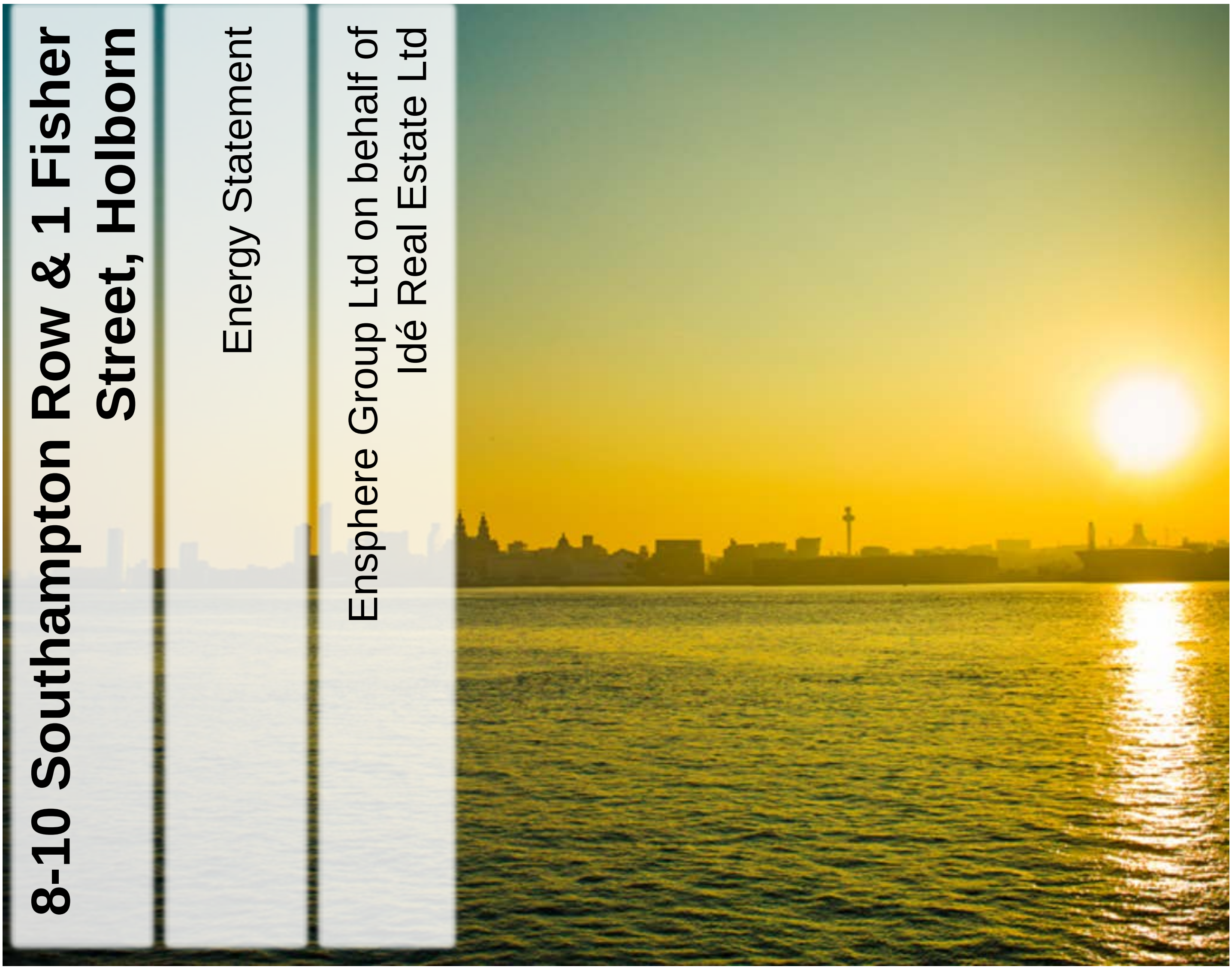

8-10 Southampton Row & 1 Fisher Street, Holborn

Energy Statement

Ensphere Group Ltd on behalf of Idé Real Estate Ltd

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8-10 Southampton Row & 1 Fisher Street, Holborn

Energy Statement

Client Name:	Idé Real Estate Ltd
Document Reference:	16-E070-003
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Quality Assurance Approval Status

This document has been prepared and checked in accordance with Ensphere Group Ltd's Quality Management System.

Issue:	Version:	Prepared by:	Reviewed by:	Date:
Final	V3	Pete Jeavons	Pete Jeavons	May 2017

Contents

1. Executive Summary

1.1 This Energy Statement presents the energy strategy for a proposed scheme at 8-10 Southampton Row, Holborn.

1.2 The proposed scheme includes the refurbishment and extension of 8-10 Southampton Row to facilitate the redevelopment of the site as a hotel.

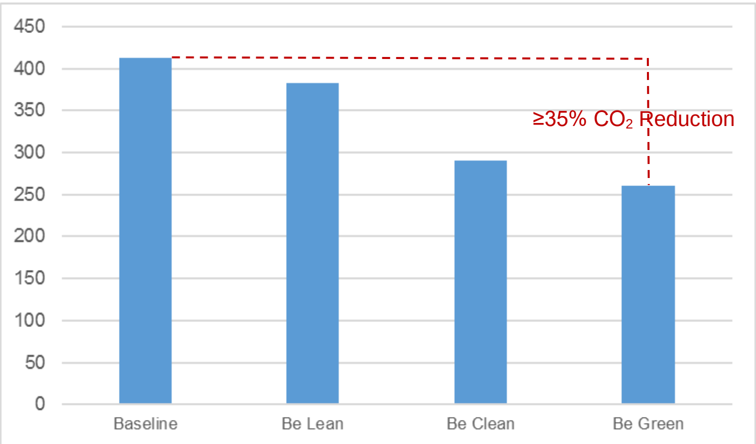
1.3 Consideration has primarily been given to the planning policy context and other requirements prior to establishing a strategy based upon the energy hierarchy; with a priority given to energy reduction and efficiency. Renewable and low carbon technologies have also been considered in the context of their technical feasibility and financial viability.

1.4 The following is therefore proposed:

- High performance building fabric and energy efficient lighting, services and equipment;
- Passive design measures to reduce energy demand for heating, cooling, ventilation and lighting;
- Combined Heat and Power (CHP) to provide the majority of hot water;
- Air Source Heat Pumps to provide space heating.

1.5 In line with Policy 5.2 of the London Plan and the Council policy, an on-site carbon saving of ≥ 35% has been targeted for the entire development relative to Part L 2013 (equivalent to a 40% carbon saving relative to the 2010 version of Part L).

Figure 1.1 Site-Wide Tonnes CO_2 following Application of the Enegy Hierarchy



1.6 Overall, the proposed energy strategy is considered consistent with the National Planning Policy Framework and the policies of the GLA and local authority and, when implemented, will provide an efficient and low carbon building.

2. Introduction

2.1 Ensphere Group Ltd was commissioned by Idé Real Estate Ltd to produce an Energy Statement for a proposed development at 8-10 Southampton Row, Holborn.

Site & Surroundings

Site

2.2 The site is located in central London in the London Borough of Camden. It has an irregular shape and currently comprises an existing building (Carlisle House, 8-10 Southampton Row) of heritage value (Grade II listed and located in the Kingsway Conservation Area) in the western part and an access shaft associated with the Crossrail project in the eastern part. The current use of the building is for Crossrail's construction activities including their offices.

2.3 Access to the site is via Southampton Row to the west. The north of the site is bound by Fisher Street and the south by Catton Street. An existing commercial structure lies to the immediate east.

Surroundings

2.4 Opposite, to the west, is the Grade II listed 15-23 Southampton Row (within the Bloomsbury Conservation Area) and to the south is the Grade II listed Baptist Church House. To the north is the Grade II listed Central St Martin's College of Art and Design. The Kingsway Tram Subway is also Grade II listed and forms the only underground tunnel in London specifically designed for trams. This part of the tunnel is no longer in use but the tunnel further south along Kingsway has been adapted for buses.

2.5 The Southampton Row townscape is an example of early 20th century commercial architecture on a comprehensive scale. Most of the ground floors are commercial with offices above.

2.6 The wider area is diverse, and whilst predominantly office and residential in nature; other cultural and commercial (including hotels) are apparent. The site is located in close proximity to numerous major transport nodes; with Holborn Tube Station being the closest and approximately 1-minute walk to the south of the site. A variety of other emblematic places are located within a 20-minute walk, including the British Museum, Somerset House, Sir John Soane's Museum, Covent Garden, Conwall Hall and the Royal Opera House.

Permitted Development

2.7 The site benefits from an existing planning permission for Development of Crossrail site for the erection of a part 8/part 9 storey building to provide 22 residential units (Class C3) namely 5 x 1-bedroom, 14 x 2-bedroom, 2 x 3-bedroom and 1 x 4-bedroom self-contained flats with associated entrances, refuse and cycle storage and substation; alterations to ground floor facade and screening of Crossrail head house building. (ref: 2013/1477/P; Granted 05/01/15).

