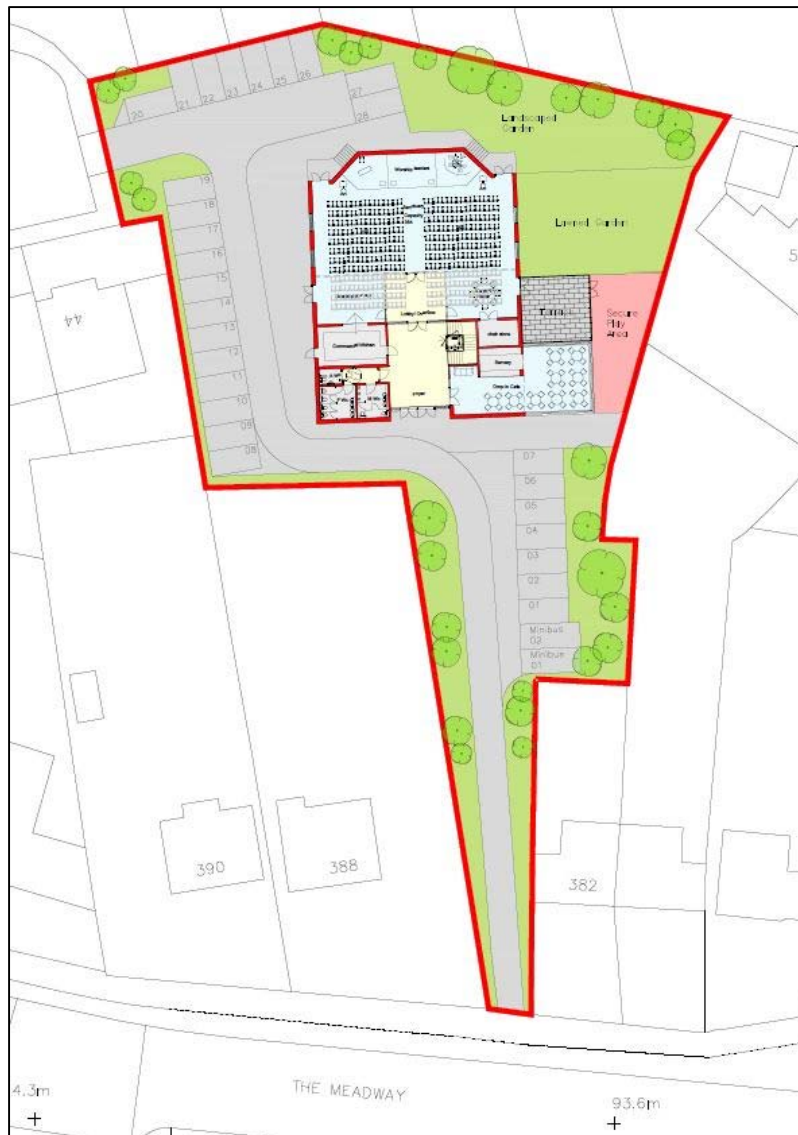
Site Location Plan

2.2 Details of development

The application is for the redevelopment of existing church site to provide enhanced facilities and seating for up to 400.

In line with the guidelines listed in Table 1b this is to be considered a minor development.



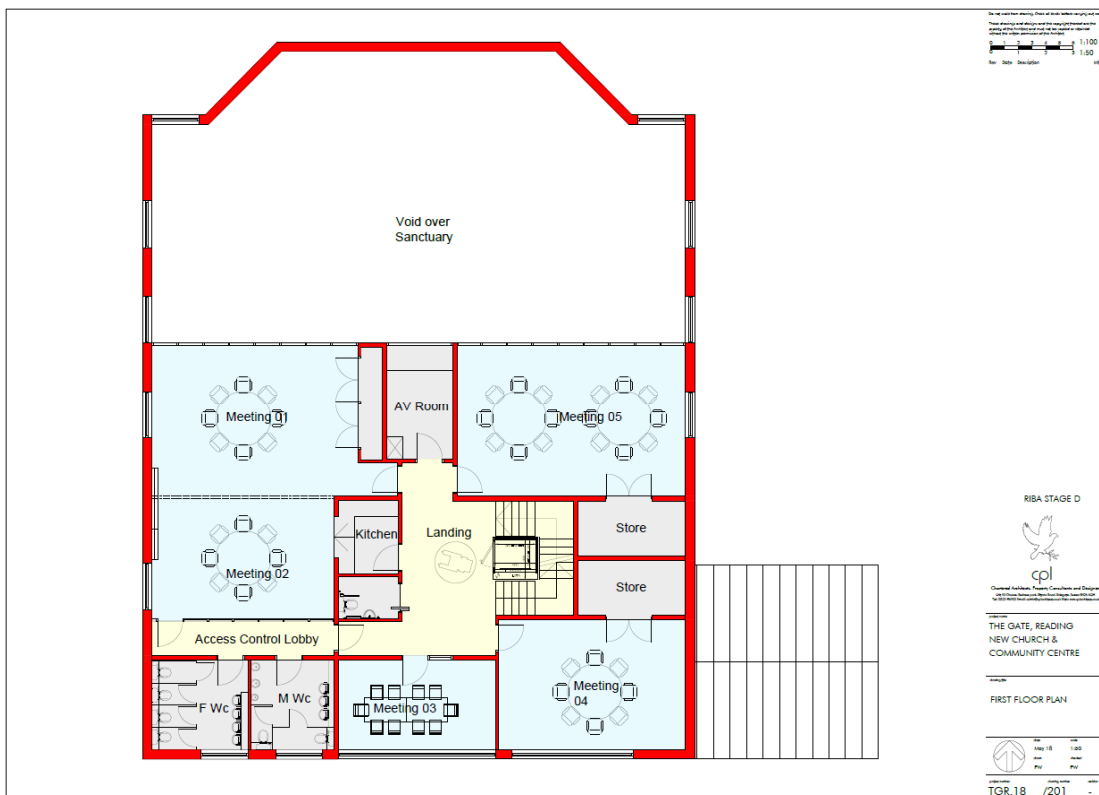
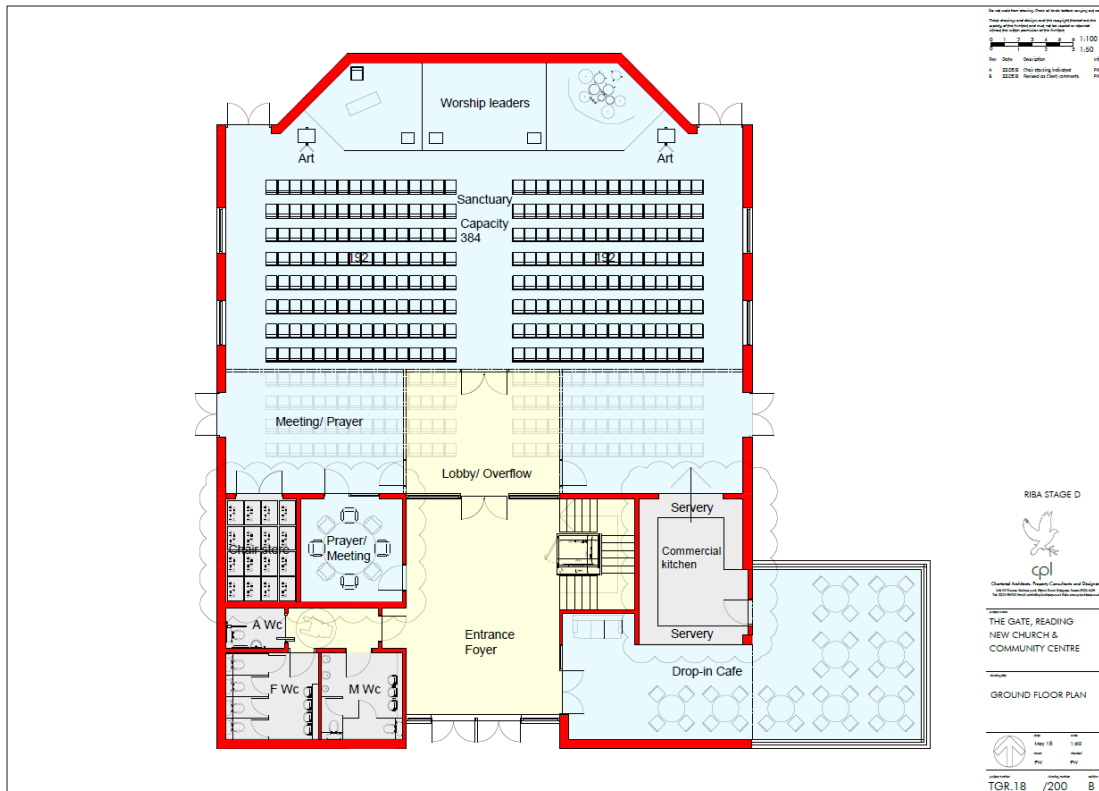


