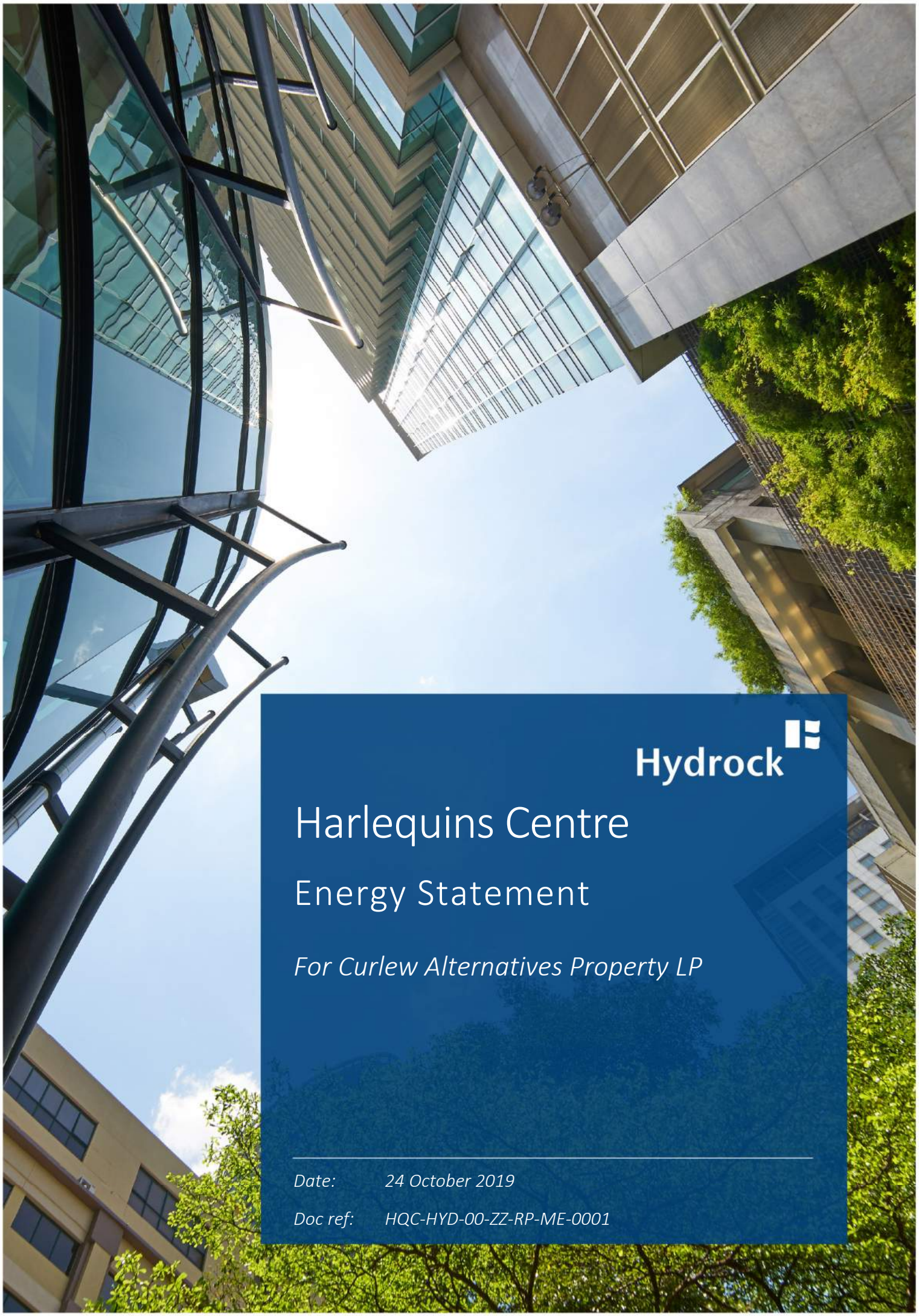

Hydrock

Harlequins Centre

Energy Statement

For Curlew Alternatives Property LP

Date: *24 October 2019*

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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.

1.1 Purpose of Report

Figure 1: Conceptual Site Layout of Harlequin 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. As design progresses, further analysis will need to be carried out to determine the exact amount/size of renewable energy systems required.

1.2 Description of Development

The proposed development of Harlequins Centre, Exeter comprises two blocks, with Block One containing co-living rooms with a small commercial unit, and Block 2 containing a hotel, restaurant, and co-living provision. Up to 300 co-living rooms are provided over the two blocks, along with up to 120 hotel rooms in Block Two.

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 2 on the left, Block 1 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

1.1 National

1.1.1 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.

1.1.2 Building Regulations Part L

Both elements 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.

1.2 Local

1.2.1 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.

1.2.1.1 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)).

1.2.1.2 *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

All non-domestic developments will be required to achieve BREEAM 'Excellent'.

1.2.1.3 *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.

1.3 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.