Proposed Development

2.8 Development proposals are for the refurbishment and extension of 8-10 Southampton Row to facilitate the redevelopment of the site as a hotel. Part of the ground floor of the new-build extension will be occupied by Crossrail as Headhouse Facilities.

Report Objective

2.9 The objective of the Energy Statement is to outline how energy efficiency, low carbon and renewable technologies have been considered as part of the energy strategy.

3. Assessment Methodology

Analysis Methodology

3.1 There is a broad consensus that the preferred approach to minimising carbon emissions from buildings is to firstly focus on reducing the demand for energy before reviewing efficient and renewable technology options.

3.2 However, priorities and performance targets can vary at a local level and the report therefore commences with a review of the planning policy and other considerations.

3.3 A site context appraisal is then undertaken to establish the site specific parameters for climatic conditions and available energy infrastructure. The subsequent sections follow the Energy Hierarchy (discussed below) and review the design proposals in relation to passive design and energy efficiency as well as the potential to incorporate low carbon and renewable technology.

Energy Hierarchy

3.4 The tiers of the Energy Hierarchy are:

Energy Hierarchy	
1. Be Lean	Reduce Energy Demand
2. Be Clean	Use Energy More Efficiently
3. Be Green	Use Renewable Energy

3.5 The first principle of the Hierarchy is to reduce demand and the need for energy in the first place. Where opportunities to improve the efficiency of the design have been maximised, consideration is then given to the second principle whereby priority is given to the efficient use of energy. This is on the basis that low carbon technologies can be cost-effective and provide significant carbon savings when compared to conventional technologies.

3.6 The third principle of the hierarchy promotes the use of renewable technologies. Whilst these technologies can be relatively expensive to install, they do offer the potential to significantly reduce carbon emissions.

3.7 The summary section of the report presents an overview of the findings and the strategy.

4. Planning Policy Context

4.1 National and local planning policy relevant to sustainable development is considered in detail below:

National Planning Policy Framework

4.2 The Department for Communities and Local Government determines national policies on different aspects of planning and the rules that govern the operation of the system.

4.3 The transition to a low carbon economy is promoted in paragraphs 17, 93 through to 97 of the NPPF.

London Planning Policy Framework

4.4 Key London Plan planning policy is detailed below:

The London Plan as Altered (2016)

4.5 The London Plan as Altered March 2015 is the overall strategic plan for London. Chapter five details *London's Response to Climate Change* and include a number of policies that set the overarching principles for reducing carbon emissions in the built environment, as follows:

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-domestic buildings from 2019.

<u>Residential Buildings:</u>

Year	Improvement in 2010 Building Regs
2010-2013	25% (Code Level 4)

2013-2016	40%
2016-2031	Zero Carbon

Non-Residential Buildings:

Year	Improvement in 2010 Building Regs
2010-2013	25%
2013-2016	40%
2016-2019	As per building regulations requirements
2019-2031	Zero Carbon

C) Major development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emission 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) Calculations of the energy demand and carbon dioxide emissions covered by the 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 hierarchy;

b) Proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services;

c) Proposals to 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 5.5 – Decentralised Energy Networks

Strategic

A) The Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025. In order to achieve this target the Mayor prioritises the development of decentralised heating and cooling networks at the development and area wide levels, including larger scale heat transmission networks.

LDF Preparation

B) Within LDFs boroughs should developer policies and proposals to identify and establish decentralised energy network opportunities. Boroughs may choose to develop this as a supplementary planning document and work jointly with neighbouring boroughs to realise wider decentralised energy network opportunities. As a minimum, boroughs should:

a) Identify and safeguard existing heating and cooling networks;

b) Identify opportunities for expanding existing networks and establishing new networks. Boroughs should use the London Heat Map tool and consider any new developments, planned major infrastructure works and energy supply opportunities which may arise;

c) Developer energy master plans for specific decentralised energy opportunities which identify;

- Major heat loads (including anchor heat loads, with particular reference to sites such as universities, hospitals and social housing);
- Major heat supply plant;
- Possible opportunities to utilise energy from waste;
- Possible heating and cooling network routes;
- Implementation options for delivering feasible projects, considering issues of procurement, finding and risk in the role of the public sector.

d) Require developers to prioritise connection to existing or planned decentralised energy networks where feasible.

Policy 5.6 – Decentralised Energy in Development Proposals

Planning Decisions

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.

B) Major development proposals should select energy systems in accordance with the following hierarchy:

1) Connection to existing heating or cooling networks;

2) Site wide CHP network;

3) Communal heating and cooling.

C) Potential opportunities to meet the first priority in this hierarchy are outlined in the London Heat Map tool. Where future network opportunities are identified, proposals should be designed to connect to these networks.

Policy 5.7 – Renewable Energy

Strategic

A) The Mayor seeks to increase the proportion of energy generated from renewable sources, and expects that the projections for installed renewable energy capacity outlined in the Climate Change Mitigation and Energy Strategy and in supplementary planning guidance will be achieved in London.

Planning Decisions

B) Within the framework of the energy hierarchy (see Policy 5.2), major development proposals should provide a reduction in expected carbon dioxide through the use of on-site renewable energy generation, where feasible.

LDF Preparation

C) Within LDFs boroughs should, and other agencies may wish to development more detailed policies and proposals to support the development of renewable energy in London – in particular, to identify broad areas where specific renewable energy technologies, including large scale systems and the large scale deployment of small scale systems, are appropriate. The identification of areas should be consistent with any guidelines and criteria outlined by the Mayor.

D) All renewable energy systems should be located and designed to minimise any potential adverse impacts on biodiversity, the natural environment and historical assets, and to avoid any adverse impacts on air quality.

Policy 5.9 – Overheating and Cooling

Strategic

A) The Mayor seeks to reduce the impact of the urban heat island effect in London and encourages the design of places and spaces to avoid overheating and excessive heat generation, and to reduce overheating due to the impacts of climate change and the urban heat island effect on an area wide basis.

Planning Decisions

B) Major development proposals should reduce potential overheating and reliance on air conditioning systems and demonstrate this is in accordance with the following cooling hierarchy:

1) Minimise internal heat generation through energy efficient design;
2) Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls;
3) Manage the heat within the building through exposed internal thermal mass and high ceilings;
4) Passive ventilation;
5) Mechanical ventilation;
6) Active cooling.

C) Major development proposals should demonstrate how the design, materials, construction and operation of the development would minimise overheating and also meet its cooling needs. New development in London should also be designed to avoid the need for energy intensive air conditioning systems as much as possible. Further details and guidance regarding overheating and cooling are outlined in the London Climate Change Adaptation Strategy.

LDF Preparations

D) Within LDFs boroughs should develop more detailed policies and proposals to support the avoidance of overheating and to support the cooling hierarchy.

Local Planning Policy Framework

4.6 The relevant planning authority is Camden Council and planning policy for the area is detailed in a number of statutory documents.

Core Strategy (2010)

4.7 Camden's Core Strategy sets out the key elements of the Council's planning vision and strategy for the borough. It is the central part of our Local Development Framework (LDF), a group of documents setting out our planning strategy and policies. Policies considered pertinent to this report are presented below:

Policy CS13 – Tackling Climate Change Through Promoting Higher Environmental Standards [extract]

Reducing the effects of and adapting to climate change

The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

[…]

c. minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:

   1. ensuring developments use less energy,

   2. making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks;

   3. generating renewable energy on-site; and

d. ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions.

Local Energy Generation

The Council will promote local energy generation and networks by:

e. working with our partners and developers to implement local energy networks in the parts of Camden most likely to support them, i.e. in the vicinity of:

   - housing estates with community heating or the potential for community heating and other uses with large heating loads;

   - the growth areas of King's Cross; Euston, Tottenham Court Road; West Hampstead

Interchange and Holborn;

- Schools to be redeveloped as part of Building Schools for the Future programme;
- Existing or approved combined heat and power / local energy networks (see Map 4);

And other locations where land ownership would facilitate their implementation.

f. Protecting existing local energy networks where possible (e.g. at Gower Street and Bloomsbury) and safeguarding potential network routes (e.g. Euston Road);

[…]

<u>Camden's Carbon Reduction Measures</u>

The Council will take a lead in tackling climate change by:

j. Taking measures to reduce its own carbon emissions;

k. Trialling new energy efficient technologies, where feasible; and

l. Raising awareness on mitigation and adaptation measures.

Development Policies (2010)

4.8 Camden's Development Policies Document sets out detailed planning criteria that the council uses to determine applications for planning permission in the borough. The following is considered pertinent to this report:

DP22 – Promoting Sustainable Design and Construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must:

[…]

The Council will require development to be resilient to climate change by ensuring schemes include appropriate climate change adaptation measures, such as:

f. Summer shading and planting;

[…]

5. Other Policy & Regulatory Considerations

5.1 This section comprises an overview of other considerations relevant to the Energy Statement.

Building Regulations

Update 2013 (Part L Conservation of Fuel & Power)

5.2 The Department for Communities and Local Government announced on 30 July 2013 that the update to Part L would include a further 6% carbon reduction for residential from 6 April 2014 and a further 9% reduction for non-residential.

