Summerland Street - Exeter

Sustainability and Energy Statement for Planning

McLaren (Exeter) Limited

27 March 2023

Notice

This document and its contents have been contributed to by Gleeds and Hulley & Kirkwood Consulting Engineers Ltd, and are intended solely as information for McLaren (Exeter) Limited and use in relation to the Sustainability and Energy Statement for Planning

Contents

Introduction

McLaren (Exeter) Limited are proposing to regenerate the site, which is currently under multiple occupancy, to provide residential development in the form of new Co-living accommodation in place of the industrial units that currently occupy the site.

The development will include Co-living studio apartments on the upper floors, external rooftop amenity space with communal uses on the ground floor and dispersed throughout the upper floors.

McLaren (Exeter) Limited is committed to providing sustainable and innovative solutions for the Exeter Co-Living Scheme, with sustainability driving the design.

1. Sustainability Statement

McLaren (Exeter) Limited is committed to providing sustainable and innovative solutions for the Exeter Co-Living Scheme. Throughout the design development of this project sustainability has been considered, and in line with BRE guidance methods for delivering this have been employed. With sustainability driving the design, the scheme will achieve BREEAM Excellent.

Gleeds, our appointed as BREEAM consultants, have set out a clear strategy for achieving BREEAM Excellent which we are implementing.

The BREEAM pre assessment, can be viewed at Appendix 1.

1.1 To embed sustainability into the full project lifecycle the design team have undertaken as follows:

Mat01 – Life Cycle Assessment

A workshop has been undertaken to review different design options; these were then analysed using OneClick LCA to determine the embodied carbon impact over numerous life cycle stages. The following design options were reviewed:

- Brick, render and metal cladding with RC frame and pile foundations
- Brick slips and render with RC frame
- Brick, render and metal cladding with steel frame
- Render with SFS frame
- RC concrete with pad foundations
- Asphalt
- Paving slab/blocks
- ASHP and electric panel heaters
- Gas fired boilers and wet panel radiators
- ASHP and underfloor heating to communal areas

Each option was reviewed in terms of the material types and quantities and the kgCO2 output provided.

Mat06 – Material Efficiency

<u>Architectural</u>

Stride Treglown (Architects) confirmed that the following strategies were being considered early as part of the material efficiency strategy:

- **External Walls** – The proposed design for planning includes external brick outer skin with metal stud inner skin which increased the opportunity for material with a higher recycled content, whilst also ensuring durability of the external walls to limit material degradation.

- **En-suite bathroom pods -** these would be prefabricated and brought to site, therefore waste during the installation stages would be mitigated.
- **Furniture -** would be of a standardised specification to ensure it is easily replaceable and low maintenance. The bedroom fit-out would include furniture manufactured off-site to reduce waste. It was noted that the design had not progressed to a point where specific products or materials would be specified, this will be captured at subsequent RIBA stages.
- **Removing redundant materials from the design/ Making use of recycled or reclaimed materials** – A RIBA 2 Life Cycle Assessment has been undertaken to review numerous superstructure design options to determine the impact (embodied carbon), within this assessment, review of external façade options is taking place to determine the impact of changes (e.g., brick or brick-slips/render).
- **Designing for deconstruction and material reuse –** Functional adaptation strategy study and ease of disassembly guide to be produced by Stride Treglown to reduce waste and cost associated with future refurbishment or fit-out works and likelihood of demolition. Increasing the lifetime value of materials and products and improving the ability to cost-effectively reuse and recycle materials.
- **Removing redundant materials from the design –** Designing for durability and resilience exercise to be undertaken by Stride Treglown to avoid unnecessary cost and material use resulting from the need to repair and replace materials and reduce the likelihood and impact of environmental degradation to exposed building elements.

It was confirmed that very early considerations had been given to the design and that these would start to take shape as the RIBA 3 design progresses.