Proposed Site Plan (CPL Chartered Architects)



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384 Meadway, RG30 4NX





Proposed Ground, First Floor and Second Floor Plans (CPL Chartered Architects)



Proposed Elevations (CPL Chartered Architects)



Section 3: Energy

3.1 The Energy Hierarchy

The energy hierarchy is generally accepted as the most effective way of reducing building carbon emissions. This is highlighted and recognised in the 2016 edition of the London Plan in the Mayor's energy hierarchy;

1. Be lean: use less energy
2. Be clean: supply energy efficiently
3. Be green: use renewable energy

Development proposals should:

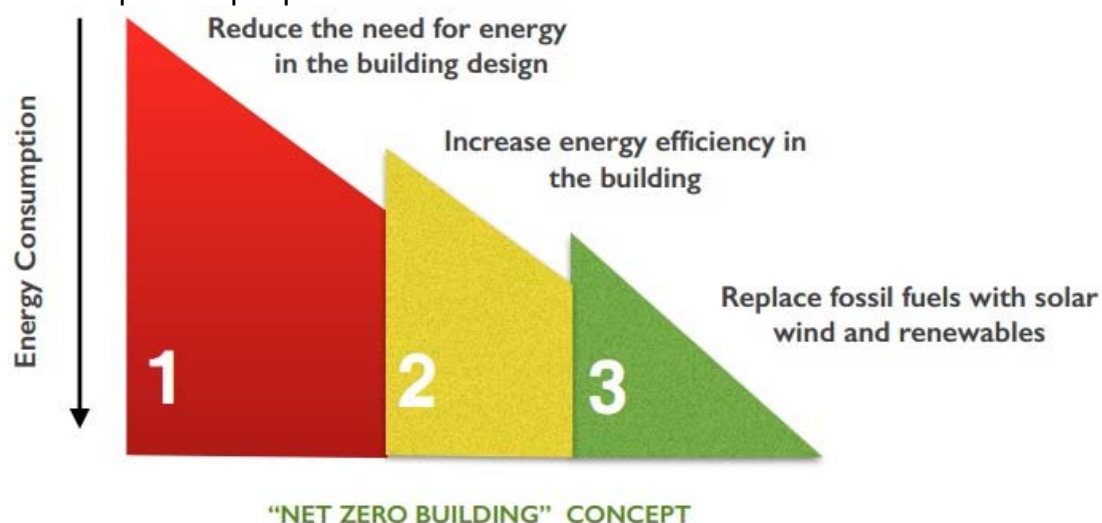


Figure 3.1: The Energy Hierarchy

- **Reducing energy demand**

The first step in the process of reducing the overall energy used and CO₂ produced by the building is to minimise the energy required to heat it. A well-insulated building envelope and passive design will reduce the energy requirement for heating and ventilating the building.

- **Energy efficient systems**

The second step is to specify services and controls, lighting and appliances that are energy efficient and which result in further reduction in energy requirements.

- **Making use of Low or zero-carbon (LZC) technologies**

When the energy demand has been reduced by implementing the processes of improving the fabric and energy efficiency, then LZC technologies can be employed to reduce the environmental impact of the remaining energy consumption.

3.2 Calculating Baseline Energy Demand

The first step is to calculate a Building Regulations Part L2A 2013 compliant specification in order to establish baseline emissions for the development. Calculated data using the government's approved methodology (SBEM 2013) has been used to establish baseline energy requirements which comply with the 2013 edition of Part L minimum elemental standards.

These have then been used to produce a BRUKL Output Document for the whole development with the correct number of zones assigned to each category.

Element	Baseline Specification
Walls	0.30W/m ² K
Roof	0.18W/m ² K
Heat loss Floors	0.25W/m ² K
Glazing	2.20W/m ² K
Space Heating	91% efficient Gas LPHW Underfloor
DHW	Delivery 95%
Ventilation	As above
Lighting	65 Lm/W
Controls	Manual On/Off
LZC Technology	None
Air tightness	15m ³ /hr/m ²
Electrical Power Factor	<0.9

Table 3a: Baseline specification

The baseline emissions and energy consumption figures are produced by the Part L2A 'notional' building calculations taken from the IES software modelling. The combined results are shown in table 3b below:

3b: Total Annual Part L Baseline Regulated Emissions & Fabric Energy Efficiency	
Emissions	22.8 kgCO ₂ /m ² /yr
Energy	80.14 kWh/m ² /yr



The strategic aim is to reduce carbon emissions overall, so that while planning decisions and monitoring requirements will be underpinned by the targets expressed above, the requirement for energy assessments to include separate details of unregulated emissions is to recognise explicitly the additional contribution that can be made through use of efficient equipment, building controls and good management practices, including green leases. Unregulated emissions are therefore included in the calculations, but are not taken into account when calculating percentage improvement.