National Planning Practice Guidance

Climate Change

5.3 Advises how planning can identify suitable mitigation and adaption measures in plan-making and the application process to address the potential for climate change.

Renewable and Low Carbon Energy

5.4 The guidance is intended to assist local councils in developing policies for renewable energy in local plans, and identifies the planning considerations for a range of renewable sources.

London Planning Practice Guidance

Sustainable Design and Construction Supplementary Planning Guidance (April 2014)

5.5 The Mayor has published supplementary planning guidance on Sustainable Design and Construction. The document provides guidance on the implementation of London Plan policy 5.3 as well as a range of policies, primarily in Chapters 5 and 7 that deal with matters relating to environmental sustainability.

Energy Planning Guidance (March 2016)

5.6 Policy 5.2 of the London Plan requires each major development proposal to submit a detailed energy assessment. The GLA provides guidance to developers and their advisors on preparing energy assessments to accompany strategic planning applications. With regards to the carbon reduction targets detailed in policy 5.2 of the London Plan, the mayor will apply a 35 per cent target beyond Part L 2013 of the Building Regulations. This is deemed to be broadly equivalent to the 40 per cent target beyond Part L 2010.

Local Planning Policy Guidance

Camden Planning Guidance – Sustainability (CPG3) (2015)

5.7 The guidance provides information on ways to achieve carbon reductions and more sustainable developments. It highlights the Council's requirements and guidelines in support of policies CS13, DP22 and DP23.

5.8 Requires developments involving 5 or more dwellings and/or 500sq m (gross internal) floorspace or more are required to submit an energy statement which demonstrates how carbon dioxide emissions will be reduced in line with the energy hierarchy.

5.9 Includes requirements concerning credits under certain BREEAM categories (e.g. 60% energy credits).

Emerging Planning Policy

Local Plan Submission Draft

On 24 June 2016 the Council submitted the Camden Local Plan and supporting documents to the Secretary of State for Communities and Local Government for independent examination. Draft policies relevant to this report are presented below:

Draft Policy CC1 Climate Change Mitigation [extract]

The Council will require all development to minimise the effects of climate change and encourage all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation.

We will:

a. Promote zero carbon development and require all development to reduce carbon dioxide emissions through following the steps in the energy hierarchy;

b. Require all major development to demonstrate how London Plan targets for carbon dioxide have been met;

[…]

d. Support and encourage sensitive energy efficiency improvements to existing buildings;

[…]

f. Expect all developments to optimise resource efficiency.

For decentralised energy networks, we will promote decentralised energy by:

g. Working with local organisations and developers to implement decentralised energy networks in the parts of Camden most likely to support them;

h. Protecting existing decentralised energy networks (e.g. at Gower Street Bloomsbury, Kings Cross, Gospel Oak, and Somers Town) and safeguarding potential network routes; and

i. Requiring all major developments to assess the feasibility of connecting to an existing decentralised energy network, or where this is not possible establishing a new network.

To ensure that the Council can monitor the effectiveness of renewable and low carbon technologies, major developments will be required to install appropriate monitoring equipment.

6. Site Context Appraisal

6.1 Local climatic conditions, natural resources and energy infrastructure are addressed within this section.

Local Climate

6.2 An assessment of the local climate and natural resources has been compiled from Met Office, Department of Energy and Climate Change and British Geological Survey data. Consideration has been given to the data for Hampstead as the nearest climate station to the site.

Table 6.1 Averages Table (Climate Period 1981-2010)

Month	Max temp (ºC)	Min temp (ºC)	Days of air frost (days)	Sunshine (hours)	Rainfall (mm)	Days of rainfall ≥1mm (days)	Monthly mean wind speed at 10m (knots)
January	7.1	2	8.6	57.5	64.7	12	n/a
February	7.4	1.7	9.5	76.4	46.6	9.7	n/a
March	10.5	3.5	4	107.1	48.9	10.2	n/a
April	13.3	5	1.5	151.6	51.5	9.9	n/a
May	16.8	8	0.1	192.2	58	9.5	n/a
June	19.9	10.9	0	191	54.2	9	n/a
July	22.4	13.2	0	199.9	50.4	8.5	n/a
August	22	13.1	0	193	64.4	8.9	n/a
September	18.8	11	0	140.8	56.9	8.8	n/a
October	14.6	8.1	0.3	109.9	77.7	11	n/a
November	10.3	4.8	2.9	69.4	68.3	11.4	n/a
December	7.4	2.5	7.7	51.6	62.9	11.4	n/a
Annual	**14.3**	**7**	**34.6**	**1540.4**	**704.5**	**120.1**	**n/a**

Microclimate

6.3 The term "microclimate" refers to the climatic conditions at a certain area, which may differ from the surroundings. In the context of sustainability in urban developments, the interest lies at the microclimate within the development site and immediate surroundings as this will have an impact on the actual energy performance of the buildings, the potential for renewables exploitation, indoor/outdoor comfort and safety conditions for occupants and the public.

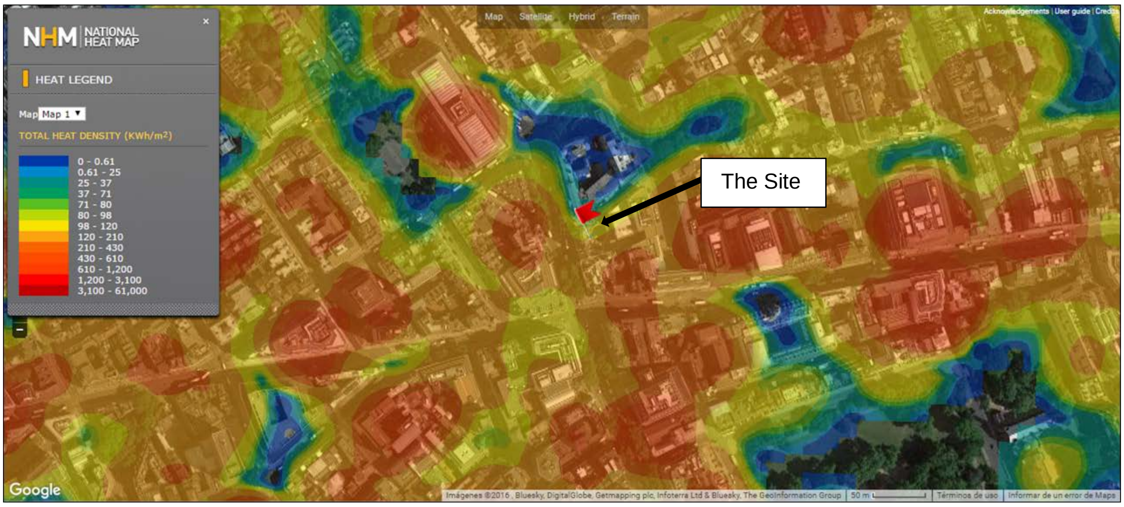
6.4 Given the complex interrelationship between building configuration and microclimatic variables (e.g. air temperature, humidity, wind speed/direction, solar radiation), the microclimatic analysis requires advanced modelling techniques and computational simulations which fall out of the scope of the standard approach towards the formulation of an overarching energy strategy.

6.5 As a general trend, it can be expected that the air temperatures will be higher than assumed for the standard energy performance calculations (in line with National Calculation Methodology), as a result of the Urban Heat Island (UHI) effect; and solar radiation intensity (W/m^2) will present variations depending on elevation orientation. The wind profile will be substantially variant and altered within the dense urban context, with characteristically higher turbulence.

District Heating Opportunities & Heat Maps

6.6 The purpose of the National Heat Map, which was commissioned by the Department of Energy and Climate Change and created by CSE, is to support the planning and deployment of local low-carbon energy projects in England. It aims to achieve this by providing publically accessible high-resolution web-based maps of heat and demand by area.

