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Energy Statement

145 – 147 Camden Road, London, NW1 9HA

Iceni Projects Limited on behalf of

Harry Motors Ltd

March 2016

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Iceni Projects Ltd
Flitcroft House 114-116 Charing Cross Rd, London WC2H 0JR
T 020 3640 8508 **F** 020 3435 4228 **W** iceniprojects.com

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ICENI PROJECTS LIMITED ON BEHALF OF HARRY MOTORS LTD

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1. EXECUTIVE SUMMARY

1.1 This Energy Statement presents the energy strategy for a proposed office development at 145 – 147 Camden Road, London.

1.2 Consideration has primarily been given to the planning policy context and other requirements prior to establishing a strategy prioritising efficiency, with low carbon and renewable technologies considered in the context of their economic feasibility and financial viability, as per the Mayor's energy hierarchy approach.

1.3 The following is therefore proposed:

- Passive design measures to reduce energy demand for heating, cooling, ventilation and lighting;
- High performance building fabric and energy efficient lighting, services and equipment;
- Highly efficient gas-fired boiler providing hot water and space heating;
- Potential for connectivity to future district energy networks; and
- 20% of the total regulated CO_2 emissions for the development to be met by roof-mounted PV.

1.4 The proposed energy strategy for 145 – 147 Camden Road will target a ≥35% reduction in regulated CO_2 emissions compared to the Building Regulations Part L2A 2013 baseline, therefore being considered consistent with the National Planning Policy Framework and policies of the GLA and Camden Council and, when implemented, will provide a highly-efficient and low carbon development.

2. INTRODUCTION

2.1 Iceni Projects Ltd was commissioned by Harry Motors Ltd to produce an Energy Statement for a proposed scheme at 145 – 147 Camden Road, London, NW1 9HA.

Site & Surroundings

2.2 The Application Site currently comprises a car park used for the adjacent 'Auto Deutsche' car restoration workshop, with this building located to the south-east of the Site occupying the developable area directly above the railway. Camden Road borders the site to the south and south-east, and the Thameslink railway line is located directly west, with services from Bedford to St. Pancras International & London Blackfriars, with some services operating to Brighton.

2.3 To the north and east is Cantelowes Gardens which is maintained by Camden Borough Council and operates as a children's play area, a skateboarding bowl, a free to use outdoor gym and a multi-games use area. This area is publicly accessible up to 10pm each day.

2.4 The Site is situated in a predominantly residential area of Camden / Kentish Town, with some limited commercial uses along Camden Road. The topography of the Site is generally flat.

The Proposed Development

2.5 Planning permission is to be sought for a proposed re-development of the existing car park to a new four-storey office of approximately 950sq.m of floorspace, with associated cycle storage, a bin store, lift access throughout and balcony space on each floor.

Report Objective

2.6 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.

Methodology

2.7 The report commences with a review of the planning policy and site context prior to an introduction to the Energy Hierarchy, the approach used as a basis for the energy strategy.

2.8 Passive design and energy efficiency measures are then reviewed before an assessment of the potential for district energy and low carbon and renewable technologies.

2.9 The proposed energy strategy then follows, with the report concluding with a summary.

3. PLANNING CONTEXT

3.1 Approaches to energy and carbon dioxide are incorporated within policy at all levels as set out below:

National

National Planning Policy Framework (NPPF)

3.2 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. The following parts of the NPPF are considered most relevant to energy in the context of the proposed scheme:

> **NPPF Paragraph 17. [extract]**
>
> Within the overarching roles that the planning system ought to play, a set of core land-use planning principles should underpin both plan-making and decision-taking. These [12 principles] area that planning should:
>
> Support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change, and encouraging the reuse of existing resources, including conversion of existing buildings, and encourage the use of renewable resources (for example, by the development of renewable energy);

> **NPPF Paragraph 93.**
>
> Planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability and providing resilience to the impacts of climate change, and supporting the delivery of renewable and low carbon energy and associated infrastructure. This is central to the economic, social and environmental dimensions of sustainable development.

NPPF Paragraph 95.

To support the move to a low carbon future, local planning authorities should:

Plan for new development in locations and ways which reduce greenhouse gas emissions;

Actively support energy efficiency improvements in existing buildings; and

When setting any local requirements for a building's sustainability, do so in a way consistent with the Government's zero carbon building policy and adopt nationally described standards.