3.3 Emission Reduction Targets (Be Lean and Be Clean)

The first two steps of the Mayor's energy hierarchy look at reducing energy consumption in the building through improvements to its fabric and by increasing the efficiency of the building services. This reduces the energy required to run the building and thus the emissions associated with that energy use.

The current 2013 Part L2A is already very stringent in terms of fabric performance targets. The fabric specification used in the 'notional building' (used to calculate the target emission rate) can be difficult to achieve in reality and further opportunities for improvement to the building fabric and services beyond those which meet the current 2013 Building Regulations requirements can be very limited when compared with those which may be expected from buildings constructed to earlier versions of the Regulations, but further improvements are possible by considering the following steps:

- Reduce elemental U-Values
- Reducing heat loss through uncontrolled ventilation (air leakage)
- Increased control of necessary ventilation
- Improving mechanical & electrical system efficiency
- Increasing control over mechanical & electrical systems.

Element	Be Lean and Be Clean Specification
Walls	0.22W/m ² K
Roof	0.14W/m ² K
Heat loss Floors	0.18W/m ² K
Glazing	1.6W/m ² K
Space Heating	96% efficient Gas LPHW Under Floor
DHW	Delivery 95%
Ventilation	Mech Ext – WCs, Meeting Rms, Sanctuary, Café & Foyer
Lighting	85 Lm/W
Controls	Manual ON/Off
LZC Technology	None
Air tightness	10.0m ³ /hr/m ²
Electrical Power Factor	>0.95

Table 3c: Be Lean and Be Clean specification



The improved Be Lean and Be Clean emissions and energy consumption figures produced by the Part L2A 'notional' building calculations taken from the IES software modelling are shown in table 3d below:

3d: Total Annual Part L Be Lean and Be Clean Regulated Emissions & Fabric Energy Efficiency	
Emissions	22.3 kgCO₂/m²/yr
Energy	79.48 kWh/m²/yr



3.4 Communal Heating and CHP

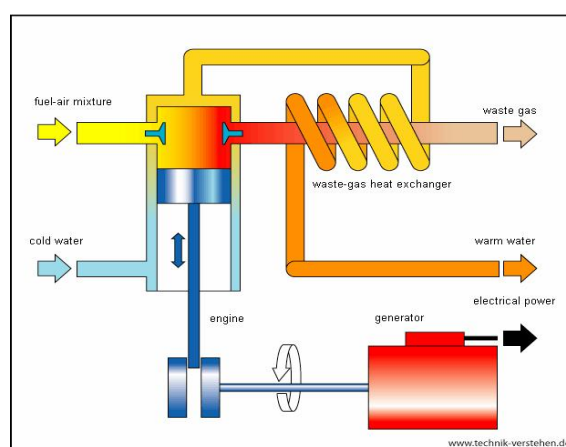
Communal heating scheme

The benefit of communal heating systems becomes questionable for small scale installation. Additional space is required for centralised plant rooms and ducting/pipework. The increased cost and complexity of such systems is not offset by the minimal performance improvement that may be achieved and given this; communal heating is not proposed for the development.

Combined heat & power (CHP)

Combined heat and power uses an electricity generator, generally a gas powered internal combustion engine, with heat recovery on the exhaust used to heat water for heating and domestic hot water supply.

The proportions of heat and electricity produced are normally in the region of 65:35. This requires a constant heat load throughout the year for the system to perform efficiently.



For CHP to be viable on commercial developments a high hot water demand is usually required in order to generate sufficient heating baseload. As this is not the case on this occasion CHP is not viable for consideration.



3.5 CO₂ reduction through the use of renewable or low carbon technology (Be green)

Reading Core Strategy Policy CS1 aims to promote and secure greater use of decentralised and renewable or low-carbon energy in new development. This is however no minimum target for renewable energy provision on minor non-residential developments of less than 1,000m².

3e: Target contribution from low carbon & renewable technologies	
Total 'baseline' Part L 2013 compliant CO ₂ emissions (Tonnes CO ₂ per year)	21.08
Total 'be lean, be clean' Part L 2013 compliant CO ₂ emissions (Tonnes CO ₂ per year)	20.61
Contribution from renewables (Tonnes CO ₂ per year)	0.18
Total reduction over Baseline (Tonnes CO ₂ per year)	20.43

Energy resources accepted as renewable or low carbon technologies are defined by the Department of Energy and Climate Change Low Carbon Buildings Program as:

- Solar photovoltaics
- Wind turbines
- Small hydro
- Solar thermal hot water
- Ground source heat pumps
- Air source heat pumps
- Bio-energy
- Renewable CHP
- Micro CHP (Combined heat and power)

The proposal is to install 4.8 m² of 11% efficient Polycrystalline PV to a South elevation, pitched at 20 degrees. This strategy will save approximately 1,026 kWh/yr of electricity whilst offsetting 0.65 tonnes of CO₂ across the development.

The final specification for the scheme is shown below in table 3f with the results shown in tables 3g.



Element	Be Lean, Be Clean and Be Green Specification
Walls	0.22W/m ² K
Roof	0.14W/m ² K
Heat loss Floors	0.18W/m ² K
Glazing	1.6W/m ² K
Space Heating	96% efficient Gas LPHW Under Floor
DHW	Delivery 95%
Ventilation	Mech Ext – WCs, Meeting Rms, Sanctuary, Café & Foyer
Lighting	85 Lm/W
Controls	Manual On/Off
LZC Technology	4.8 m ² of 11% efficient Polycrystalline PV
Air tightness	10.0m ³ /hr/m ²
Electrical Power Factor	>0.95

Table 3f: Be Lean, Be Clean and Be Green specification

3g: Contribution from PV & total improvement over Part L	
Total Baseline Emissions (Tonnes CO ₂ /yr)	21.08
Total compliant Be Lean & Be Clean Emissions (Tonnes CO ₂ /yr)	20.61
Contribution from renewables (Tonnes CO ₂ /yr)	0.18
Total compliant Be Green Emissions (Tonnes CO ₂ /yr)	20.43
Percentage reduction achieved from renewables	0.87%
Total improvement over baseline (%)	3.08%



Solar Photovoltaics

Solar panel electricity systems, also known as solar photovoltaics (PV), capture the sun's energy using photovoltaic cells. These cells do not need direct sunlight to work – they can still generate some electricity on a cloudy day. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting. When excess power is generated this can be sold back to the grid.



This technology has been chosen for this site.

Wind Turbines

Wind turbines harness the power of the wind and use it to generate electricity. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines. Urban sites such as the location of this development are generally unsuitable for wind turbine installations due to the interrupted turbulent wind flows caused by surrounding buildings and large obstacles. There are also possible issues with noise and 'flicker' for the neighbouring buildings.