<u>Structural</u>

- **Increasing the utilisation factor of structural members** – A&C confirmed that the column design and foundations have been designed to the appropriate SLS (serviceability limit state) and ULS (Ultimate Limit State) to avoid overspecification whilst still meeting the structural requirements for the design. The structural design has been produced to the limits within the code.
- **Designing to standard material dimensions to reduce cut-offs and waste on site** – This will be reviewed in more detail at RIBA 3, it may be challenging to align this with other standards/requirements for the design, but this has been noted as one to review at the next stage. One example of how this will be achieved is via optimising the floor to ceiling heights.
- **Remove redundant materials from the design** – The structure has been optimised with a reinforced concrete frame. This has been determined the most optimal solution. A Life Cycle Assessment of the alternative structural options for the design has been undertaken to understand the embodied carbon impact.
- **Using materials that can be recycled or reused at the end of their service life** – this has been considered in the structure and substructure, considerations will be made during the next phase also and this passed to the contractor at the appropriate stage.
- **Using prefabricated elements where appropriate to reduce material waste** – reinforcement comes to site pre-cut/bent (BAMTEC) to increase efficiency and reduce off-cuts etc. BAMTEC saves costs and resources by being a prefabricated solution for surface reinforcement. According to their website, it is possible to save 20-40% steel due to FEM software and static calculations. When compared to steel mesh, BAMTEC can save 10-20% material and as it can be rolled out this can reduce the need for overlapping saving material and time.
- **Consider using an 'exposed thermal mass' design strategy to reduce finishes** – A&C confirmed the selection of a concrete frame design option. This assists with the SBEM being considered an ‘exposed thermal mass’ design strategy.
- **Avoiding over-specification of predicted loads** – this has been considered above, but within the Employer’s Requirements the structure must be designed to the appropriate loads.
- **Optimising the foundation design for embodied environmental impact** – A life cycle assessment of the alternative superstructure and sub-structure has been undertaken to determine the most optimal design.

- **Providing material elements that reduce the need for replacement** – A life cycle costing exercise is to be undertaken once the RIBA 2 cost plan is available.

Building Services

Hulley & Kirkwood confirmed the following considerations had been included within the early design:

- **Providing material elements that reduce the need for replacement -** LED lighting incorporated throughout the building. All pumps are inverter driven reducing energy demand and wear and tear
- Primary plant all monitored by BMS to ramp up/down as required, thereby reducing unnecessary energy consumption and wear and tear
- **Using prefabricated elements where appropriate to reduce material** - Pipework sections to be measured up and prefabricated offsite to reduce waste.
- **Removing redundant materials from the design -** Use of thermal stores to manage peak demands, reducing the primary plant size. Ventilation plant selected with spare capacity to future-proof (in the event of change of use) and reduce the risk of premature wear. Controls to include spare capacity to future-proof.
- A life cycle assessment of three alternative services design options has been undertaken to determine the embodied carbon impact. Consideration of the operational energy has also been included with a passive design analysis and low zero carbon technology feasibility study undertaken to optimise the design.

Further measures will be discussed and identified as the design develops.

Wst05 – Adaptation to Climate Change

A climate change adaptation strategy appraisal has been produced using a systematic risk assessment to identify the impact of expected extreme weather conditions from climate change and the impact on the building over its predicted life cycle.

The assessment covered the installation of building services and renewable systems, as well as structural and fabric resilience aspects. Solutions and recommendations were included within the report for implementation within the design as follows:

- Completion of the Flood Risk Assessment (FRA) and Surface Water-run Off strategy detailing risk of flooding and the appropriate allowances for future climate change. While it is expected that the drainage engineer will provide a detailed and suitable strategy, it is advised that detailed consideration is given to the longevity of the drainage systems and their capacity to deal with future climate change. As this development is on existing previously developed land within the city centre it is not anticipated that a significant increase in surface water run-off would be provided as a result of the development, however, this is to be reviewed and advised by the drainage engineer and associated professionals.
- Undertake a thermal assessment of the building to identify if there is any risk of overheating under future climate scenarios (using the relevant future weather data files). Futureproof the building to ensure that changes can be made to avoid overheating in the future.
- External envelope and structure to be designed to withstand the effects of driving rain and increased wind velocity and any associated subsidence variance.
- Roof to be designed to withstand the effects of potential overwhelming and increased structural damage from expected extreme weather scenarios. Allow for access to the roof and façade for ease of general maintenance.
- Specification of development appropriate leak detection systems (both water and refrigerant)

To achieve BREEAM compliance with credit reference WST 05, the above recommendations would need to be considered and implemented during the design and build of this development.

Climate Change Resilience –Mitigation

The aim of Climate Change Resilience – Mitigation, is to demonstrate how the development will adapt to the changing climate with consideration given to mitigation to reduce the likelihood of worst-case emissions pathways being realised.