NPPF Paragraph 96.

In determining planning applications, local planning authorities should expect new development to:

Comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can demonstrated by the applicant, having regard to the type of development involved and its design, that his is not feasible or viable; and

Take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

Regional

3.3 Within London, key sustainable development principles relating to carbon dioxide and energy are set out below:

The London Plan (March 2015)

3.4 The London Plan is the overall strategic plan for London and should be a material consideration for any development proposals within the GLA boundary. Chapter 5 details London's response to climate change, and policies of relevance to this statement are as follows:

- **Policy 5.2: Minimising Carbon Dioxide Emissions** – requires all development proposals to adhere to the energy hierarchy when seeking to minimise carbon emissions, are requires all major non-domestic developments to submit an energy statement demonstrating how carbon emissions will be improved on by 40% over the targets set by Building Regulations Part L 2010.
- **Policy 5.3: Sustainable Design and Construction** – requires all major developments to demonstrate how carbon dioxide is minimised across the site, how internal overheating is limited, and how natural resources are efficiently used.
- **Policy 5.6: Decentralised Energy in Development Proposals** – seeks to encourage major developments to connect to existing or proposed heating or cooling energy networks where feasible, and if based on future network opportunities, be designed to connect to these.

- **Policy 5.7: Renewable Energy** – encourages major developments to provide a portion of carbon emissions reductions from on-site renewable energy, where feasible.

- **Policy 5.9: Overheating and Cooling** – requires major developments to reduce potential overheating and reliance on air conditioning systems in accordance with the cooling hierarchy.

3.5 Additionally, paragraph 5.42 under Policy 5.7 confirms the following with regard to renewable energy within major developments:

> *"There is a presumption that all major development proposals will seek to reduce carbon dioxide emissions by at least 20 per cent through the use of on-site renewable energy generation wherever feasible."*

Sustainable Design and Construction Supplementary Planning Guidance (April 2014)

3.6 This document provides guidance on the implementation of London Plan policies 5.2 & 5.3 as well as a range of requirements relating to energy. It also provides further clarification for the carbon reduction targets given in Policy 5.2 of the London Plan, stating in paragraph 2.4.3 that:

> *"The Mayor will adopt a flat carbon dioxide improvement target beyond Part L 2013 of 35% to both residential and non-residential development"*

Energy Planning – GLA guidance on preparing energy assessments (April 2015)

3.7 The guidance note provides further detail on addressing the London Plan's energy hierarchy through the provision of an energy assessment to accompany strategic planning applications. Additionally in an update section for 2015, it confirms the 35% improvement target as per the Sustainable Design & Construction SPD above.

Local

3.8 In determining the local context, the London Borough of Camden policy & guidance is provided through the following documents and policy / guidance of relevance is noted:

Core Strategy 2010 – 2025 (Parts 1 & 2)

3.9 The Core Strategy sets out the key elements of the Council's vision for Camden and is the central document of the LDF. A policy of relevance is as follows:

- **Policy CS13: Tackling Climate Change through Promoting Higher Environmental Standards –** requires all development to minimise carbon emissions by implementing the Camden energy hierarchy (identical to the London Plan energy hierarchy)

3.10 Additionally, paragraph 13.11 as supporting text for Policy CS13 expects developments to achieve a 20% reduction in CO_2 emissions from on-site renewable energy generation, as per the London Plan guidance.

Development Policies 2010 – 2025

3.11 The development policies document sets out more detailed planning criteria for assessing proposals. A policy of relevance is as follows:

- **Policy DP22: Promoting Sustainable Design and Construction –** expects major non-residential development to achieve an 'excellent' rating in BREEAM assessments from 2016, and zero carbon from 2019.

Draft Local Plan (Submission Version, 2016)

3.12 Although not adopted presently, this document does provide an indication of the key policy objectives for the area over the coming decades, and gives the following with regard to energy & carbon emissions:

- **Policy CC1: Climate Change Mitigation –** expects all development to reduce CO_2 emissions through the energy hierarchy and all major developments to demonstrate how the London Plan CO_2 emission reduction targets have been met. Also requires major developments to assess the feasibility of connection to existing decentralised energy networks.