The urban nature of the site and lack of space mean that a wind turbine cannot be recommended as a viable option for this development. There are also general issues surrounding the use of building mounted turbines with the potential for excessive noise and vibration within the building and the effect of flicker on surrounding buildings and amenity spaces.

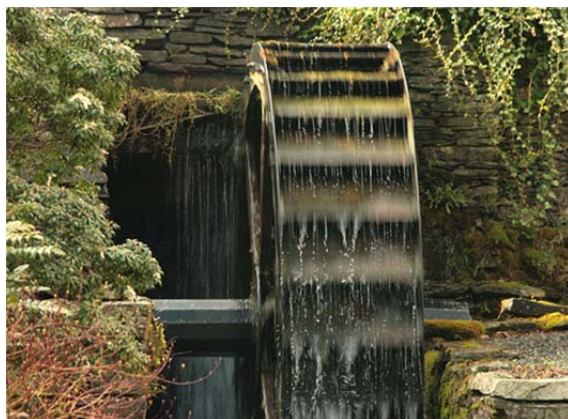
Table 3j: Average wind speeds for the site RG30 4NX

45m above ground level	6.1m/s
25m above ground level	5.6m/s
10m above ground level	4.8m/s



Small Hydro Generation

Hydroelectricity generation uses running water to generate electricity, whether it is a small stream or a larger river. All streams and rivers flow downhill. Before the water flows down the hill, it has potential energy because of its height. Hydro power systems convert this potential energy into kinetic energy in a turbine, which drives a generator to produce electricity. Small, or 'micro' hydro generation requires a reliable source of flowing water with a reasonably constant flow velocity. Systems of this nature are normally installed in locations with a natural moving water source such as a river, stream or spring where part of the flow can be diverted through a generator.



There is no such source of flowing water in this case and small hydro generation is not an option for this development.

Solar Water heating



Solar water heating systems use free heat from the sun to warm domestic hot water. Solar hot water heating can generate a large proportion of a dwelling's annual DHW requirement. The displaced fuel would be mains gas meaning that the CO₂ savings of this type of system would be relatively low due to the low carbon intensity of the displaced fuel. Add to this the fact that only a small proportion of the development could benefit from solar thermal and consequently it is not considered to be a suitable system for this development as the roof space would be better used for PV.



Heat Pumps

Heat pumps use similar technology as refrigerators but reversed. A refrigerant liquid is used as a medium to extract heat from a source and convert it into useful heat energy. The heat source used can be generally one of three types; the ground, the air or a body of water. Both ground and water sourced heat pumps use a long circuitous pipe through which a refrigerant is pumped. In ground sourced heat pumps this can be either a coiled pipe or 'slinky' that is buried in a series of horizontal trenches or a loop inside a vertical bore hole to depths that can be up to 200m or deeper. Water sourced heat pumps generally use a similar system to the 'slinky' used for ground sourced systems but either floated on or submerged in a body of water (either a large pool or running water source). Air source heat pumps have a refrigerant coil mounted outside the building through which is passed air so that heat can be extracted. All three types of heat pump generally use the collected heat from the source to heat water. The heated water can then be used for space heating and DHW. Heat pumps require an input of energy to drive pumps, this is usually electricity and so they cannot be considered to be zero carbon unless the supplied electricity is from renewable sources; they do however have very good efficiencies; energy produced by heat pumps is typically in the region of 2.5 times that which is required to run them, giving efficiencies of 250%.



Bio Energy

The Low Carbon Buildings Program (LCBP) defines biomass as follows:

"Biomass is often called 'bioenergy' or 'biofuels'. These biofuels are produced from organic materials, either directly from plants or indirectly from industrial, commercial, domestic or agricultural products. Biofuels fall into two main categories:

- *Woody biomass includes forest products, untreated wood products, energy crops, short rotation coppice (SRC), e.g. willow.*



- *Non-woody biomass includes animal waste, industrial and biodegradable municipal products from food processing and high energy crops, e.g. rape, sugar cane, maize."*

For small-scale domestic [and small scale commercial] applications of biomass the fuel usually takes the form of wood pellets, wood chips and logs. The LCBP goes on to state:

"There are two main ways of using biomass to heat a domestic property:

- *Stand-alone stoves providing space heating for a single room. These can be fuelled by logs or pellets but only pellets are suitable for automatic feed. Generally they are 5-11 kW in output, and some models can be fitted with a back boiler to provide water heating.*
- *Boilers connected to central heating and hot water systems. These are suitable for pellets, logs or chips, and are generally larger than 15 kW"*

(<http://www.lowcarbonbuildings.org.uk/micro/biomass>)

This technology is dismissed as the space requirements needed for the boiler and pellet store make this impractical along with complying with the clean air zone requirements.



Section 4: Sustainability

The proposed development is required to achieve BREEAM certification as required by planning policy. The BREEAM assessment has been undertaken and will be submitted in a separate report.

Sustainable Design and Construction requires development to demonstrate that sustainable design standards are integral to the proposal, including its construction and operation, and ensure that they are considered at the beginning of the design process.

The design addresses issues regarding sustainability in a number of areas:

4.1 Management

Sustainability Objective:

To use sustainable construction methods and encourage best practice in building delivery.

Consultation between the stakeholders, including the architect, client and local authority has ensured that all key design needs have been met.

Best practice will be used during construction so as to reduce the impact of works on the surrounding environment and a commitment will be made to register the site with the Considerate Contractors Scheme.

The construction site will be managed so as to reduce resource use, energy for site operations, water consumption, waste and pollution. A system of monitoring, target setting and reporting will be put in place to ensure standards are met.

A system of commissioning will be instigated by the design team to ensure that all installed M&E plant is fully commissioned on installation and that this is followed up by further seasonal commissioning of heating and cooling systems for at least the first 12 months after completion.

Building user guides will be provided to building end users if requested to ensure they are provided with adequate information to enable effective use of the building and its systems. These will be tailored for both building managers and occupiers to ensure all building users fully understand the buildings operation so as to encourage efficient use. A programme of aftercare support will be implemented upon handover.



4.2 Health & Wellbeing

Sustainability Objective:

To provide comfortable working and living spaces that promotes a healthy environment and which is adaptable to changing needs.

Health and wellbeing considers the environment provided for building users and how this promotes healthy happy lives.

The internal spaces are designed and orientated wherever possible in such a way as to provide natural daylight, sunlight and external views to occupied spaces thus adding to the internal environment.

Finishing elements will be chosen which do not contain harmful chemicals such as VOCs and formaldehyde.

Every practical effort will be made to minimise sound transmission to the external environment. The measures employed will aim to go beyond current Building Regulation standards for minimising sound transmission wherever practical.

The internal spaces have been designed to be adaptable and accessible in order to accommodate occupiers changing needs over time.

