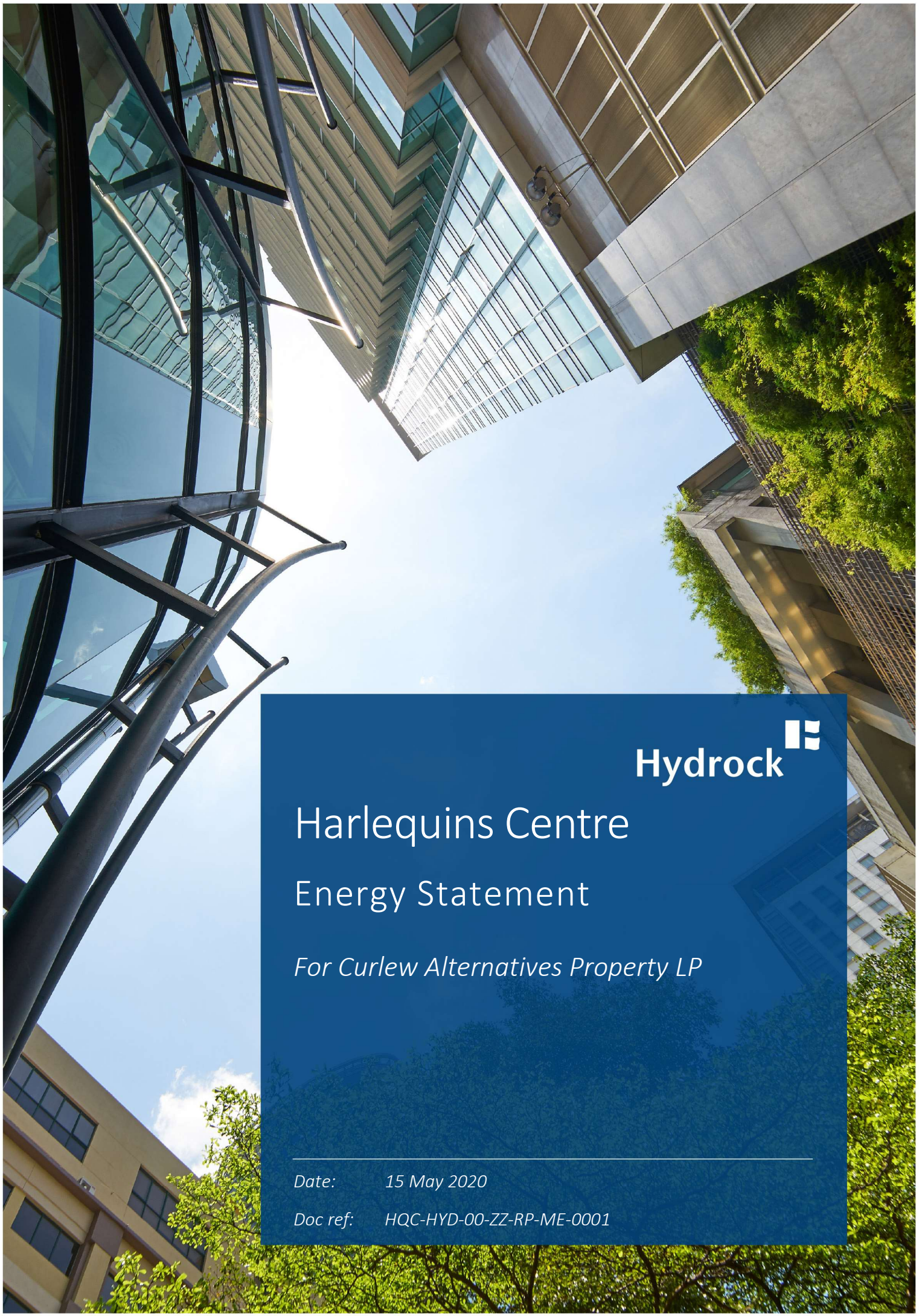

Hydrock

Harlequins Centre

Energy Statement

For Curlew Alternatives Property LP

Date: *15 May 2020*

Doc ref: *HQC-HYD-00-ZZ-RP-ME-0001*

DOCUMENT CONTROL SHEET

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CONTENTS

1. INTRODUCTION

Hydrock Consultants has been appointed by Curlew Alternatives Property LP to provide planning stage advisory services in relation to the design and construction of the proposed development of a hotel and co-living development in Exeter City Centre.