The following recommendations are being followed as they take account of climate change scenarios expected to impact the UK. Climate change may not necessarily have any immediate impact anticipated in regards to Summerland Street, Exeter. However, due to the nature of the climate change challenges these recommendations are strongly advised to allow for more substantial mitigation and adaption of future climate change events and to assist with related regional and national goals.

- Where specifying combustion systems, consider the emissions of the systems to be installed and select low NO_x plant to reduce the impact on local and wider air quality (it is understood this will be a fully electric site so this will be achieved by progressing with the existing development design).
- Undertake Life Cycle Assessment of the building design/materials to reduce the embodied carbon impact of the development.
- Ensure an appropriate metering strategy is in place (with BMS) to monitor energy consuming systems.
- Appoint a qualified ecologist to review and advise on any potential recommendations and enhancements to develop the biodiversity net gain of the site and improve ecological value/green space where possible.
- Undertake a passive design analysis and low zero carbon technology feasibility study to determine the most effective design measures to implement within the development. Identify opportunities to incorporate passive design prior to specification of LZC technologies, selecting only the technologies most appropriate for the site to reduce further the demand in line with the energy hierarchy.

These recommendations are being implemented within the project.

2. Energy Statement

Please see Appendix 2.

Appendix 1 - BREEAM pre assessment

Appendix 2 - Energy Statement

hulley & kirkwood

consulting engineers




Summerland Street
Exeter

Energy Statement

Planning Issue

March 2023

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Revision: A
Project No: P0573
Date: March 2023

Summerland Street

Exeter

Energy Statement

Planning Issue

March 2023

REV	DESCRIPTION	PREPARED BY	DATE
A	Initial Issue	EK	March 2023

CONTENTS

Executive Summary

This Energy Statement has been submitted to demonstrate compliance with the following energy and carbon project specific related drivers for the proposed Summerland Street development.

The energy and carbon project specific related drivers are:

- Building Regulations: Conservation of fuel and power - Approved Document Part L 2021, Volume 2: New buildings other than dwellings

- Exeter City Council (ECC) Core Strategy (adopted February 2012) and policies CP13, CP14 and CP15

- BREEAM UK New Construction (NC) Version 6.0, Ene 01 (Reduction of Energy Use and Carbon Emissions) “Excellent” Rating Performance

The above requirements are demonstrated in this statement by assessing the most appropriate options within three principal categories:

- Passive Options (to *maximise the energy efficiency of fabric)*
- Good Practice Energy Saving Technology Options (*to reduce the energy load of the development)*
- Low Zero Carbon/ Renewable Energy Technology Options *(to deliver on-site low carbon and/ or renewable energy systems)*

Section 3.0 outlines these options, highlighting that in addition to the passive measures and energy saving technologies proposed to be incorporated, the inclusion of air source heat pump(s) for providing heating and domestic hot water coupled with photovoltaic panels (including for future provision for district heating connection) will comply with the Building Regulations Part L 2021, relevant ECC policies’ and BREEAM UK NC Version 6.0 Ene 01 Excellent requirements.

1.0 Introduction

Hulley and Kirkwood Consulting Engineers have been appointed to provide a statement for the proposed Summerland Street development to demonstrate the recommended means of compliance with the relevant Exeter City Council planning policies.

1.1 Site Review

The project includes for the demolition of existing buildings and the erection of a 167 bed-space co-living development (up to 7 storeys in height) and associated work.

The building has been assessed to include low carbon and renewable energy generation to achieve reduced energy and carbon emission levels.

The key energy requirements of the development arise from the heating and hot water demands and the electrical load associated with both the building operation and plug-in loads. Proposals should address the hot water demand, heat load and/or the electrical loads of the development.

1.2 The Scheme Solution

The current scheme adopts a passive approach coupled with energy saving technologies to minimise the energy usage, where possible. The envelope will be highly insulated and air tight for minimising the heating energy consumption.

Section 3.0 details an assessment of the LZC/ renewable technologies that have been considered for the site with explanations of which technologies are considered suitable for further development, and which have been excluded due to the site constraints and suitability for the project.