4.3 Energy

Sustainability Objective:

To ensure that the development is energy efficient in order to reduce running costs while maximising internal comfort for the building occupiers and ensure the emission of climate change gasses is minimised.

Section 3 details the energy strategy proposed for the building. A number of other areas are addressed below thus reducing energy consumption with an aim to reduce running costs and lifecycle carbon emissions.

Smart meters can be requested from the energy supplier so that the electricity and gas use can be monitored by occupants. Visual displays providing this information encourage energy efficiency and reduce running costs.

External lighting will use low energy fittings where appropriate with adequate controls such as timers, daylight sensors and movement sensors.



4.4 Transport

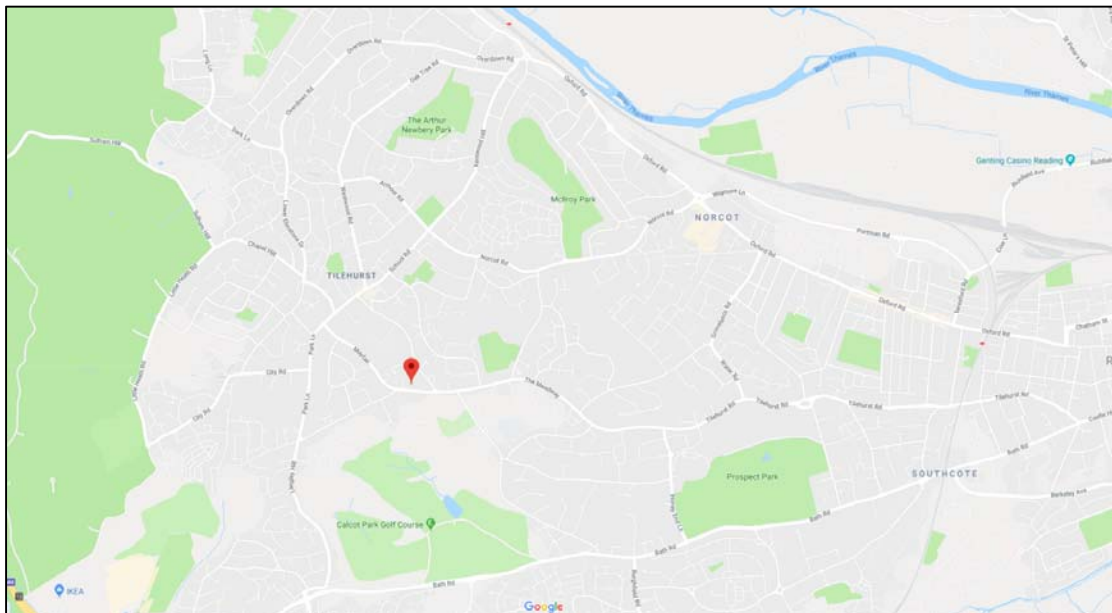
Sustainability Objective:

To reduce pollution and congestion levels. To encourage walking, cycling and the use of public transport.

As around 30% of UK energy use is associated with transport. Developments of this nature that can encourage a reduction in car use have a positive impact on the environment both through a reduced reliance on precious fossil fuel resources and a reduction in harmful emissions.

The central location of the development means that it is close to local amenities and has excellent public transport links, with regular bus services on The Meadway with Reading West and Tilehurst Railway Station within two miles of the site.

Twenty secure cycle storage will be provided for building users while parking will be limited to 28 spaces, including two minibus parking bays, in order to encourage car sharing, along with more sustainable transport options. Safe pedestrian routes will further encourage walking and the use of public transport.



4.5 Water Use

Sustainability Objective:

*Conserve water through efficiency measures and recycling.
Mitigating against increases in flood risk due to reduction in permeable areas and climate change.*

Clean water is a precious resource and efforts to be efficient in its use and minimise waste are of ever growing importance.

The following example specification demonstrates how a target of 105litres per person per day can be achieved without requiring rainwater or greywater harvesting, however, the BREEAM requirement will dictate the minimum standards to be set for sanitary fittings. In addition, measures will be taken to minimise the risks of leaks and identify them when they do occur.

Maximum design flow rates & capacities:

Taps (other than kitchen taps)	5.00(litres/min)
Kitchen and Utility Taps	7.00(litres/min)
Showers	7.00(litres/min)
Baths (with shower over)	170(litres to overflow)
WCs (Flush Volume)	Full Flush: 6.00(litres)
	Part Flush: 4.00(litres)
Washing Machine (Where specified)	8.17(litres/kg dry load)
Dishwasher (Where Specified)	1.25(litres/place setting)

4.6 Materials

Sustainability Objective:

To reduce the impact of construction on natural resources by using sustainable, legally sourced product.

Building materials have a significant impact when the embodied energy and resources used in their manufacture, transport and disposal are considered. Responsible sourcing of materials can have a real beneficial effect on the embodied impact of the final development. Part of the building will be of a timber construction with further investigation into offsite manufacture.

All relevant materials in basic and finishing elements will be responsibly and legally sourced from certified suppliers using sustainable raw materials where possible.

Wherever possible reused and recycled materials will be sourced.

All materials will be sourced from local suppliers where possible to reduce transport miles and support the local supply chain.

Materials containing chemicals which are harmful to health or the environment will be avoided wherever possible.

4.7 Waste Management

Sustainability Objective:

To reduce waste going to landfill through material efficiency, recycling and sustainable construction methods.

A key part of sustainability is to manage resources efficiently. Reducing the amount of waste created and maximising resource efficiency during demolition, construction and during the building's lifetime is fundamental to providing sustainable developments.

Efforts to reduce construction waste generally will concentrate on reducing site waste together with increasing reuse and recycling of waste that cannot be avoided in an effort to reduce volumes going to landfill. This can be implemented through a Site Waste Management Plan.

Adequate facilities will be provided for the storage and recycling of waste and recycling and this in conjunction with the adoption of the Local Authority collection scheme for waste and recycling will encourage occupants to minimise waste going to landfill.



4.8 Land Use & Ecology

Sustainability Objective:

*To protect, maintain and enhance existing biodiversity and habitats.
To create new habitats to add value to the landscape in order to improve the urban environment.*

This is an urban location with an existing community use and as such it is assessed to have limited ecological value any undertaking to improve upon this will have a positive ecological impact.

The nature of the development means there is opportunity to improve the ecology and introduce improved areas of planting. Efforts will be made to protect any existing urban habitats while encouraging new ones.

4.9 Pollution

Sustainability Objective:

To reduce the environmental impact of atmospheric, watercourse, noise and sound pollution.

There are a variety of forms of environmental pollution that can potentially arise from the construction and use of buildings. A significant proportion is airborne in the form of dust, fumes and chemicals. Other forms of pollution include unwanted noise or light.