This document forms part of the planning application for the site and will inform the Exeter City Council (ECC) Planning Department of the proposed energy and sustainability strategy for the site. This document replaces a previous report submitted with planning application 19/1556/FUL submitted November 2019 and accompanies amended plans for this application, submitted May 2020.

1.1 Purpose of Report

Figure 1: Conceptual Site Layout of Harlequins Centre

The purpose of this document is to inform the design team, and ECC, of the energy strategy for the project and how it relates to the local planning requirements. This document summarises an initial options appraisal that has been carried out for the development in terms of energy. This includes looking at the inclusion of renewable energy systems as well as passive and active design measures. It is based on the amended plans submitted May 2020. As design progresses, further analysis will need to be carried out to determine the exact amount/size of renewable energy systems required, but this report provides an assessment based on current understanding of the energy requirements

1.2 Description of Development

The proposed development of Harlequins Centre, Exeter has been amended to two blocks, with Block One providing co-living accommodation (Sui Generis), and Block Two containing a hotel (Class C1). As a part of the amended scheme it has been decided that Block One is to be designed to Passivhaus principles; a voluntary standard intended to maximise occupant comfort and minimise energy usage. Block Two will not be designed to these principles but will continue to be designed to meet BREEAM 'Excellent' standards.

The site currently comprises the Harlequins Shopping Centre, which is due to be demolished as part of the works. The site is situated adjacent to Paul Street and Queen Street. A car parking ramp provides access and egress for the Guildhall Shopping Centre rooftop carpark, which is located opposite the Harlequins Shopping Centre; the carpark access is to remain and will not be demolished as part of the proposed works.

Figure 1 illustrates the conceptual position of the two blocks (Block Two on the left, Block One on the right) and the existing car park ramp that is to remain, located between the two proposed blocks. As Harlequins Centre is a

large-scale development in the centre of Exeter, it will be expected to provide high levels of sustainable design, innovation and wellbeing for occupants.

2. PLANNING POLICY

2.1 National

2.1.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF) acts as guidance for local planning authorities and decision makers, both in drawing up plans and making decisions about planning applications.

The NPPF sets out the Government's planning policies for England and how these are expected to be applied through local authorities. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so.

The NPPF also provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

2.1.2 Building Regulations Part L

The co-living elements of the development will be required to comply with Approved Document L1A 2013 (ADL1A) for domestic buildings.

Both the communal elements of Block One and all areas of Block Two of the proposed development will be required to comply with Building Regulations Approved Document L2A 2013 (ADL2A) for England.

The overriding and most rigorous requirement in ADL2A is Criterion 1:

Criterion 1 – The predicted rate of carbon dioxide emissions from the building (BER – Building Carbon Dioxide Emission Rate) is not greater than the target rate (TER – Target Carbon Dioxide Emission Rate).

N.B. The BER is the emissions from the designed buildings outlined in this report. The TER is calculated using the designed geometry with a predefined set of parameters for building fabric, building services and renewable/low carbon technologies. These parameters are outlined in the regulations and are identical for all buildings being assessed under Part L2A.

2.2 Local

2.2.1 Exeter Core Strategy

The Core Strategy, adopted in 2012, is one of the Council's key strategies. It sets the spatial elements of the Council's vision and objectives for now and the future.

2.2.2 Policy CP17: Sustainable Design

All proposals for development will need to exhibit a high standard of sustainable design that is resilient to climate change and complements or enhances Exeter's character, local identity and cultural diversity. The proposed development at Harlequins Centre will:

- Employ high quality design to create a distinctive sense of place;
- Create a safe and secure environment that encourages social interaction and inclusion and promotes healthy living and a sense of well-being;

- Retain and enhance the biodiversity of the site and adjacent areas;
- Apply innovative design to overcome constraints, such as a noise, pollution and topography;
- Aim to install low and zero carbon energy provision (for example, Combined Heat and Power (CHP)).