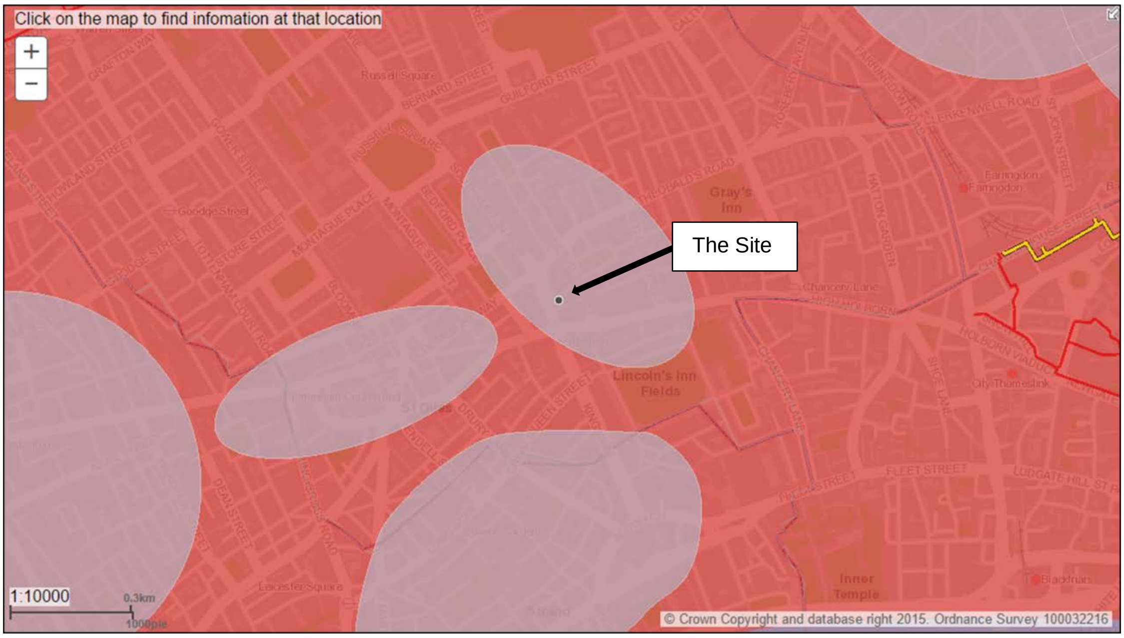
Figure 6.1 Extract from the National Heat Map



6.7 The map shows the site as being within an area identified as having a relatively high total heat density.

6.8 Similarly, the London Heat Map is a tool provided by the Mayor of London to identify opportunities for decentralised energy projects in London and it builds on the 2005 London Community Heating Development Study.

Figure 6.2 Extract from the London Heat Map



6.9 The above extract from The London Heat Map shows the site located in an area of high heat density. Whilst the site is identified as being within an opportunity area, no existing district energy networks or proposed energy works are identified in the vicinity of the site (the nearest being ~1km to the east).

7. Baseline & Carbon Reduction Target

Baseline Position

7.1 A baseline position must first be established, which is calculated using SBEM and assuming compliance with Part L of the 2013 Building Regulations. The following represents site-wide data for the TER calculation.

Figure 7.1 Baseline Carbon Emissions

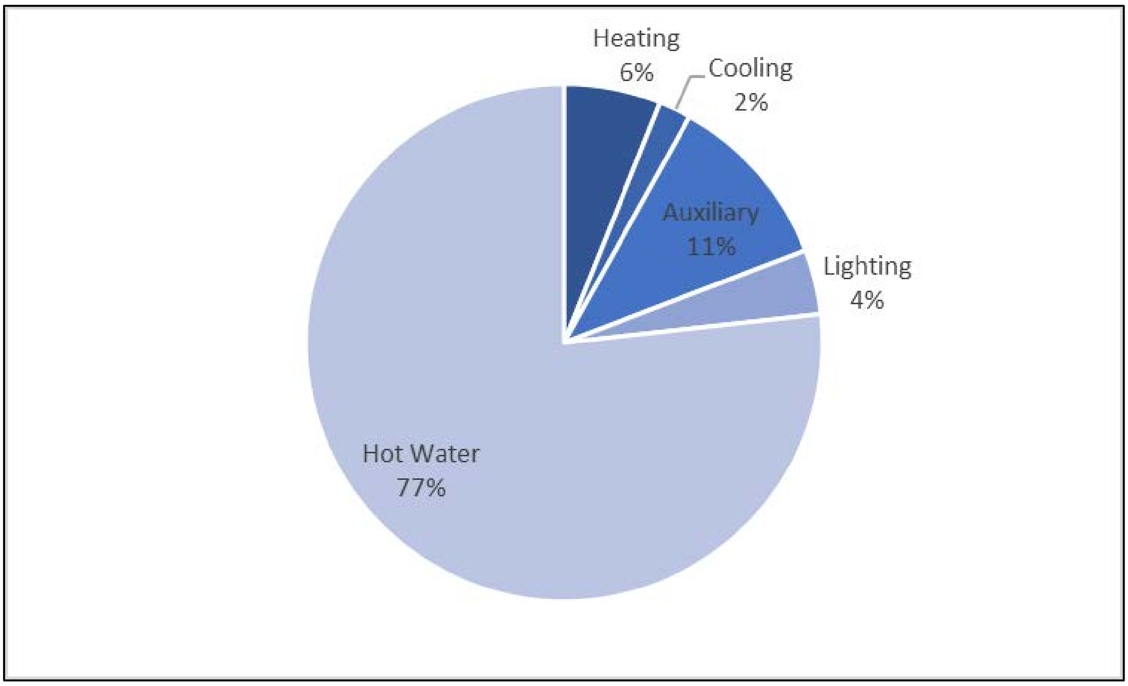


Table 7.1 Carbon Dioxide Emissions - Baseline

Step	Carbon Dioxide Emissions (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2013	413	79

7.2 Non-domestic unregulated emissions have been taken from the unregulated emissions values generated by the SBEM models.

Carbon Reduction Target

7.3 In line with Policy 5.2 of the London Plan and Policy CS13 of the Core Strategy, an on-site carbon reduction target of 35% beyond Part L 2013 applies.

Table 7.2 Target Savings for Regulated Carbon Dioxide Emissions

	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	%
Total Target Savings	144	35%

8. Passive Design & Energy Efficiency

8.1 This section considers features of the proposed design (including indicative performance levels) relevant to passive design and energy efficiencies.

Table 8.1 Passive Design & Energy Efficiency Design Features

Aspect	Description	Appraisal
Passive Design 	Passive design seeks to maximize the use of natural sources of heating, cooling and ventilation to maintain thermal comfort levels within the building.	Building Massing & Orientation The building comprises a single block of ground plus upper storeys and is orientated on the east-west axis of the site. Passive Heating / Cooling The limited extent of south-facing surfaces will help reduce the direct solar gain and potential for overheating. It is intended that windows will be set back slightly to provide a degree of shading from the sun. It is intended that the building will have the potential to be naturally ventilated (via openable window / vent), with ventilation rates calculated to ensure sufficient air chances per hour to maintain temperatures within a comfortable range. Lighting and Daylighting Design The design of the glazed areas will seek to offer good access to natural daylight to reduce consumption of energy for artificial lighting. Overall, a balance shall be sought between achieving daylighting levels and winter solar gains, whilst minimising summer heat gains and cooling loads.
Fabric Efficiency 	Fabric efficiency concerns the thermal properties associated with the building fabric and construction.	Insulation Heat Transfer Coefficients, otherwise referred to as U-Values, are a measure of the rate of heat transfer through a building element over a given area, under standardised conditions (i.e. the rate at which heat is lost or gained through a fabric). It is intended that the performance of the building fabric will incorporate relatively low U-Values to reduce the rate at which the buildings lose heat, preserving the heat within the space and reducing the requirement for mechanical heating.

		The following U-values are provided as a guide for the basic building elements: External Walls ~0.20-0.26W/m²K; Roof ≤0.16W/m²K; Ground Floor ≤0.22W/m²K; Windows ≤1.60W/m²K. <u>Air Tightness</u> A high level of air tightness is proposed and a level below $5m^3/h/m^2$ is targeted, meaning that air infiltration between the internal and the external environment will be largely controlled and space heating demand further reduced. <u>Thermal Bridging</u> Thermal bridging is the penetration of the insulation layer by a highly conductive non-insulating material allowing rapid heat transfer from an interior to exterior environment (and vice versa). In well insulated buildings, as much as 30% of heat loss can occur through thermal bridges. The building fabric shall be constructed so that there are no reasonably avoidable thermal bridges in the insulation layers caused by gaps within the various elements.
System Efficiency 	System efficiency concerns the energy efficiency of the heating, cooling, lighting and auxiliary systems employed within the building.	<u>Back-up Boilers</u> Where conventional gas-fired boilers are employed, these will have an efficiency of >90%. <u>Extract Fans</u> It is anticipated that extract fans will be employed in WC and kitchen areas. The specific fan power (SFP) for these systems will be efficient and below 0.3W/l/s. <u>Metering</u> The major energy uses shall be monitored via separate energy meters and a Building Energy Management System (BEMS) will be installed, which will allow for optimum operational control and performance of complex building services in the development.