Best practice will be used during the construction phase to ensure that environmental pollution due to construction work will be minimised. Any waste that is generated will be taken to, and processed by a local recycling centre.

Efforts will be made to ensure the environmental impact of the materials used for the build will be reduced through responsible sourcing and reduced wastage.

The use of materials where the manufacture or installation requires the use of harmful global warming chemicals will be avoided.

Initial investigations of the Environment Agency Flood Map suggest that the site is inside Zone 1 with a low risk of flooding.

We have assumed that this development will cause no increase in surface water run-off. There is an opportunity to reduce the amount of impermeable area by incorporating permeable paving around the building and this should have the effect of reducing run-off from the site post development.



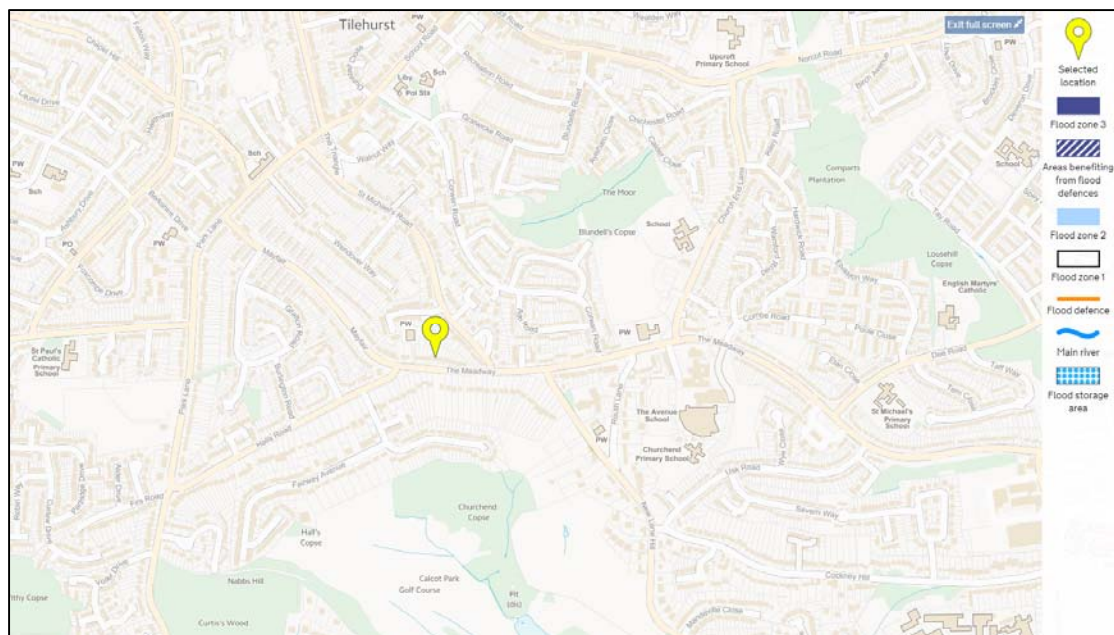


Figure 4.1: Environment Agency Flood Map for RG30 4NX.



Section 5: Summary

To ensure compliance with Reading Borough Council 2008 (revised January 2015) Core Strategy a number of sustainable construction strategies will be incorporated in the design and construction of the development. These will include, amongst others, minimum standards relating to energy and water use which will reduce the developments environmental impact over its lifetime which assists in ensuring a sustainable development for both current and future users.

To ensure compliance with Reading Borough Council 2008 (revised January 2015) Core Strategy Policy CS1 and CS2 the energy strategy proposed for the development at 384 Meadway, RG30 4NX follows the energy hierarchy and promotes a 'fabric first' approach. This ensures an energy efficient building that is not totally reliant on renewable generation to achieve a reduction in emissions. This approach results in an overall reduction in emissions (when compared to a Building Regulations baseline) of 3.08%.

The recommended LZC strategy specifies 4.8 m² of 11% efficient Polycrystalline PV to a South elevation, pitched at 20 degrees.

Table 5.a shows the reduction in tonnes of CO₂ and kWh per year through the recommended fabric improvements, energy efficiency measures and LZC technologies.

Table 5.a: Total anticipated reduction in regulated emissions & energy use		
	kWh/year/m ²	Tonnes CO ₂ per year
Total Part L2A 'Baseline' annual figures	80.14	21.08
Unregulated energy figures	13.14	6.82
Total 'be lean, be clean' annual figures	79.48	20.61
Total 'be lean, be clean & be green' annual figures	79.03	20.43
Contribution from renewables	0.57%	0.87%
Total reduction over Baseline	1.39%	3.08%

The proposed strategy offsets a total of 0.65 tonnes CO₂ per year, a reduction of 3.08%. The proposal reduces the energy demand by 1.39% which ensures a sustainable development for now and the future.



This development fully complies with National and Local Policy along with meeting all adopted policy and also delivering a sustainable scheme in all aspects through a fabric first holistic approach.

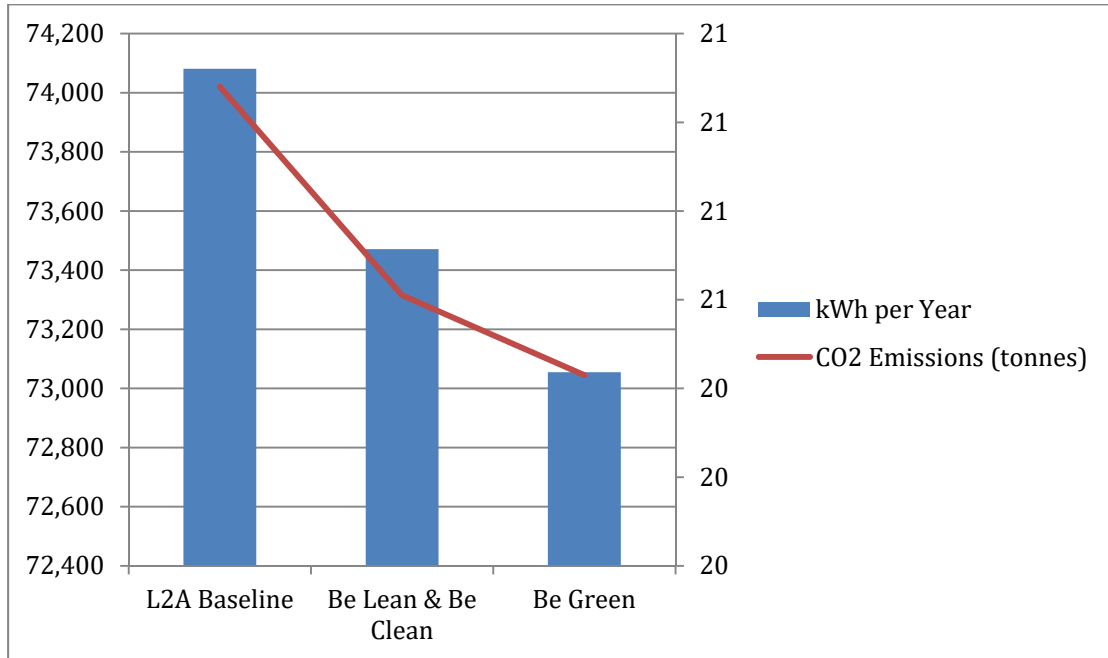


Figure 5.1: CO₂ emissions for each stage of the assessment



Appendix



mes
building solutions
Part of the **FOCUS** consultancy group

Project name

384 The Meadway

As designed

Date: Thu Sep 13 16:53:55 2018

Administrative information

Building Details

Address: Tilehurst, READING, RG30 4NX

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name: RCC Fundraising & Building Oversight Group