Camden Planning Guidance: Sustainability (July 2015)

3.13 This SPD provides guidance on how to achieve the required carbon reductions of the borough and deliver more sustainable developments, and supports Policies CS13 & DP22 outlined above.

3.14 It asks that all major development proposals are submitted with an energy statement demonstrating CO_2 emissions reductions in line with the energy hierarchy, and gives indications of what to include in this.

Sustainability Standards

3.15 It is intended to assess the new offices under the BREEAM New Construction methodology for non-domestic uses with a target of achieving 'Excellent'.

3.16 Further details on the BREEAM sustainability assessment tool can be found in the accompanying Sustainability Statement, produced by Iceni Projects Ltd. BREEAM considers a number of issues relevant to energy including energy efficiency, carbon emissions, unregulated energy consumption, monitoring and management of energy systems.

4. FORMULATION OF THE STRATEGY

4.1 The Energy Strategy is based upon the principles of the Energy Hierarchy and is consistent with the Council's & the Greater London Authority's recommended sequential approach.

4.2 The tiers of the Energy Hierarchy are:

1. Be Lean — Reduce Energy Demand
2. Be Clean — Use Low Carbon Source of Energy
3. Be Green — Use Renewable Energy

4.3 The residual energy demand that needs to be supplied via burning fossil fuels is therefore minimised, and significant carbon savings are achieved during the operation phase of the development's lifecycle.

4.4 The first principle therefore relies on energy efficient design and the site characteristics such as the local climate, surroundings, scale and size of the development, which all influence the energy savings that can be achieved. Furthermore, the design of the building fabric can reduce energy wastage and associated energy demand.

4.5 The second principle prioritises the use of low carbon sources 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.

4.6 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.

4.7 In subsequent sections following on from an appraisal of site context, passive design and energy efficiency, low-carbon and renewable technologies are considered.

5. SITE CONTEXT APPRAISAL

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

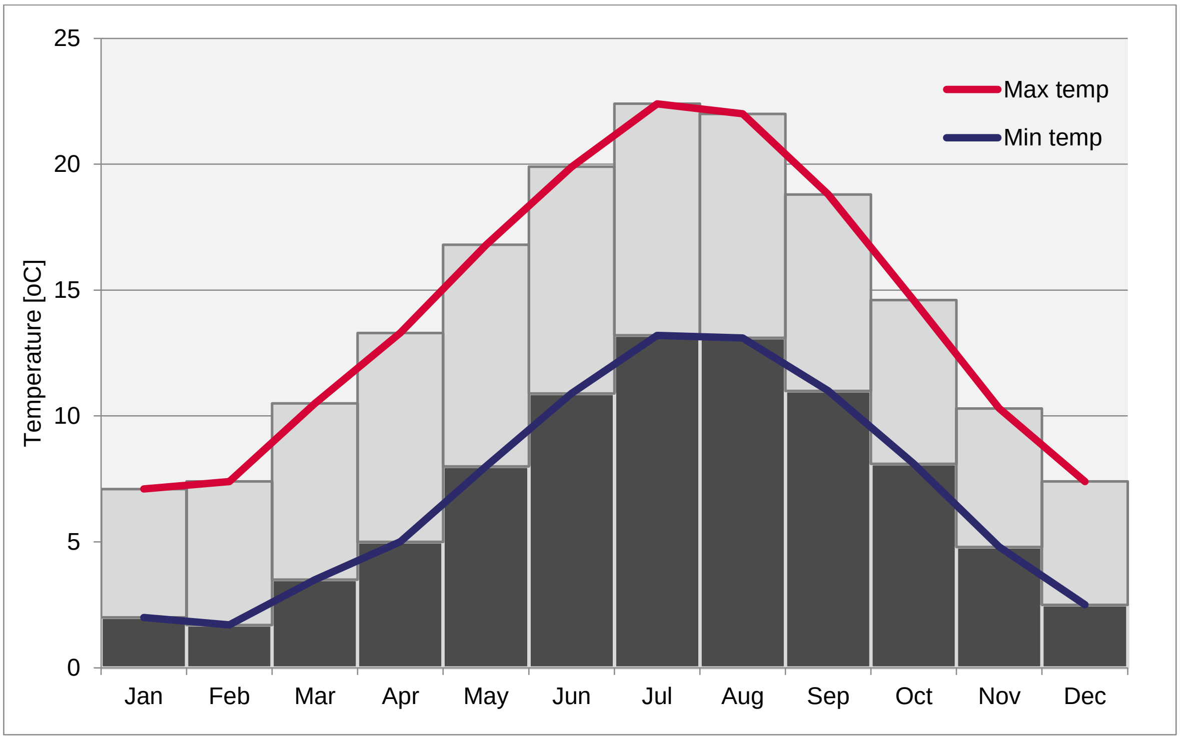
Local Climate

5.2 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.