2.2.3 Policy CP15: Sustainable Construction

Policy CP15 states that all developments must be resilient to climate change (particularly summer overheating) and optimise energy and water efficiency through appropriate:

- Design;
- Insulation;
- Layout;
- Orientation;
- Landscaping;
- Materials; and
- Using technologies to reduce carbon emissions

In order for new developments to achieve compliance with Policy CP15, ECC require all non-domestic development achieve BREEAM Excellent. However, at the recent appeal for a site in St Davids (Walnut Gardens ref APP/Y1110/W/19/3227714 and /3238758) the inspector concluded that this actually related to an outdated version of BREEAM which equates now to BREEAM Very Good, which is therefore strictly the policy test, In addition ECC advise that all residential scheme are to achieve a reduction in carbon emissions of 19% over Part L1A 2013 regulations, this represents a 44% reduction over Part L2A 2006, which is set out in policy CP15 of the Exeter Core Strategy.

2.2.4 Policy CP13: Decentralised energy networks

Policy CP13 states that the use of decentralised energy networks will be developed and will be encouraged. New developments with a floorspace of at least 1,000 sq. metres will be required to connect to any existing, or proposed Decentralised Energy Network.

As there is no existing district heating provision in the area, the development is not suitable to adhere to Policy CP13. However, the development will be required to connect to a network if such provision is made available in the future. The building services design of the blocks will make reasonable allowance for connection onto a district heating network, if appropriate to do so if/when a network becomes available.

2.3 Summary

New developments will be required to demonstrate as part of an Energy Statement submitted with the planning application, how the above issues have been addressed. This document seeks to demonstrate a response to these objectives.

3. ENERGY STRATEGY

The energy strategy for the proposed site has been developed in accordance to local and national policies and is based on the principles of the Energy Hierarchy, a framework that assists progress towards more sustainable energy systems. The basic principles of the Energy Hierarchy are:

1. Be Lean – Use less energy.
2. Be Clean – Use the energy that is required more efficiently.
3. Be Green – Use renewable energy to supplement steps 1 and 2.

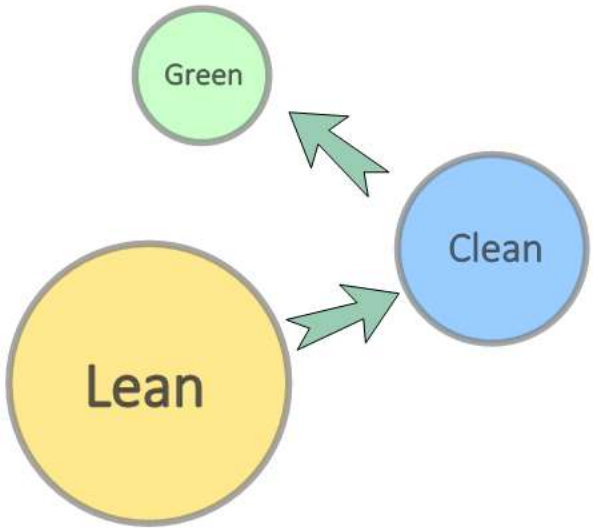

Figure 2: Energy Hierarchy

3.1 Step 1 – Minimising Energy Consumption – Be Lean

Energy demand reduction provides the largest opportunity for minimising a building's potential CO_2 emissions. Minimising energy consumption for the development will be accommodated by driving down energy demand through passive building design and operational techniques prior to focusing on energy efficient plant and controls.

The first principle therefore relies on energy efficient design and the site characteristics which embody passive designs. Furthermore, the design of the building fabric can reduce energy wastage and associated energy demand.

Passive design can be described as designing a building to take maximum advantage of the light and heat from the sun and natural ventilation to reduce the energy demand of a building. The following passive design measures can be exploited to improve both the performance and energy efficiency of the building:

- Location, grouping, orientation and layout
- Natural ventilation
- Landscape features and shading
- Thermal mass
- Architectural massing