		<u>Lighting Efficacy</u> At this stage, detailed lighting design calculations have not yet been undertaken, but lighting design is intended to be highly efficient and in excess of Building Standards requirements. It is intended that lighting efficacy shall be in excess of 75lumens/circuit Watt. Lighting controls (e.g. PIR occupancy sensors) shall be employed throughout the non-residential components and zoned to suit the different space uses; the lighting control strategy shall work in conjunction with daylighting sensors in spaces with substantial glazing, to further reduce the energy consumption for artificial lighting. External lighting shall be highly efficient and employ controls to avoid energy wastage from unnecessary operation during daytime.
Overheating Mitigation 	The issue of overheating will need detailed and considered assessment at a later stage of design on the basis that, as buildings become progressively better sealed and insulated, the potential for overheating increases.	<u>Limiting Summer External Gains</u> Solar control glazing shall be installed to the elevations most affected; the precise specification of glazing types for windows and glazed curtain walling is to be based upon further analysis at later stages so that the appropriate balance is found between limiting summer heat gains without compromising daylight harvesting and winter solar gains. Thermal mass (discussed above) and internal occupant-controlled shading elements will be considered at the more detailed design stage along with heat reflective finishes of the external building surfaces. The above shall be considered in conjunction and interrelationship with the ventilation strategy, to ensure thermal comfort for occupants and energy savings. <u>Limiting Internal Heat Gains</u> Heat losses from the Hot Water and Low Temperature Hot Water (LTHW) distribution network are considered to be a significant source of potential overheating in well insulated buildings. This issue can be a significant factor affecting comfort and will therefore need full consideration during the detailed design of the mechanical systems. However, it is expected that attention will be given to: • The positioning of the distribution network and its potential impact on surrounding spaces;

		• The (mechanical) ventilation of spaces where heating pipework is distributed (e.g. corridors); • The implementation of combined passive/active ventilation systems for air exhaust of spaces into corridors and to the outside; • Maximising the natural ventilation potential of spaces; • The performance of the insulation, with calculations undertaken assessing heat losses from the pipework relative to the heat losses from the spaces.

9. District Energy & Low Carbon Technology Appraisal

9.1 Low carbon technologies are energy generation systems which offer the capability to make more efficient and effective use of primary energy resources, emitting significantly lower levels of carbon dioxide than conventional energy generation methods.

Table 9.1 District Energy & Low Carbon Technology Appraisal

Technology	Description	Appraisal	Proposed
District Energy 	The term "district energy" applies to the energy distribution network, rather than the origins of the energy and the extent of any carbon savings will be largely determined by the energy source and heat losses on the network.	<u>Opportunities</u> • A sufficient heating demand exists on site which could be satisfied by a District Energy system; <u>Limitations</u> • Connection costs and energy prices may be high; • The carbon factor associated with the fuel source is beyond the control of the developer. • There is no DEN in the vicinity of the site. <u>Appraisal</u> • Whilst District Energy is not evident in the vicinity of the site, it is proposed that the site be future proofed to allow future connection.	Future proofed to allow future connection
Combined Heat & Power 	Combined Heat & Power (CHP) systems generate electrical energy and provide the waste heat from the process to be used on site. They are typically gas-powered but can be run off alternative fuel sources. CHP	<u>Opportunities</u> • A sufficient heating demand exists on site which the CHP system could supply; • A base load exists for hot water generation for the residential elements of the proposal. <u>Limitations</u> • The space heating demand presents a variable daily, weekly and seasonal trend; this potentially introduces design complexity and viability implications for the technology;	Yes

	is a highly efficient means to supply heat in developments, providing significant carbon savings and wider environmental benefits (the power generation is much less resource intensive and carbon emitting compared to grid electricity from the average UK power station).	<u>Appraisal</u> • CHP is considered a potentially feasible and viable technology for the site and is proposed for the hot water.	

10. Renewable Technology Appraisal

10.1 Renewable technologies are those which take their energy from sources which are considered to be inexhaustible (e.g. sunlight, wind etc.). Emissions associated with renewables are generally considered to be negligible and the technologies are frequently referred to as "zero carbon".

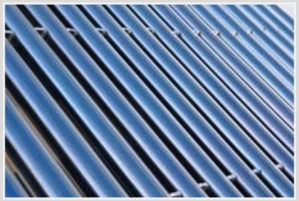
Table 10.1 Renewable Technology Appraisal

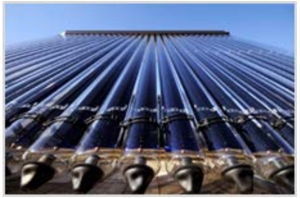
Technology	Description	Appraisal	Proposed
Biomass Systems 	Biomass systems are heating systems that use agricultural, forest, urban and industrial residues and waste to produce heat and (depending on the system) electricity. At the building scale, biomass boilers using wood pellets or woodchips are the norm. Biomass should be sourced locally to limit "embodied carbon" associated with transport and ideally be derived from waste wood products to limit the take-up of agricultural land for fuel crops.	<u>Opportunities</u> • A sufficient heating demand exists, which the biomass system could supply; <u>Limitations</u> • The site is located in an urban environment and away from a readily available and diverse supply of biomass; • Transport, storage and maintenance requirements, would increase the managerial requirements of operation; and • Carbon emissions associated with cultivation, processing and transport of biomass are not normally considered in the context of planning or Building Regulations meaning that total carbon emissions are likely to be significantly higher than estimated. <u>Appraisal</u> • Whilst technically feasible, the absence of a readily available and diverse local fuel source creates risk associated with security of fuel supply. This has implications for operational viability; • Biomass is therefore not a preferred technology for the scheme.	No
Heat Pumps	Heat pumps draw thermal energy from the air, water or	<u>Opportunities</u> • A sufficient heating demand exists, which ASHPs could accommodate;	Yes

Air Source Heat Pumps 	ground ("source") and upgrade it to be used as useful heat at another location ("sink"). Heat pumps require electricity to operate (or gas in the case of Gas Absorption Heat Pumps) as mechanical input is required to convert harvested energy to useful heat and complete its transport to the "sink". Heat pumps are generally considered as renewable (despite an electrical or gas requirement) because the source of the heat is the ambient temperature in the exterior environment, which is ultimately heated via the sun. Reversible systems can provide air conditioning comfort cooling; however, when in cooling mode, the system is not considered renewable as it is not taking advantage of a renewable source of energy.	Limitations • The performance of ASHPs typically varies more than other heat pump options due to greater fluctuations in air temperatures, relative to other heat sources; • Performance reduces when systems are required to achieve higher temperatures. Heat pumps are therefore normally better applied to space heating rather than hot water and specifically to low supply temperature systems (e.g. underfloor heating); • All heat pumps generate noise associated with the movement of refrigerant and (any) fans; • Whilst less expensive than other heat pump systems, relative to other technologies, capital and maintenance costs are high; Appraisal • ASHPs are proposed for space heating on the basis that demand will be variable and intermittent; but also represent a proportionally small amount of the overall energy requirements. A responsive system is therefore advantageous. • Furthermore, it is expected that clients will expect cooling and a reversible AC system would provide the most cost effective and least complex solution.	
Ground Source Heat Pumps 		Opportunities • A sufficient heating demand exists, which GSHPs could accommodate; Limitations • Site constraints and shading render a horizontal configuration non-feasible. Capital costs for vertical installations are typically greater than for horizontal systems due to drilling costs; • Thermal properties of the ground will depend upon a number of factors including geology and depth. Desktop information suggests that thermal properties are below average and therefore deeper boreholes would likely be required; • Performance reduces when systems are required to achieve higher temperatures. Heat pumps are therefore normally better applied to space heating rather than hot water and	No

		specifically to low supply temperature systems (e.g. underfloor heating); <u>Appraisal</u> • Installed vertically, a GSHP system would be technically feasible for supplying heat to part of the development; • However, uncertainties exist with regards to the thermal properties of the ground and performance; • GSHPs are not proposed; principally for financial viability reasons and on the basis that it would represent a relatively expensive means of reducing carbon.	
<u>Water Source Heat Pumps</u> 		<u>Opportunities</u> • A sufficient heating demand exists, which WSHPs could accommodate; <u>Limitations</u> • There is no surface water course in close proximity to the site. • Any use of the river would need to be considerate of the relevant authorities, other users and potential for impact on wildlife. <u>Appraisal</u> • WSHP is not considered an option for the site; primarily for technical feasibility considerations.	No
Micro Hydro Power 	Micro hydro power systems harnesses energy from flowing water by using height differences (called "head"); the minimum allowable head is 1.5m and ideally not lower than 10m.	<u>Opportunities</u> • A sufficient electricity demand exists, which micro hydro power could address. <u>Limitations</u> • No suitable water body is found in the vicinity of the site. <u>Appraisal</u>	No