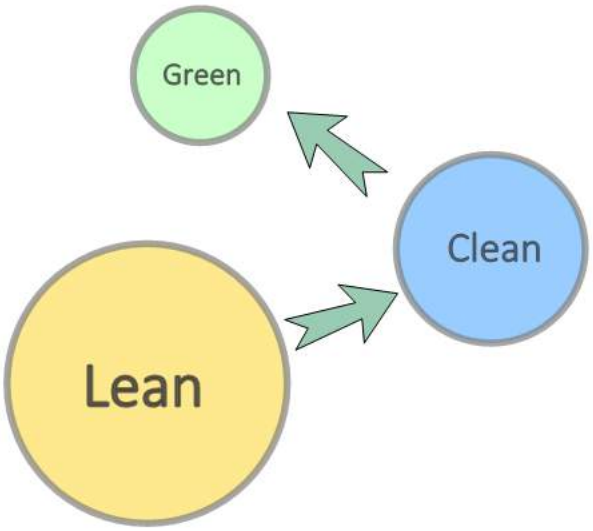

Figure 2: Energy Hierarchy

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

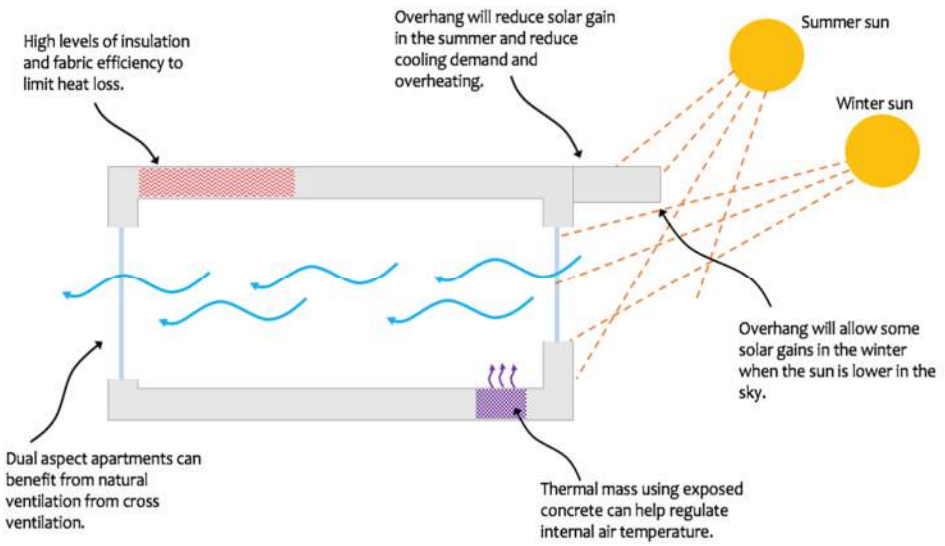

Figure 3: Example of Passive Design Options

The layout of the scheme has been developed where possible to utilise natural light and heat from the sun. All areas have generous 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.

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 5.2.

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 5.3.

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.

As both blocks of the scheme will be required to achieve BREEAM Excellent credentials, it is imperative that they achieve a minimum of 5 credits under Ene 01 - reduction of emissions. This will be achieved partly through the measures indicated previously, but will also require the inclusion of renewable or low-carbon technology on-site.

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 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.

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 1 and Block 2 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:

- Two separate assessments have been made: one for all co-living spaces and one for the hotel.
- All co-living spaces across Block 1 and Block 2 are included within the same assessment as the plant located in Block 1 is utilised to serve the co-living spaces in Block 2.
- The co-living spaces are assessed for compliance purposes under the same conditions as a student accommodation block, owing to the fact that co-living is not included within the latest regulations. Energy profiles, as well as the management and operation of both types are identical.

5.2 Thermal Modelling Assessment

This development has been modelled using IES VE 2018 under a DSM assessment.

The building fabric parameters used for the simulation can be seen in the below table. These values represent a sizeable reduction compared to the base L2A England 2013 values used for the notional building; demonstrating adherence to the energy hierarchy principles.

Building Element Thermal Properties (Both Blocks)		
U-Values		
External Walls	0.18	W/m²K
Exposed Floor	0.18	W/m²K
Roof	0.18	W/m²K
Glazing	1.6	W/m²K
Glazing G-Value	0.40	-
Air Permeability	5	m³ /(h.m²) @50Pa

Table 1: Thermal Elements Properties

5.3 Building Services Systems

Throughout the simulation the following building services assumptions were taken into account:

	Co-living (Block 1 & 2)	Hotel (Block 2 only)
Heating	Gas-fired high efficiency boilers with CHP serving radiators throughout.	VRF Heating in rooms and communal areas.
Cooling	N/A.	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.

The assumed renewables and low carbon specification are listed in the table below.

Renewables and Low Carbon Specification			
	Specification	Output	Quantity
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.
CHP (Block 1)	SAV XRGI 20	44kW Thermal Output	1No.

Table 2: Renewables and Low Carbon Technology Specification

5.4 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.

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 (Block 1 & 2)	41.8	36.4	5
Hotel (Block 2 only)	79.8	76.0	5

Table 3: Dynamic Simulation Results

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: The building 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, Block 2 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, based upon the information provided above, the prerequisite number of BREEAM Ene01 credits for BREEAM Excellent rating have been achieved and therefore this development is in compliance with the relevant ECC planning policies.