The recommended options to be developed during the design stage are:

- Air Source Heat Pump(s) (ASHPs) (air to water) for heating and hot water
- Photovoltaic Panels (PVs)
- Future provision for district heating connection

Exact sizes of the ASHP(s) to be determined at detailed design stages.

2.0 Project Specific Energy and Carbon Emission Benchmarks

The servicing strategy is driven by the following energy and carbon project specific requirements:

- **Building Regulations:** Conservation of fuel and power - Approved Document Part L 2021, Volume 2: New buildings other than dwellings.

- **Exeter City Council Core Strategy** (adopted February 2012) and relevant policies, i.e.:

  Policy CP13 Decentralised Energy:

  CP13: Decentralised Energy Networks will be developed and brought forward. New development (either new build or conversion) with a floorspace of at least 1,000 square metres, or comprising ten or more dwellings, will be required to connect to any existing, or proposed, Decentralised Energy Network in the locality to bring forward low and zero carbon energy supply and distribution. Otherwise, it will be necessary to demonstrate that it would not be viable or feasible to do so. Where this is the case, alternative solutions that would result in the same or better carbon reduction must be explored and implemented, unless it can be demonstrated that they would not be viable or feasible.

  Policy CP14 Renewable and Low Carbon Energy:

  New development (either new build or conversion) with a floorspace of at least 1,000 sq. metres, or comprising ten or more dwellings, will be required to use decentralised and renewable or low carbon energy sources, to cut predicted CO_2 emissions by the equivalent of at least 10% over and above those required to meet the building regulations current at the time of building regulations approval, unless it can be demonstrated that it would not be viable or feasible to do so.

  Policy CP15 Sustainable Construction:

  All non-domestic development will be required to achieve BREEAM 'Very Good' standards increasing to 'Excellent' standards from 2013. Non-domestic buildings are expected to be zero carbon from 2019.

- BREEAM UK New Construction Version 6.0, Ene 01 (Reduction of Energy Use and Carbon Emissions) 'Excellent' rating minimum performance standards.

3.0 Passive/ Energy Reducing/ LZC & Renewable Energy Technology Options Appraisal

This section reviews and analyses the principal sustainable and low zero carbon/ renewable technologies that are deemed appropriate for the proposed development.

Key:
☆ = low ☆☆☆☆☆ = high

3.1 Passive Options

This category recommends the investigation of the site layout, building orientation and design, thermal insulation levels and construction practices, all of which are proposed to be incorporated within the development proposals.

These proposals will result in minimising the development's energy consumption/carbon footprint by reducing solar overheating (avoiding comfort cooling where possible) and decreasing heat losses (fabric and infiltration), while maximising natural daylight.

Item	Description	Suitability	Capital Cost
Increased Insulation	Increased thermal insulation to the building reduces heat losses and subsequently plant sizing. **The targeted U-values for the proposed development are in excess of BRs Part L 2021 values and therefore can result in reduced heating energy consumption. The average U-values for all elements of the proposed new building are recommended as below:** • **External Walls: 0.15 W/m²K** • **Ground Floor: 0.14 W/m²K** • **Roof: 0.15 W/m²K** • **Glazing: 1.4 W/m²K** ○ **All areas- g value: 0.48, light transmittance: 0.76*** ○ **Ground floor areas and KLDs (including adjacent studios on that elevation) - g value: 0.28, light transmittance: 0.60*** * in line with the initial Overheating: Approved Document O assessment carried out for the project	☆☆☆☆☆	☆☆

Construction Processes	The Building Regulations require a maximum of 8 $m^3/h/m^2$ at 50 pascals for the air leakage rates from a new building; the lower this figure the less energy is lost from the inside of a building to outside. **With good construction processes and approved thermal bridging values incorporated it is anticipated that an infiltration rate of 3 $m^3/h/m^2$ at 50 Pascals can be targeted.**	☆☆☆☆☆	☆
Window Design	In addition to consideration of the site layout, and building orientation/design, increased levels of glazing (window design) allows more daylight to enter a building, potentially reducing the dependency upon artificial light and provide better well-being of the occupants. **Optimum window sizes when combined with efficient lighting controls can offer increased energy savings. An initial Overheating: Approved Document O assessment has been completed to ensure that the proposals cover the overheating mitigation requirements of the building regulations.**	☆☆☆☆☆	☆☆

3.2 Good Practice Energy Saving Technology Options

This category extols the benefits of employing energy saving technologies considered appropriate to be incorporated within the development proposals.