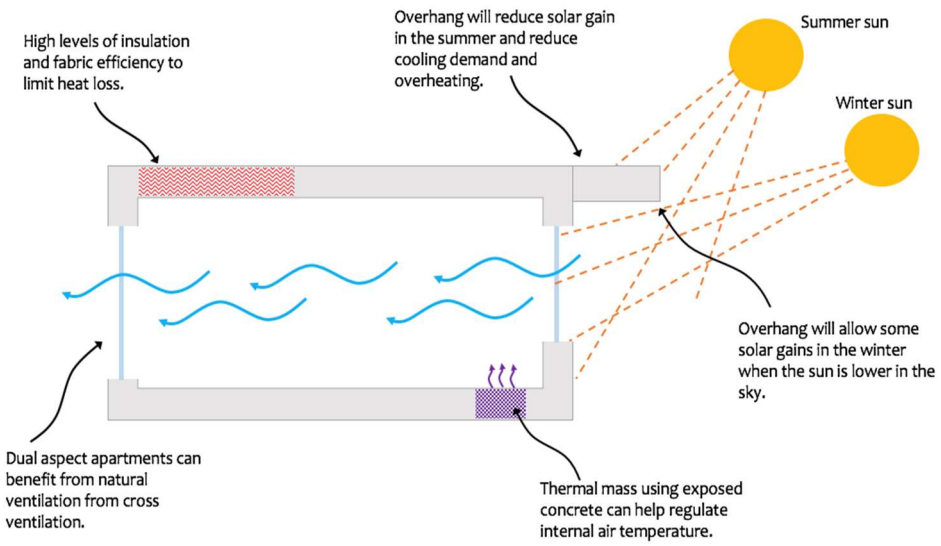

Figure 3: Example of Passive Design Options

The proposals for the Harlequins Centre provide for two substantial blocks which are an essentially energy efficient approach as it results in a low proportion of external wall to building footprint. Both blocks have been designed where possible to utilise natural light and heat from the sun. All areas have adequate amounts of glazing to allow daylight to penetrate into living spaces, reducing reliance on artificial lighting.

High performance glazing will maximise day lighting and winter sun solar gain whilst reducing heat loss through the glazed areas. However, this approach needs to be balanced against the danger of summer overheating in the building and therefore thermal modelling calculations have been undertaken in order to assess and consequentially inform work to minimise any potential for summer overheating.

The building fabric used for the development will be specified with high efficiency building fabric to minimise heat loss and air leakage. The U-values specified for the Harlequins Centre development are found in Section 5.4.

3.2 Step 2 – Supply Energy Efficiently – Be Clean

Following the implementation of all appropriate passive measures, the integration of energy efficient technologies into the development should be sought.

The second principle places the emphasis on using energy more efficiently. This is on the understanding that low carbon technologies can be cost-effective and can also provide significant carbon savings when compared to conventional technologies. All building services systems and the distribution strategies for the Harlequin Centre development are to be high performance, as indicated in Section 5.4.

Furthermore, the scheme will also encourage the use of low energy appliances and provide information and guidance on efficient use and operation of the buildings. Appliances will be chosen where practicable to be A/A+ rated under the EU Energy Labelling Scheme.

3.3 Step 3 – Utilising Low to Zero Carbon Technologies – Be Green

A further opportunity to increase the sustainability of a development is through the inclusion of renewable energy sources into the energy strategy. The most desirable technology may not necessarily be the most appropriate technology for the scheme. Low and Zero Carbon technologies are assessed on their suitability for the scheme in the following section of this report.

4. RENEWABLE AND LOW-CARBON ENERGY ANALYSIS

4.1 Introduction

Following the first two stages of the energy hierarchy (Lean and Clean), the residual carbon reduction will be met through renewable technologies.

4.2 Renewable and Low-carbon Energy Options

To achieve the necessary emission levels a number of site wide energy generation technologies could be given initial consideration:

- Combined Heat and Power;
- Solar Thermal Hot Water;
- Wind turbines;
- Photovoltaics.

4.2.1 Combined Heat and Power

Combined Heat and Power Units are essentially small electricity power stations. They generate electricity and are more efficient than power stations because the heat generated as a by-product of electricity generation is used to provide heating and/or hot water to buildings.

CHP systems are well suited to buildings that have a constant or near constant energy demand. Both the co-living spaces and the hotel are anticipated to have near constant demands for domestic hot water, and therefore have been included in the indicative analysis in Section 5.

4.2.2 Solar Thermal Hot Water

Solar water heating systems use the energy from the sun to heat water. The systems use heat collectors, generally mounted on the roof in which a fluid is heated by the sun. This fluid is used to heat up water that is stored in either separate hot water storage vessel or a twin coil hot water storage inside the building. The anticipated life span of a SHW system is 20 years.

SHW can work well in conjunction with other renewable technologies (subject to adequate roof space), but is unlikely to work well with future potential connection to district heating as both will be sized to provide the base load heating and hot water.

Due to the limited roof space available on both blocks, solar thermal is deemed unsuitable for inclusion at this stage.

4.2.3 Wind Turbines

Wind turbines work by converting the kinetic energy in wind into mechanical energy that is then converted to electricity. They are available in a range of sizes and designs and can either be free standing, mounted on a building or integrated into a building structure.