		• Micro hydro is therefore not considered an option for the site, for technical feasibility reasons.	
Micro Wind Power 	Wind turbines are used to generate electricity; with power production determined by the rotation of the blades and being proportionate to the speed of their rotation. The technology is most efficient for constant, low turbulence wind profiles.	Opportunities • A sufficient electricity demand exists, which micro wind power could contribute towards; Limitations • Due to the urban environment, the wind profile is expected to be highly turbulent, reducing the efficiency of the system; • The average wind speed is low and falls within the lower range for a viability case; • Roof mounted turbines would add height to the buildings with associated aesthetic and planning considerations; and • Moving plant on the roof potentially creates noise and vibration, with associated nuisance and structural considerations. Appraisal • Whilst wind turbines are considered technically feasible in a limited capacity, wind speeds are relatively low and subject to turbulence. The technology is therefore likely to underperform; • On-site & real-time wind speed measurements for at least a year would be required prior to establishing a case for this technology (recommended should the end users wish to investigate further); • Given the uncertainty over performance, the fact that any contribution will likely be quite minor, micro wind turbines are not proposed for the development.	No
Solar Systems Photovoltaics	Both solar thermal and photovoltaic (PV) systems convert energy from the sun	Opportunities • A sufficient electricity demand exists; which PV could partially address;	No

	into a form which can be applied within the building. Solar thermal generates energy for heating (usually for hot water) and PV generates electricity. Hybrid photovoltaic / solar thermal collectors are also available and co-generate heat and power. To maximise the performance from the technology, the solar collectors should be pointed towards the sun; which in the UK is maximised when orientated to the south and at an angle of 30°.	• An extent of roof space exists on the site, which is not subject to significant overshading. <u>Limitations</u> • The area of roof space will limit the potential application of the technology; • The technology tends to have a high capital cost per unit of carbon saved. <u>Appraisal</u> • The high capital costs compared to anticipated savings render this option financially unviable; • The limited availability of suitable roof space would mean that PV would not be able to satisfy the carbon reduction target in isolation and would need to be combined with other LZC technologies. • PV panels are therefore not a preferred option for the energy strategy	
<u>PV-T</u> 		<u>Opportunities</u> • A sufficient electricity and heating demand exists; which PV-T could partially address; • An extent of roof space exists on the site, which is flat and not subject to significant overshading. <u>Limitations</u> • Potential carbon savings are jeopardised by auxiliary power needed to move the heat around the development; • Heating energy generation presents high seasonal variance and has therefore limited scope in efficiently supplying the base heating load (hot water); • The system would be conflicting with the preferred technology	No

		Appraisal • Whilst technically feasible in a limited capacity, the potential maximum application of the technology is unlikely to provide significant carbon dioxide reductions for the development; • This technology would conflict with other preferred LZC technologies; • The high capital costs compared to anticipated savings render this option financially unviable; • The limited availability of suitable roof space would mean that PV-T would not be able to satisfy the carbon reduction target in isolation and would need to be combined with other LZC technologies. • PV-T panels are therefore not a preferred option for the energy strategy.	
Solar Thermal 		Opportunities • A sufficient heating demand exists; which Solar Thermal could partially address; • An extent of roof space exists on the site, which is flat and not subject to significant overshading. Limitations • The technology tends to have a high capital cost per unit of carbon saved; • Potential carbon savings are jeopardised by auxiliary power needed to move the heat around the development; • Heating energy generation presents high seasonal variance and has therefore limited scope in efficiently supplying the base heating load (hot water); • The system would be conflicting with the preferred technology.	No

		Appraisal • Whilst technically feasible in a limited capacity, the potential maximum application of the technology is unlikely to provide significant carbon dioxide reductions for the development; • This technology would conflict with other preferred LZC technologies; • The high capital costs compared to anticipated savings render this option financially unviable; • Solar Thermal panels are therefore not a preferred option for the energy strategy.	

11. Summary

11.1 This Energy Statement provides an overview of the energy strategy in consideration of the site context, anticipated energy requirements and local priorities and initiatives.

11.2 A review of Camden Council's planning policies has identified a number of requirements relating to energy. Of these, Core Strategy policy CS13 (*Tackling Climate Change Through Promoting Higher Environmental Standards*) and Development Policies Document policy DM22 (*Promoting Sustainable Design and Construction*) are considered most pertinent along with Camden Planning Guidance – *Sustainability* (CPG3). Consideration has also been given to the NPPF and GLA's London Plan and the targets contained therein.

11.3 The approach follows the Energy Hierarchy, with priority given to efficient design on the basis that it is preferable to reduce carbon emissions by reducing energy demand than through the use of low and/or zero carbon technologies.

11.4 The building's fabric shall be constructed to a high performance standard, achieving high levels of thermal insulation and low air permeability. Energy efficient lighting and appropriate controls shall be employed throughout the development.

11.5 The CHP central plant shall be used to supply the majority of the base hot water load. The system would be centralised and operate in parallel with an efficient and conventional back-up gas-fired boiler(s). This system is compatible with any future district energy network.

11.6 Space heating represents a relatively small proportion of the overall heating requirements and, due to the nature of the spaces and occupation, will be required to operate intermittently. A reversible ASHP is therefore proposed for space heating on the basis that it will allow for a significant degree of control (i.e. only applying heating when and where needed), will reduce the risk of uncontrolled and wasteful heat losses in the building (e.g. distribution losses) and can be coupled with mechanical cooling relatively simply (anticipated to be an expectation of end-users in a high-end hotel).

Carbon Savings

11.7 Energy modelling has been undertaken using SBEM and the carbon savings delivered by each of the three steps of the Energy Hierarchy have been estimated (indicative outputs are included in the appendices).

Table 11.1 Carbon Dioxide Emissions after Each Stage of the Energy Hierarchy

Step	Carbon Dioxide Emissions (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2013	413	79
After energy demand reduction	383	79
After CHP	291	79
After renewable energy	260	79

Table 11.2 Regulated CO_2 Savings from Each Stage of the Energy Hierarchy

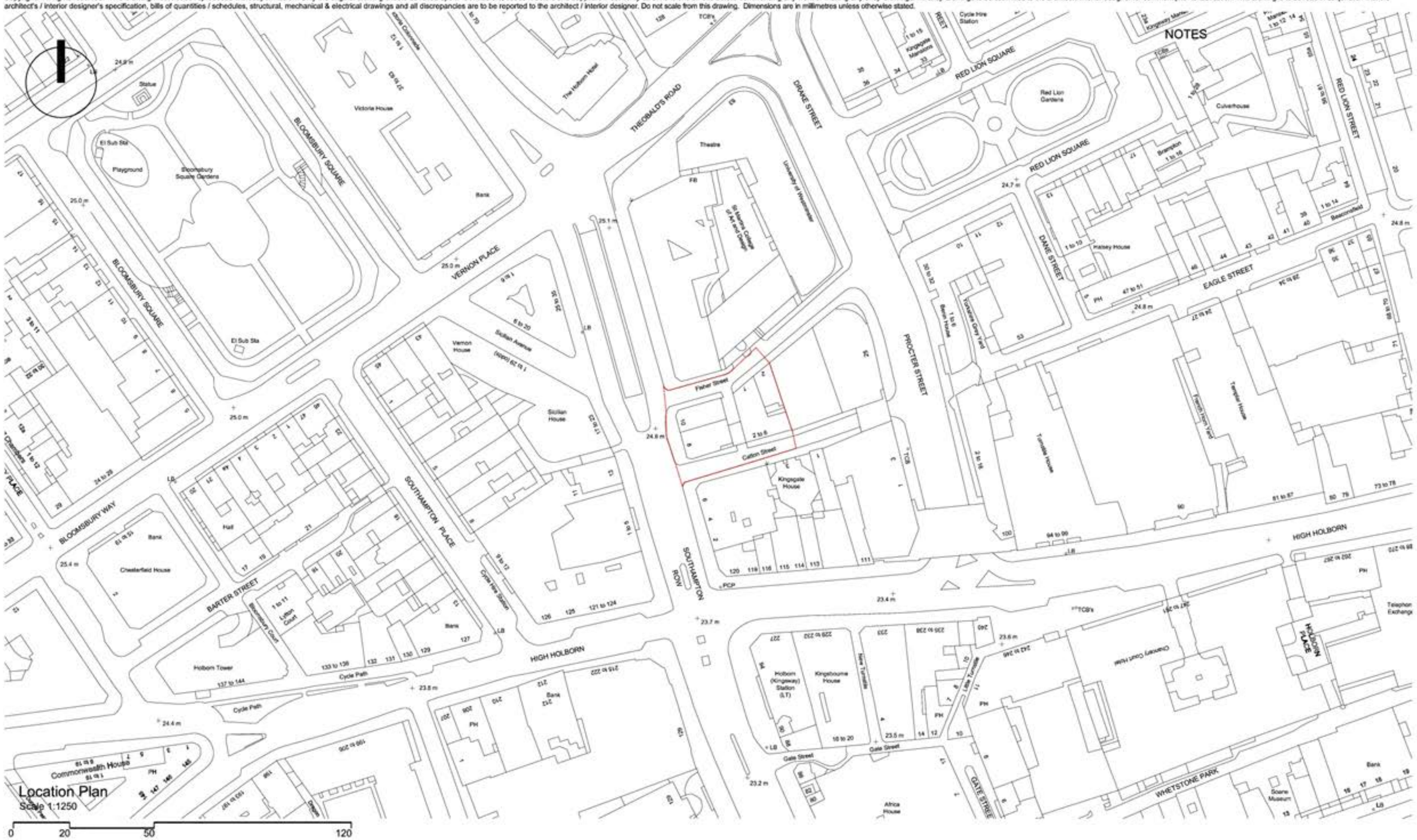
	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	%
Savings from energy demand reduction	29	7.14%
Savings from CHP	93	22.43%
Savings from renewable energy	31	7.43%
Total Cumulative Savings	153	37.00%
Total Target Savings	144	35%
Annual Surplus	7	

11.8 In line with the London Plan and Council policies, a carbon saving >35% against Part L 2013 baseline has been targeted for the development.