Item	Description	Suitability	Capital Cost
Inverter Controlled Pump Motors	The close matching of pump power to the required pump performances will provide significant reductions in (electric) energy demand. **The primary and secondary circulation pumps within the development present a good opportunity to achieve these reductions.**	☆☆☆☆☆	☆☆
Comprehensive Sub-Metering Facilities	The installation of sub-meters correctly located within building services systems can provide essential information regarding energy usage, permitting close monitoring (and hence reducing energy wastage) to be achieved. **It is proposed to provide energy usage and monitoring also in line with the BREEAM UK NC Version 6.0 requirements.**	☆☆☆☆☆	☆☆
Water Flowrate Regulation	The reduction of water usage/wastage is obviously important, and combined with a saving in the energy used to heat the water makes this option more attractive. **The regulation of water flowrates to appliances are proposed to be incorporated within the water services.**	☆☆☆☆☆	☆

Lighting Design	High efficiency luminaires utilising long life lamps with dimmable low loss ballasts / LED technology provide an effective energy saving over conventional luminaires. **LED technology is proposed to be incorporated throughout the development, with presence linked control within general and circulation areas.**	☆☆☆☆☆	☆☆☆

3.3 Renewable and Low Zero Carbon Energy Technology Options

The following renewable and/ or low zero carbon energy technologies were given initial consideration for use within the scheme. The reasons for excluding certain technologies or including for further assessment are listed below.

Item	Description	Suitability	Capital Cost
Wind Turbines	Electrical generation from wind turbine units, either individually or grouped together to form a 'wind farm'. Wind turbines are also available in a scaled down form that can be mounted on buildings. **Due to the limited site area, the wind turbine(s) would have to be located on the top of the proposed development, resulting in significant visual impact. The restricted site and location do not render this option worthy of further consideration.**	☆	☆☆☆
Solar Thermal Panels	External panels which can be mounted on the roof or in an open space through which a medium is passed to absorb heat energy from the sun. The heat can be used to supplement a development's hot water production. **This option has benefits to the scheme, as there will be demand for hot water within the building. However, the visual impact and reflections on the surrounding areas will need to be assessed. Also, additional plant space will be required for placing the pre-heating buffer vessels. Therefore, this technology is not deemed appropriate for the building.**	☆☆☆	☆☆☆☆
Photovoltaic Panels	External panels which can be mounted on the roof or integrated into the façade of buildings, or in any open space, subject to planning permission. The panels convert the energy of the sun directly into electricity. The electricity can be used to supplement the building's power supply. **PV panels are deemed to be an appropriate technology for this development (especially for offsetting the energy required to run the air source heat pump(s)), although the visual impact and estimated service/ access space requirements would need to be addressed.**	☆☆☆☆	☆☆☆

Biomass Boiler	Biomass boilers burn biological material such as wood pellets or logs in place of fossil fuels to serve the heating and hot water demands of a development. Pellet or chip biomass boilers generally have a hopper attached in which the fuel is loaded and automatically feeds into the boiler. The hopper will need to be refilled on a regular basis depending on demand and the size of the hopper. Log boilers typically require manual loading at an increased frequency due to the need for positioning the logs correctly. A steady fuel source is vital, ideally within a 50mile radius, so that carbon emission reductions are not cancelled out by transport pollution. **Biomass boilers require constant maintenance and attention to ensure that they are working correctly and efficiently. Therefore, there are significant logistical, operational and storage implications. Additional plant space for the biomass boiler and its storage would also be required. For the above reasons this technology is not deemed appropriate for the development.**	☆☆	☆☆☆☆
Combined Heat & Power CHP	CHP is a process that uses a fuel source to generate electricity and utilises the heat produced as a by-product to meet a heating demand. The fuel for this process is typically natural gas, but can also be biogas, biomass, gas oil, or hydrogen fuel cells, amongst others. The electricity generated can be utilised by the building operators or exported to the grid, or a combination of the two. **There is a Client preference for eliminating the use of gas, therefore this technology is not deemed appropriate for the development.**	☆☆☆	☆☆☆
Centralised District Heating	A district heating system, or heat network, is a system for distributing heat to different residential or commercial properties. The heat is generated at a centralised location and can be extended to serve a particular development or building via below ground pipework and a heat exchanger. The heat can be used to satisfy a building's heating and hot water demand. **Currently there are no appropriate district heating schemes in the local vicinity. However, future provision connection can be incorporated in the scheme.**	☆☆☆☆	☆☆