Temperatures

5.3 The nearest climate station to the site is located at Hampstead. The highest average maximum temperature typically occurs in July and is recorded as 22.4ºC on average for the period 1981-2010; the lowest average minimum temperature typically occurs in February and is recorded as 1.7ºC.

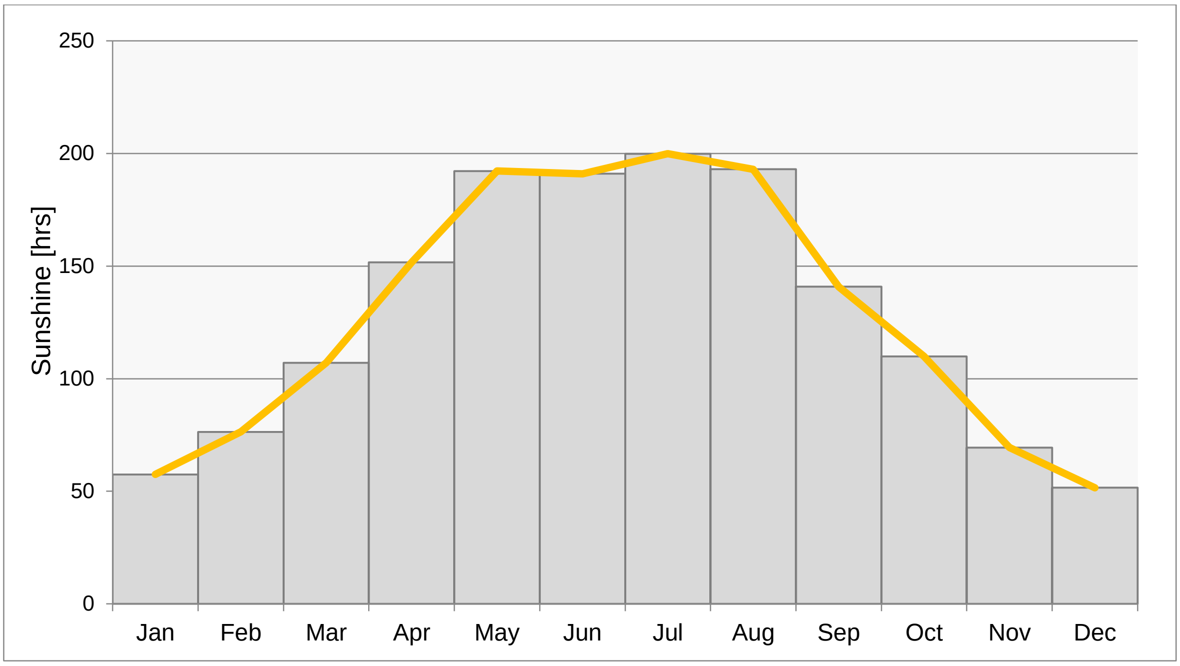
Graph 5.1 Average Monthly Maximum & Minimum Dry Bulb Temperature



Sunshine Hours

5.4 The total sunshine hours per annum over the period 1981-2010 is ~1,540; with the monthly average peaking in July with 199.9 hours. The lowest monthly average hours of sunshine is recorded as December with 51.6 hours.