11.9 Overall, the proposed energy strategy is considered consistent with the National Planning Policy Framework and policies of the GLA and Council and, when implemented, will provide an efficient and low carbon development.

Appendices

A. Site Plan



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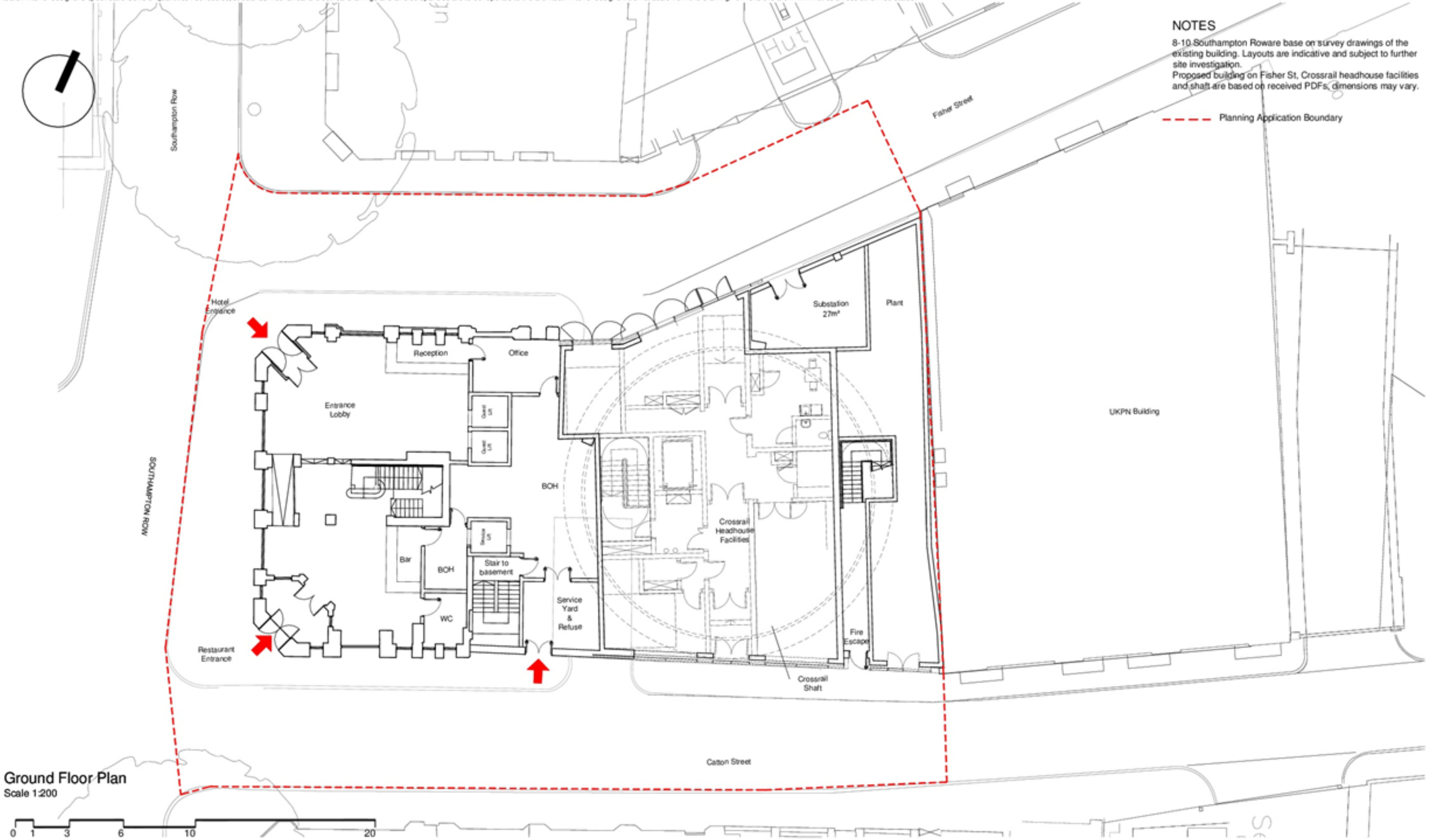
rev	amendments	date	by
P0	ISSUED FOR PRE APPLICATION	31.10.16	RA

project	drawing title	scale	date	drawn by	checked by
Holborn Fisher Street	Location Plan	1:1250 @ A3 NTS @ A4	31.10.16	RA	WY

client	drawing status	job no.	drawing no.	revision
	PRE APPLICATION	1365	A-000-001	P0

ensphere



Ground Floor Plan

Scale 1:200

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architecture

rev	amendments	date	by
P0	ISSUED FOR PRE APPLICATION	31.10.16	RA

project	drawing title	scale	date	drawn by	checked by
PRE APPLICATION	Ground Floor Plan	1:200 @ A3 NTS @ A4	31.10.16	RA	WY

client	drawing status	job no.	drawing no.	revision
Idé Real Estate	PRE APPLICATION	1365	A-100-002	P0

B. Energy Modelling Outputs

SBEM Main Calculation Output Document

Thu Dec 15 20:38:27 2016 v5.2.g.3

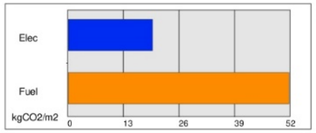
Building name

Southamptonv3

Building type: C1 Hotels

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, Part L for Republic of Ireland and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, **SBEM is not intended as a building design tool.**

Building Energy Performance and CO2 emissions

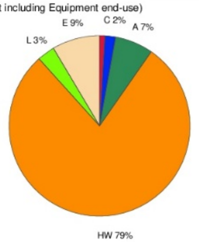


27 kgCO2/m2 displaced by the use of renewable sources.

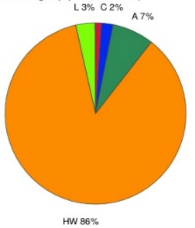
Building area is 5894.64 m2

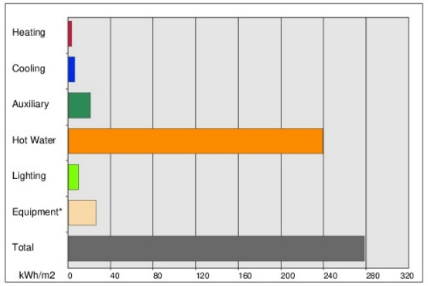
Annual Energy Consumption

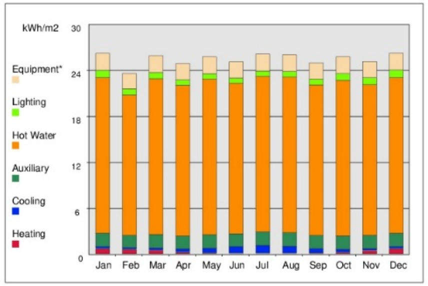
(Pie chart including Equipment end-use)



(Pie chart excluding Equipment end-use)







(*) Although energy consumption by equipment is shown in the graphs, the CO2 emissions associated with this end-use have not been taken into account when producing the rating.

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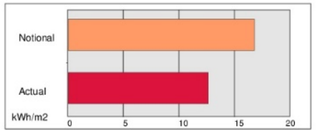
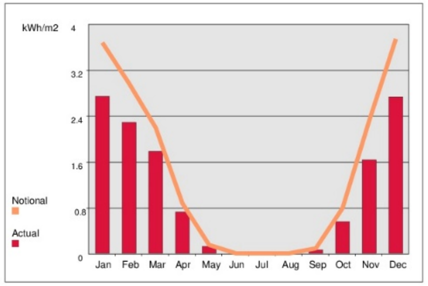
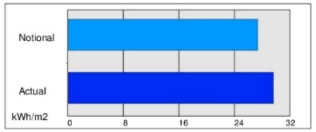
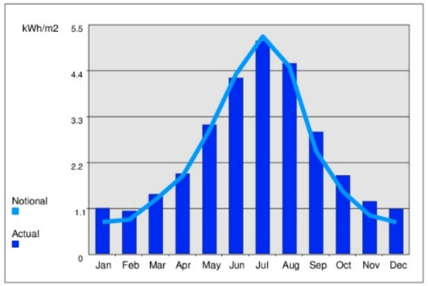
Annual Heating Demand





Annual Cooling Demand





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ensphere

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Southamptonv3

As designed

Date: Thu Dec 15 20:38:28 2016

Administrative information

Building Details

Address: Southampton Row, London,

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: Virtual Environment

Interface to calculation engine version: v7.0.6

BRUKL compliance check version: v5.2.g.3

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Pete Jeavons

Telephone number:

Address: Ensphere Group Ltd, 10 Greycoat Place, London,

Criterion 1: The calculated CO_2 emission rate for the building should not exceed the target

CO_2 emission rate from the notional building, $kgCO_2/m^2$.annum	69.1
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	69.1
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	44.1
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 the building services should achieve reasonable overall standards of energy efficiency

Values not achieving 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	0.26	0.26	CR000000_W22
Floor	0.25	0.22	0.22	BD000002_F
Roof	0.25	0.18	0.18	CR000004_C
Windows***, roof windows, and rooflights	2.2	1.6	1.6	CR000000_W22_O0
Personnel doors	2.2	2.2	2.2	PL000001_W4_O0
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a-Limit}$ = 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	5

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- ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	5	6	-	0.8	0.8
Standard value	2.5*	N/A	N/A	1.6^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps. For types <=12 kW output, refer to EN 14825 for limiting standards.