Ground Source Heat Pumps (GSHP)	A technology that uses the constant temperature of the ground to provide low grade hot water for use in building heating systems. Pipework is buried in the ground either in a horizontal ‘slinky’ configuration or a vertical ‘u-tube’ utilising bore holes. Water is passed through the ground loops where it absorbs the heat from the ground. The water is used to raise the temperature of a refrigerant which is in turn elevated further by the heat pump to provide heat to the heating system. **A large area of surrounding land would be required to make this option viable, or a ‘pile’ arrangement could be considered depending upon ground conditions. The site would experience significant external disruption, as well as high associated capital cost. Therefore, the use of a GSHP is not deemed appropriate for the scheme.**	☆☆	☆☆☆☆
Air Source Heat Pumps (ASHP)	An ASHP is a refrigerant based system that absorbs or rejects heat from/to the external air. In air-to-water systems the refrigerant passes through a heat exchanger to provide hot or chilled water for either space heating, domestic hot water generation or comfort cooling. In air-to-air systems the heat exchanger transfers the heat to air. Direct expansion (DX) split units provide either heating or cooling to one zone/appliance. Variable Refrigerant Flow (VRF) systems can provide simultaneous heating and cooling to multiple areas at the same time. **With the reductions in the carbon emission factor of electricity, ASHP(s) are considered a viable and future proof alternative to gas in terms of total carbon footprint. However, consideration will need to be given to electrical infrastructure upgrades for the increased load demand. For the above reasons this technology is deemed appropriate for the development.**	☆☆☆☆	☆☆☆

From an initial review of the project against the options highlighted above, it is recommended that the following low zero carbon and renewable technologies are considered for implementation within this scheme:

- Air Source Heat Pump(s) for heating and hot water (the exact size is to be determined at detailed design stages)
- Photovoltaic Panels (PVs)
- Future provision for district heating connection

3.4 Selected Options

After careful assessment the following options are considered to be the most appropriate and practicable, and are recommended to be incorporated within this scheme;

Passive Options

- Increased thermal insulation
- Low air infiltration losses
- High levels of natural daylight

Good Practice Energy Saving Technologies

- Inverter driven motors, for variable power output matched to actual usage (not on/off)
- Comprehensive sub-metering facilities
- Water flowrate regulation
- Lighting controls incorporating presence linking
- Low energy LED lamp technology

Low Zero Carbon/ Renewable Technologies

- Air Source Heat Pump(s) for heating and hot water
- Photovoltaic Panels (PVs)
- Future provision for district heating connection

4.0 Energy Compliance Modelling

Preliminary BRUKL (Building Regulations Part L 2021) calculations using dynamic simulation modelling (IESVE) have been carried out by incorporating the passive, good practice energy saving and LZC/ renewable energy options as described in Section 3.0.

4.1 Energy Compliance Modelling Input Assumptions

To provide an understanding of the inputs/ assumptions, the principal design criteria used to produce the proposed energy compliance model are as follows:

Input	Proposed
Building Regulations:	England Building Regulations Part L 2021
BRUKL compliance check version:	V6.1. e.0
Calculation engine version:	7.0.19
Location:	Exeter
Compliance weather file:	PLYMOUTH_TRY.epw (compliant weather file closest to site)
Model geometry	Model geometry based on proposed Architectural planning drawings
Air permeability @50pa	3 m³/(h.m²)
U-values	Glazing: 1.4 W/(m²K) [inc. frame] All areas- g value: 0.48, light transmittance: 0.76 Ground floor areas and KLDs (including adjacent studios on that elevation) - g value: 0.28, light transmittance: 0.60 Rooflights: 2.1 W/(m²K)
	External walls: 0.15 W/(m²K)
	Roof: 0.15 W/(m²K)
	Ground floor: 0.14 W/(m²K)
Lamp efficacy and lighting controls for all areas:	105 lm/cW (average) with presence detection in circulation areas
Ventilation strategy	MVHR in all occupied areas • Studios: SFP 1.1 W/l/s, heat recovery efficiency: 90% or better • KLDs: SFP 1.0 W/l/s, heat recovery efficiency: 87% or better • Ground Floor Non-standard accommodation areas: SFP 1.3 W/l/s, heat recovery efficiency: 85% or better
Power factor correction unit:	YES
Building Management System (warn out of range values):	YES
ASHP(s) SCOP	3.3 or better for heating 3.4 or better for hot water
VRV in non-standard accommodation areas and KLDs	SCOP: 3.5, SEER: 5.0, EER: 3.5
PV system	Generating 28,000 kWh/annum (subject to detailed design, requirement may reduce)