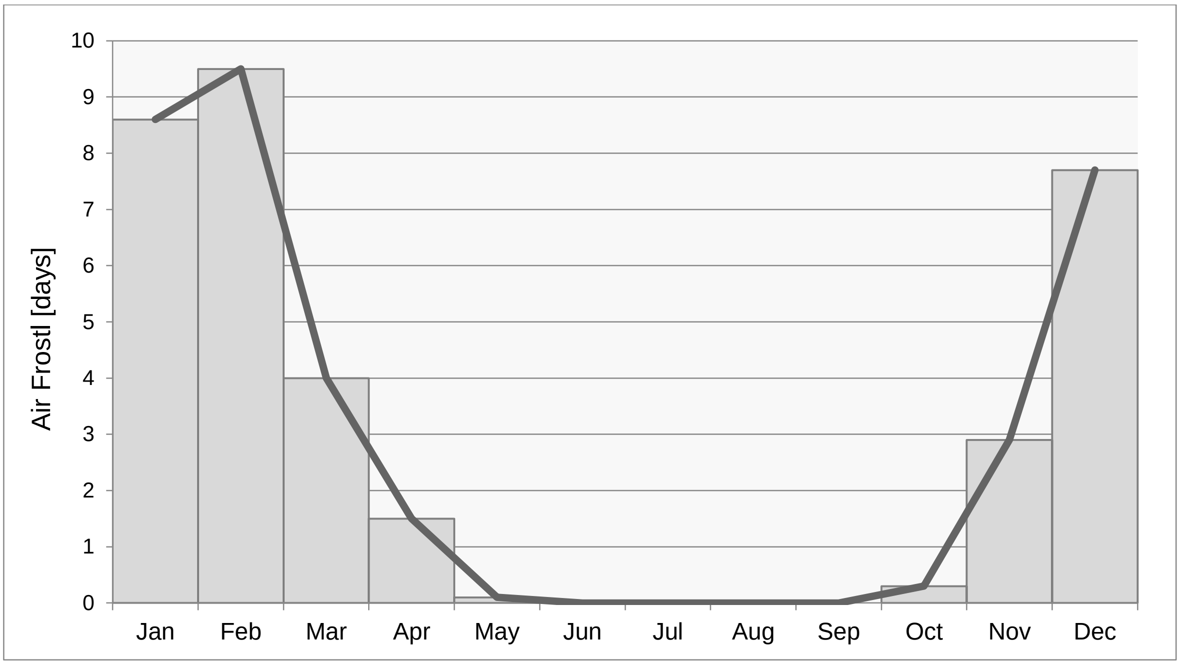
Graph 5.2 Average Monthly Sunshine Hours



Frost Days

5.5 Per annum, and measured over the period 1981-2010, the area experiences a total of 34.6 days on average; peaking in February with an average of 9.5 days.

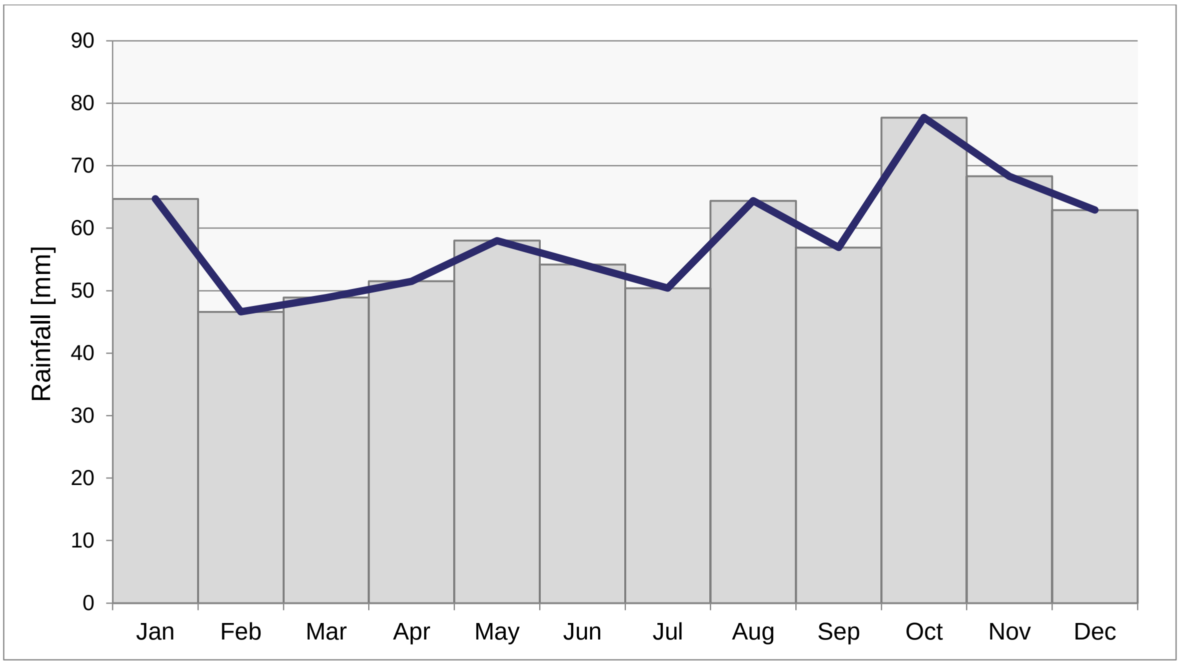
Graph 5.3 Average Monthly Air Frost Days