Telephone number: ---

Address: ---, ---, ---

Certifier details

Name: MES Building Solutions

Telephone number: 01636 653055

Address: Newark Beacon, Cafferata Way, NEWARK, NG24 2TN

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	22.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	22.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	22.1
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.22	0.22	RM000008:Surf[1]
Floor	0.25	0.18	0.18	RM000008:Surf[0]
Roof	0.25	0.14	0.14	VR000001:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	RM000021:Surf[0]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	10

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- b) LTHW NG UF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	0.2	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- a) LTHW NG UF Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	0.2	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
A WC		-	85	-	30
A WC		-	85	-	27
A WC		-	85	-	30
Art Studio		85	-	-	247
AV Room		85	-	-	108
Chair Store		85	-	-	14
Circulation		-	85	-	83
Commercial Kitchen		-	85	-	228
Drop in Cafe		-	85	-	203
Entrance Foyer		-	85	-	107
Kitchen		-	85	-	98
Landing		-	85	-	39
Lobby/ Overflow		-	85	-	56
Meeting 01		-	85	-	255
Meeting 02		-	85	-	265
Meeting 02		-	85	-	176
Meeting 03		-	85	-	126
Meeting 04		-	85	-	191
Meeting/Prayer		-	85	-	190
Meeting/Prayer		-	85	-	193

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Open Plan Office		85	-	-	209
Prayer/ Meeting		-	85	-	109
Prayer/ Meeting Room		-	85	-	117
Sanctuary		-	85	-	1118
Stairs		-	85	-	33
Stairs		-	85	-	24
Stairs		-	85	-	59
Store		85	-	-	10
Store Room		85	-	-	6
WC's		-	85	-	95
WC's		-	85	-	93
Yinka's Office		85	-	-	159
Youth Office		85	-	-	102

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Art Studio	NO (-67.2%)	NO
AV Room	N/A	N/A
Drop in Cafe	NO (-23.2%)	NO
Meeting 01	NO (-87.4%)	NO
Meeting 02	NO (-86.9%)	NO
Meeting 02	NO (-81.6%)	NO
Meeting 03	NO (-61.4%)	NO
Meeting 04	NO (-70.6%)	NO
Meeting/Prayer	NO (-54.7%)	NO
Meeting/Prayer	NO (-49.1%)	NO
Open Plan Office	NO (-59.8%)	NO
Prayer/ Meeting	N/A	N/A
Prayer/ Meeting Room	NO (-66.7%)	NO
Sanctuary	NO (-47.5%)	NO
Yinka's Office	NO (-39.8%)	NO
Youth Office	NO (-68.2%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	924.4	924.4
External area [m ²]	1700.4	1700.4
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	10	3
Average conductance [W/K]	553.34	698.43
Average U-value [W/m ² K]	0.33	0.41
Alpha value* [%]	10.73	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services
A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
B1 Offices and Workshop businesses
B2 to B7 General Industrial and Special Industrial Groups
B8 Storage or Distribution
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
C2 Residential Institutions: Universities and colleges
C2A Secure Residential Institutions
Residential spaces

100 D1 Non-residential Institutions: Community/Day Centre

D1 Non-residential Institutions: Libraries, Museums, and Galleries
D1 Non-residential Institutions: Education
D1 Non-residential Institutions: Primary Health Care Building
D1 Non-residential Institutions: Crown and County Courts
D2 General Assembly and Leisure, Night Clubs, and Theatres
Others: Passenger terminals
Others: Emergency services
Others: Miscellaneous 24hr activities
Others: Car Parks 24 hrs
Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	43.54	43
Cooling	0	0
Auxiliary	4.65	6.15
Lighting	13.08	12.73
Hot water	18.21	18.25
Equipment*	13.14	13.14
TOTAL**	79.48	80.14

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0.45	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	134.26	133.45
Primary energy* [kWh/m ²]	128.4	131.26
Total emissions [kg/m ²]	22.1	22.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	116	0	37.6	0	1	0.86	0	0.96	0
Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	141.6	0	45.9	0	6.1	0.86	0	0.96	0
Notional	102.2	0	32.9	0	1	0.86	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	146.1	0	47.1	0	8.2	0.86	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.22	RM000008:Surf[1]
Floor	0.2	0.18	RM000008:Surf[0]
Roof	0.15	0.14	VR000001:Surf[1]
Windows, roof windows, and rooflights	1.5	1.6	RM000021:Surf[0]
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	10

Project name

384 The Meadway - no PV**As designed**

Date: Thu Sep 13 16:42:29 2018

Administrative information

Building Details

Address: Tilehurst, READING, RG30 4NX

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.10

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.10

BRUKL compliance check version: v5.4.b.0

Owner Details

Name: RCC Fundraising & Building Oversight Group

Telephone number: ---

Address: ---, ---, ---

Certifier details

Name: MES Building Solutions

Telephone number: 01636 653055

Address: Newark Beacon, Cafferata Way, NEWARK, NG24 2TN

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	22.8
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	22.8
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	22.3
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

Criterion 2: The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Values which do not achieve the standards in the Non-Domestic Building Services Compliance Guide and Part L are displayed in red.

Building fabric

Element	U _a -Limit	U _a -Calc	U _i -Calc	Surface where the maximum value occurs*
Wall**	0.35	0.22	0.22	RM000008:Surf[1]
Floor	0.25	0.18	0.18	RM000008:Surf[0]
Roof	0.25	0.14	0.14	VR000001:Surf[1]
Windows***, roof windows, and rooflights	2.2	1.6	1.6	RM000021:Surf[0]
Personnel doors	2.2	-	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	-	No Vehicle access doors in building
High usage entrance doors	3.5	-	-	No High usage entrance doors in building

U_a-Limit = Limiting area-weighted average U-values [W/(m²K)]U_a-Calc = Calculated area-weighted average U-values [W/(m²K)]U_i-Calc = Calculated maximum individual element U-values [W/(m²K)]

* There might be more than one surface where the maximum U-value occurs.

** Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

*** Display windows and similar glazing are excluded from the U-value check.

N.B.: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air Permeability	Worst acceptable standard	This building
m ³ /(h.m ²) at 50 Pa	10	10

Building services

The standard values listed below are minimum values for efficiencies and maximum values for SFPs. Refer to the Non-Domestic Building Services Compliance Guide for details.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	>0.95

1- b) LTHW NG UF Mech Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	0.2	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

2- a) LTHW NG UF Nat Vent

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.96	-	0.2	0	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO
* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.					

"No HWS in project, or hot water is provided by HVAC system"

"No zones in project where local mechanical ventilation, exhaust, or terminal unit is applicable"

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
A WC		-	85	-	30
A WC		-	85	-	27
A WC		-	85	-	30
Art Studio		85	-	-	247
AV Room		85	-	-	108
Chair Store		85	-	-	14
Circulation		-	85	-	83
Commercial Kitchen		-	85	-	228
Drop in Cafe		-	85	-	203
Entrance Foyer		-	85	-	107
Kitchen		-	85	-	98
Landing		-	85	-	39
Lobby/ Overflow		-	85	-	56
Meeting 01		-	85	-	255
Meeting 02		-	85	-	265
Meeting 02		-	85	-	176
Meeting 03		-	85	-	126
Meeting 04		-	85	-	191
Meeting/Prayer		-	85	-	190
Meeting/Prayer		-	85	-	193

General lighting and display lighting		Luminous efficacy [lm/W]			General lighting [W]
Zone name		Luminaire	Lamp	Display lamp	
	Standard value	60	60	22	
Open Plan Office		85	-	-	209
Prayer/ Meeting		-	85	-	109
Prayer/ Meeting Room		-	85	-	117
Sanctuary		-	85	-	1118
Stairs		-	85	-	33
Stairs		-	85	-	24
Stairs		-	85	-	59
Store		85	-	-	10
Store Room		85	-	-	6
WC's		-	85	-	95
WC's		-	85	-	93
Yinka's Office		85	-	-	159
Youth Office		85	-	-	102

Criterion 3: The spaces in the building should have appropriate passive control measures to limit solar gains

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Art Studio	NO (-67.2%)	NO
AV Room	N/A	N/A
Drop in Cafe	NO (-23.2%)	NO
Meeting 01	NO (-87.4%)	NO
Meeting 02	NO (-86.9%)	NO
Meeting 02	NO (-81.6%)	NO
Meeting 03	NO (-61.4%)	NO
Meeting 04	NO (-70.6%)	NO
Meeting/Prayer	NO (-54.7%)	NO
Meeting/Prayer	NO (-49.1%)	NO
Open Plan Office	NO (-59.8%)	NO
Prayer/ Meeting	N/A	N/A
Prayer/ Meeting Room	NO (-66.7%)	NO
Sanctuary	NO (-47.5%)	NO
Yinka's Office	NO (-39.8%)	NO
Youth Office	NO (-68.2%)	NO

Criterion 4: The performance of the building, as built, should be consistent with the calculated BER

Separate submission

Criterion 5: The necessary provisions for enabling energy-efficient operation of the building should be in place

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m ²]	924.4	924.4
External area [m ²]	1700.4	1700.4
Weather	LON	LON
Infiltration [m ³ /hm ² @ 50Pa]	10	3
Average conductance [W/K]	553.34	698.43
Average U-value [W/m ² K]	0.33	0.41
Alpha value* [%]	10.73	10

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area Building Type

A1/A2 Retail/Financial and Professional services
A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways
B1 Offices and Workshop businesses
B2 to B7 General Industrial and Special Industrial Groups
B8 Storage or Distribution
C1 Hotels
C2 Residential Institutions: Hospitals and Care Homes
C2 Residential Institutions: Residential schools
C2 Residential Institutions: Universities and colleges
C2A Secure Residential Institutions
Residential spaces

100 D1 Non-residential Institutions: Community/Day Centre

D1 Non-residential Institutions: Libraries, Museums, and Galleries
D1 Non-residential Institutions: Education
D1 Non-residential Institutions: Primary Health Care Building
D1 Non-residential Institutions: Crown and County Courts
D2 General Assembly and Leisure, Night Clubs, and Theatres
Others: Passenger terminals
Others: Emergency services
Others: Miscellaneous 24hr activities
Others: Car Parks 24 hrs
Others: Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	43.54	43
Cooling	0	0
Auxiliary	4.65	6.15
Lighting	13.08	12.73
Hot water	18.21	18.25
Equipment*	13.14	13.14
TOTAL**	79.48	80.14

* Energy used by equipment does not count towards the total for consumption or calculating emissions.

** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m²]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	134.26	133.45
Primary energy* [kWh/m ²]	128.4	131.26
Total emissions [kg/m ²]	22.3	22.8

* Primary energy is net of any electrical energy displaced by CHP generators, if applicable.

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEFF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	116	0	37.6	0	1	0.86	0	0.96	0
Notional	0	0	0	0	0	0	0	----	----
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity									
Actual	141.6	0	45.9	0	6.1	0.86	0	0.96	0
Notional	102.2	0	32.9	0	1	0.86	0	----	----
[ST] No Heating or Cooling									
Actual	0	0	0	0	0	0	0	0	0
Notional	146.1	0	47.1	0	8.2	0.86	0	----	----

Key to terms

Heat dem [MJ/m2]	= Heating energy demand
Cool dem [MJ/m2]	= Cooling energy demand
Heat con [kWh/m2]	= Heating energy consumption
Cool con [kWh/m2]	= Cooling energy consumption
Aux con [kWh/m2]	= Auxiliary energy consumption
Heat SSEFF	= Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER	= Cooling system seasonal energy efficiency ratio
Heat gen SSEFF	= Heating generator seasonal efficiency
Cool gen SSEER	= Cooling generator seasonal energy efficiency ratio
ST	= System type
HS	= Heat source
HFT	= Heating fuel type
CFT	= Cooling fuel type

Key Features

The Building Control Body is advised to give particular attention to items whose specifications are better than typically expected.

Building fabric

Element	U _{i-Typ}	U _{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.22	RM000008:Surf[1]
Floor	0.2	0.18	RM000008:Surf[0]
Roof	0.15	0.14	VR000001:Surf[1]
Windows, roof windows, and rooflights	1.5	1.6	RM000021:Surf[0]
Personnel doors	1.5	-	No Personnel doors in building
Vehicle access & similar large doors	1.5	-	No Vehicle access doors in building
High usage entrance doors	1.5	-	No High usage entrance doors in building
U _{i-Typ} = Typical individual element U-values [W/(m²K)]			U _{i-Min} = Minimum individual element U-values [W/(m²K)]
* There might be more than one surface where the minimum U-value occurs.			

Air Permeability	Typical value	This building
m³/(h.m²) at 50 Pa	5	10