Due to the aesthetic and noise impacts of wind turbines, they would not be suitable for inclusion in a city centre scheme such as this.

4.2.4 Solar Photovoltaics

PV panels work by converting the energy from sunlight into usable electricity via photovoltaic cells placed on the roof of buildings. These can be integrated into the roof itself or tradition “bolt-on” panels.

These can vary in efficiency with the most efficient panel having an efficiency of 21%, while most perform at around 18-20%.

PV panels have a low visual impact, have limited effects on the environment, and can be combined with battery storage if desired. They can also work well in conjunction with future district heating systems.

Whilst there is limited suitable roof space available for installation, PV panels offer a far greater carbon offset benefit than solar thermal panels and therefore will be included within the analysis in Section 5.

4.2.5 Conclusion

The two buildings proposed for the Harlequins Centre have been designed with a fabric first approach (Be Lean) and will utilise energy efficient technology in building management and through use (Be Clean). The final element is the choice of renewable and/or Low Carbon energy sources to meet the remaining requirements (Be Green).

At the Harlequins Centre, the choice of energy source, as described above, is for the PV panels to supplement the electrical requirement in the most carbon efficient manner. However, these will not provide sufficient heat to provide for the hot water demand of a hotel or co-living. Suitably sized gas-powered CHP plant remain the most efficient way of delivering this and therefore are included for within the energy strategy.

5. MODELLING INPUTS AND RESULTS

5.1 Overview

This report has provided a summary of an outline assessment of the estimated CO_2 emissions for Block One and Block Two of The Harlequins Centre Development. This can be used to demonstrate compliance with the planning policy CP15.

It should be noted that, for the purposes of this assessment, the following methodology has been applied:

- Three separate assessments have been made: one for all co-living spaces within Block One, one for the communal areas within Block One and one for Block Two.
- The Co-living spaces are to be assessed using Stroma FSAP 2012 software (SAP), whereas the hotel and Block One communal areas are to be assessed using IES 2019 Software (DSM/SBEM).

5.2 SAP Assessment

The common way of assessing compliance with Part L1A is to model the designed building using SAP (Standard Assessment Procedure) software.

For Block One, a sample of 10 dwellings were selected to be assessed under SAP. The selection of these 10 units were made to represent the full cross section of dwellings in the development, so as to scale up proportionally to reflect the site and give as accurate a result as possible.

5.3 Thermal Modelling Assessment

The building fabric parameters used for the simulation can be seen in the below tables. These values represent a sizeable reduction compared to the base Building Regulation values used for the notional building; demonstrating adherence to the energy hierarchy principles.

Table 1: Thermal Elements Properties for Block One

Block One	Value	Unit
External Walls U-value	0.18	W/m²K
Exposed Floor U-value	0.18	W/m²K
Roof U-value	0.18	W/m²K
Glazing U-value	0.52	W/m²K
Glazing G-Value	0.4	-
Air Permeability	0.6	m³ /(h.m²) @50Pa

Table 2: Thermal Elements Properties for Block Two

Block Two	Value	Unit
External Walls U-value	0.18	W/m²K
Exposed Floor U-value	0.18	W/m²K
Roof U-value	0.18	W/m²K
Glazing U-value	1.6	W/m²K
Glazing G-Value	0.4	-
Air Permeability	5	m³ /(h.m²) @50Pa

5.4 Building Services Systems

Table 3, below, indicates the modelling assumptions with regards to the building services within each block. Table 4 indicates the modelled renewable and low carbon technology specifications.

Table 3: Building Services Assumptions

	Co-living (Block 1)	Hotel (Block 2)
Heating	Gas-fired high efficiency boilers with CHP serving radiators throughout. VRF heating in communal areas.	VRF Heating in rooms and communal areas.
Cooling	VRF Cooling in communal areas.	VRF cooling in rooms and communal areas.
Ventilation	MVHR in Rooms, full supply and extract in communal areas.	Centralised extract system serving hotel WCs, full supply and extract in communal areas.
Domestic Hot Water	Direct gas-fired hot water cylinders with CHP.	Direct gas-fired hot water cylinders with CHP.
Lighting	High efficiency LED lighting is assumed throughout the building.	High efficiency LED lighting is assumed throughout the building.