4.2 Energy Compliance Modelling Outputs

Based on the inputs detailed in Section 4.2 and subject to detailed design, it is anticipated that 7 credits (in excess of the minimum Ene 01 requirements for Excellent rating) can be achieved under Ene 01 BREEAM UK NC Version 6.0.

Target CO_2 Emission Rate - TER ($kgCO_2/m^2$.annum)	Building CO_2 Emission Rate – BER ($kgCO_2/m^2$.annum)	Policy CP14 10% Carbon Offset Achieved?	Policy CP 15 Ene01 'Excellent' rating achieved?
2.97	2.63	YES (11%)	YES (7 credits and an EPR of 0.72)

5.0 Conclusion

The proposed scheme (as detailed in this report) is expected to comply with the following energy and carbon project specific related drivers:

- **Building Regulations:** Conservation of fuel and power - Approved Document Part L 2021, Volume 2: New buildings other than dwellings

- **Exeter City Council Core Strategy** (adopted February 2012) and relevant policies, i.e.:

    - **CP13**: The requirements of Policy CP13 are achieved based on future provision for district heating connection.
    - **CP14:** The requirements of Policy CP14 are achieved based on compliance with the relevant to the scheme Part L requirements as detailed above with the inclusion of renewable (PVs) and low carbon energy sources ASHP, to cut predicted CO_2 emissions by the equivalent of at least 10% over and above those required to meet the building regulations current at the time of building regulations approval.
    - **CP15:** The proposed development achieves the Ene 01 (Reduction of energy use and carbon emissions) ‘Excellent’ rating minimum performance standards under the BREEAM UK New Construction Version 6.0 scheme.

Appendix A: Initial BRUKL Output Document

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Summerland Street

As designed

Date: Wed Mar 22 15:24:26 2023

Administrative information

Building Details

Address: Summerland Street, Exeter,

Certifier details

Name: Eleni Kalyva

Telephone number: 01752255575

Address: Hulley & Kirkwood, Studio 5-11, Millbay Road, Plymouth, PL1 3LF

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.19

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.19

BRUKL compliance module version: v6.1.e.0

Foundation area [m²]: 795.99

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2annum$	2.97	
Building CO_2 emission rate (BER), $kgCO_2/m^2annum$	2.63	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	31.87	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	27.99	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

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

Fabric element	$U_{a-Limit}$	U_{a-Calc}	U_{i-Calc}	First surface with maximum value
Walls*	0.26	0.16	0.37	DT000000:Surf[2]
Floors	0.18	0.15	0.29	BT000010:Surf[2]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	TH000000:Surf[1]
Windows** and roof windows	1.6	1.4	1.4	ST000000:Surf[1]
Rooflights***	2.2	2.1	2.1	GM000000:Surf[1]
Personnel doors^	1.6	1.6	1.6	ST000000:Surf[2]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	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)]
* 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.
*** Values for rooflights refer to the horizontal position.
^ For fire doors, limiting U-value is 1.8 W/m²K
NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	5665.7	5665.7
External area [m²]	5645.8	5475.5
Weather	PLY	PLY
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	2109.41	2158.88
Average U-value [W/m²K]	0.37	0.39
Alpha value* [%]	29.72	10

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
13	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
87	**Residential Spaces**
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	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	3.29	3.85
Cooling	0.28	0.13
Auxiliary	2.8	1.62
Lighting	5.65	6.04
Hot water	11.71	9.79
Equipment*	15.18	15.18
TOTAL**	**23.72**	**21.43**

* 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	4.87	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*4.87*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	43.64	40.75
Primary energy [kWh_{PE}/m²]	27.99	31.87
Total emissions [kg/m²]	2.63	2.97

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