^ Allowed SFP may be increased by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

2- CHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.93	-	-	1	0.8
Standard value	0.91*	N/A	N/A	1.5^	0.5
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* 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.

^ Allowed SFP may be increased by the amounts specified in the Non-Domestic Building Services Compliance Guide if the system includes additional components as listed in the Guide.

1- SYST0002-DHW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	N/A

1- CCHP Generator

	CHPQA quality index	CHP electrical efficiency
This building	-	0.24
Standard value	Not provided	N/A

Local mechanical ventilation, exhaust, and terminal units

ID	System type in Non-domestic Building Services Compliance Guide
A	Local supply or extract ventilation units serving a single area
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal supply and extract ventilation units serving a single room or zone with heating and heat recovery
E	Local supply and extract ventilation system serving a single area with heating and heat recovery
F	Other local ventilation units
G	Fan-assisted terminal VAV unit
H	Fan coil units
I	Zonal extract system where the fan is remote from the zone with grease filter

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Circulation	-	-	-	-	-	-	-	0.3	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
Linen	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation (2) (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation (2) (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen (2) (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen (2) (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2) (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2) (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2) (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2) (2)	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom (2) (2) (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen (1)	-	-	-	-	-	-	-	0.3	-	-	N/A
Plant	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Bedroom	-	-	-	-	-	-	-	0.3	-	-	N/A
Linen	-	-	-	-	-	-	-	0.3	-	-	N/A
Restaurant	-	-	-	-	-	-	-	0.3	-	-	N/A
Plant	-	-	-	-	-	-	-	0.3	-	-	N/A
Plant	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Circulation	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Office	-	-	-	-	-	-	-	0.3	-	-	N/A
Reception	-	-	-	-	-	-	-	0.3	-	-	N/A
Bar	-	-	-	-	-	-	-	0.3	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	1.9	1.6	0.5	1.1	0.5	1	Zone	Standard
WC	-	-	-	-	-	-	-	0.3	-	-	N/A
Store	-	-	-	-	-	-	-	0.3	-	-	N/A
Store	-	-	-	-	-	-	-	0.3	-	-	N/A
Store	-	-	-	-	-	-	-	0.3	-	-	N/A

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Circulation	-	75	-	356
Linen	75	-	-	20
Bedroom	-	75	-	666
Bedroom	-	75	-	285
Circulation (1)	-	75	-	356
Circulation (2)	-	75	-	356
Linen (1)	75	-	-	20
Linen (2)	75	-	-	20
Bedroom (1)	-	75	-	666
Bedroom (2)	-	75	-	666
Bedroom (1)	-	75	-	285
Bedroom (2)	-	75	-	285
Circulation (2) (1)	-	75	-	356
Circulation (2) (2)	-	75	-	356
Linen (2) (1)	75	-	-	20
Linen (2) (2)	75	-	-	20
Bedroom (2) (1)	-	75	-	666
Bedroom (2) (2)	-	75	-	666
Bedroom (2) (1)	-	75	-	285
Bedroom (2) (2)	-	75	-	285
Bedroom (2) (2) (1)	-	75	-	666
Linen	75	-	-	9
Bedroom	-	75	-	193
Circulation	-	75	-	265
Linen (1)	75	-	-	9
Plant	75	-	-	244
Bedroom	-	75	-	315
Bedroom	-	75	-	243
Circulation	-	75	-	265
Circulation	-	75	-	325
Bedroom	-	75	-	325
Bedroom	-	75	-	304
Linen	75	-	-	20
Restaurant	-	75	22	514
Plant	75	-	-	365

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General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Plant	75	-	-	143
Circulation	-	75	-	235
Office	75	-	-	247
Office	75	-	-	364
Circulation	-	75	-	71
Office	75	-	-	303
Office	75	-	-	494
Reception	-	75	22	297
Bar	-	75	15	314
WC	-	75	-	49
Store	75	-	-	103
Store	75	-	-	263
Store	75	-	-	90

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?
Circulation	NO (-5.1%)	NO
Linen	YES (+34.1%)	NO
Bedroom	NO (-81.4%)	NO
Bedroom	NO (-41.9%)	NO
Circulation (1)	NO (-5.1%)	NO
Circulation (2)	NO (-5.1%)	NO
Linen (1)	YES (+34.1%)	NO
Linen (2)	YES (+34.1%)	NO
Bedroom (1)	NO (-81.4%)	NO
Bedroom (2)	NO (-81.4%)	NO
Bedroom (1)	NO (-41.9%)	NO
Bedroom (2)	NO (-41.9%)	NO
Circulation (2) (1)	NO (-5.1%)	NO
Circulation (2) (2)	NO (-5.1%)	NO
Linen (2) (1)	YES (+34.1%)	NO
Linen (2) (2)	YES (+34.1%)	NO
Bedroom (2) (1)	NO (-81.4%)	NO
Bedroom (2) (2)	NO (-81.4%)	NO
Bedroom (2) (1)	NO (-41.9%)	NO
Bedroom (2) (2)	NO (-41.9%)	NO
Bedroom (2) (2) (1)	NO (-81.9%)	NO
Linen	N/A	N/A
Bedroom	NO (-91.1%)	NO
Circulation	N/A	N/A
Linen (1)	N/A	N/A
Plant	N/A	N/A
Bedroom	NO (-82.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Bedroom	NO (-70.5%)	NO
Circulation	N/A	N/A
Circulation	NO (-56.7%)	NO
Bedroom	NO (-82.9%)	NO
Bedroom	NO (-76.6%)	NO
Linen	YES (+34.1%)	NO
Restaurant	NO (-35.5%)	NO
Plant	N/A	N/A
Plant	N/A	N/A
Circulation	NO (-34.4%)	NO
Office	N/A	N/A
Office	NO (-16.5%)	NO
Circulation	N/A	N/A
Office	NO (-34.2%)	NO
Office	NO (-75.8%)	NO
Reception	NO (-46.8%)	NO
Bar	NO (-35%)	NO
WC	NO (-30%)	NO
Store	N/A	N/A
Store	N/A	N/A
Store	N/A	N/A

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?	YES
Are any such measures included in the proposed design?	YES

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Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m^2]	5894.6	5894.6
External area [m^2]	5166.6	5166.6
Weather	LON	LON
Infiltration [m^3/hm^2@ 50Pa]	5	3
Average conductance [W/K]	2314.66	2935.75
Average U-value [W/m^{2}K]	0.45	0.57
Alpha value* [%]	24.01	19.2

* 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
100	**C1 Hotels**
	C2 Residential Inst.: Hospitals and Care Homes
	C2 Residential Inst.: Residential schools
	C2 Residential Inst.: Universities and colleges
	C2A Secure Residential Inst.
	Residential spaces
	D1 Non-residential Inst.: Community/Day Centre
	D1 Non-residential Inst.: Libraries, Museums, and Galleries
	D1 Non-residential Inst.: Education
	D1 Non-residential Inst.: Primary Health Care Building
	D1 Non-residential Inst.: 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/m^2]

	Actual	Notional
Heating	2.86	6.89
Cooling	5.81	7.58
Auxiliary	20.68	28.59
Lighting	9.52	12.54
Hot water	238.77	189.63
Equipment*	25.86	25.86
TOTAL**	**225.32**	**245.23**

* Energy used by equipment does not count towards the total for calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	52.32	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	151.62	158.48
Primary energy* [kWh/m^2]	247.04	397.77
Total emissions [kg/m^2]	44.1	69.1

* 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 SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] Heat pump (electric): air source, [HFT] Electricity, [CFT] Electricity									
Actual	45.4	106.3	2.9	5.8	20.7	4.4	5.08	5	6
Notional	60.3	98.2	6.9	7.6	28.6	2.43	3.6	----	----

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 BCO can give particular attention to items with specifications that are better than typically expected.

Building fabric

Element	U_{i-Typ}	U_{i-Min}	Surface where the minimum value occurs*
Wall	0.23	0.26	CR000000_W22
Floor	0.2	0.22	BD000002_F
Roof	0.15	0.18	CR000004_C
Windows, roof windows, and rooflights	1.5	1.6	CR000000_W22_O0
Personnel doors	1.5	2.2	PL000001_W4_O0
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

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	5

C. General Notes

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The review of planning policy and other requirements does not constitute a detailed review. Its purpose is as a guide to provide the context for the development and to determine the likely requirements of the Local Authority.

No site visits have been carried out, unless otherwise specified.

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