Table 4: Renewables and Low Carbon Technology Specification

	Specification	Output	Quantity
CHP (Block 1)	SAV XRGI 20	44kW Thermal Output	1No.
PV (Block 1)	Modular Efficiency: 20% Electrical Conversion Efficiency: 97%	0.35kWp per dwelling	110m² (maximum allowable with roof layouts)
PV (Block 2)	Modular Efficiency: 20% Electrical Conversion Efficiency: 97%	9,800 kWh/annum PV	50m² (estimated based upon output)
CHP (Block 2)	SAV XRGI 6	6kW Thermal Output	1No.

5.5 Part L2A Results

The results of the DSM assessment for both blocks are shown below. Each Blocks Building Emissions Rate (BER) must beat the Target Emissions Rate (TER) to comply with Part L2A England 2013.

Table 5: Dynamic Simulation Results- Building Emissions Rate and Associated BREEAM Credits

	Target Emissions Rate ($kgCO_2/m^2$ per annum)	Building Emissions Rate ($kgCO_2/m^2$ per annum)	Ene01 BREEAM Credits Achieved
Co-living Communal Areas (Block 1)	15.9	8.7	N/A
Hotel (Block 2)	57.5	50.5	7

These results demonstrate that both blocks meet the terms of Part L2A and, if assessed, would exceed the requirements for BREEAM 'Excellent'.

5.6 SAP Results

Table 6: SAP Results

	Dwelling Type	DER (kg.CO2/m2 per annum)	TER (kg.CO2/m2 per annum)	Compliance Margin (%)	Photovoltaic (kWp)
Unit 1 – 5F Studio	Studio Flat	23.98	32.30	25.8	0.135
Unit 2 – 5F Studio	Studio Flat	20.51	28.86	28.9	0.135
Unit 3 – 5F Cluster	8-Room Cluster Flat	13.34	13.58	1.8	0.135
Unit 4 – 4F Cluster	5-Room Cluster Flat	10.28	12.88	20.2	0.135
Unit 5 – 4F Studio	Studio Flat	22.46	30.04	25.2	0.135
Unit 6 – 4F Cluster	6-Room Cluster Flat	9.03	11.14	18.9	0.135
Unit 7 – 3F Cluster	6-Room Cluster Flat	9.08	11.18	18.8	0.135
Unit 8 – 3F Studio	Studio Flat	22.46	30.04	25.2	0.135
Unit 9 – GF Studio	Studio Flat	17.91	24.51	26.9	0.135
Unit 10 – GF Studio	Studio Flat	23.43	32.41	27.7	0.135

The 10 modelled units present an averaged compliance margin of 21.94% over Part L1A 2013 and therefore demonstrates block compliance with Policy CP15.

6. SUMMARY

The information provided above has been developed to demonstrate compliance with Exeter City Council's planning policies regarding energy and energy sustainability. The Harlequins Centre development can therefore be seen to:

- Minimise energy consumption: In both blocks, energy consumption in use is a key design criteria and the buildings orientation has been optimised to maximise the passive benefits of solar heat gains and daylighting. In addition, through specification of low U-value fabric and high-performance glazing, energy demand at the proposed Harlequins Centre development has been minimised.
- Supply energy efficiently: With the energy demand minimised, high-efficiency items of plant have been specified to ensure that all energy that is required on site is delivered as efficiently as possible. Gas-fired CHP units shall provide heating and hot water to both blocks, and the electricity generated by the units shall directly offset any electricity consumed by the blocks and their tenants/customers. Any supply & extract mechanical ventilation that is required across the blocks shall incorporate heat recovery, and all gas-fired boilers, gas-fired water heaters and air conditioning equipment will have efficiencies in excess of good industry practice. LED lighting shall be specified throughout.
- Utilise low and/or zero carbon technologies: In addition to making use of CHP units, both blocks shall incorporate solar photovoltaic panels to further offset any electricity consumed on site and reduce the carbon emissions associated with the development.

It can therefore be seen that:

- *Block One achieves a c.22% betterment over Part L1A 2013 criteria; exceeding Planning Policy CP15's requirement of a 19% betterment for domestic buildings.*
- *Block Two achieves 7 Energy 01 BREEAM 2014 credits, exceeding the pre-requisite 5 credits required to achieve a BREEAM "Excellent" rating; as per Planning Policy CP15's requirements for non-domestic buildings.*

The Harlequins Centre development can therefore be seen to comply with (and in certain cases exceed) all relevant national and local planning policies