Rainfall

5.6 Data for the period 1981-2010 indicates an average yearly total of 704.5mm; peaking in October with 77.7mm in the month.

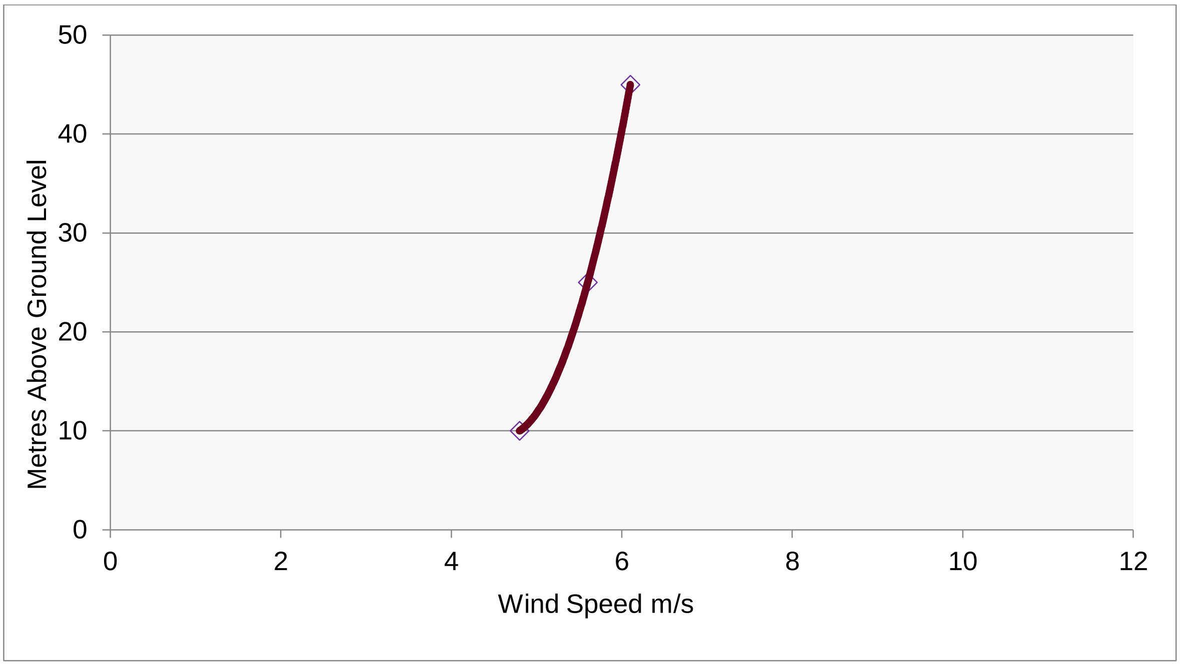
Graph 5.4 Average Monthly Rainfall



Wind Speed

5.7 The UK Windspeed database, which was originally developed by the Department of Trade and Industry prior to 2001, draws on information from the 1970s and 1980s. Whilst the database is no longer updated, it does provide a guide of likely windspeeds across the country. It is therefore a useful data source to allow a preliminary assessment. According to the database, the average wind speed at 10m above ground level (agl) in the vicinity of the site is 4.8m/s; 5.6m/s at 25m agl and 6.1m/s at 45m agl.

Graph 5.5 Average Wind Speed



Microclimate

5.8 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 developments, the potential for renewables exploitation, indoor/outdoor comfort and safety conditions for occupants and the public.

5.9 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.

5.10 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 and high wind speeds at lower levels due to buildings’ height. The influence of the adjacent park lands with trees and vegetation will likely have a passive cooling effect on neighbouring buildings such as the Application Site.

Decentralised Energy Networks

5.11 Core Strategy Map 4 shows areas most likely to provide development-led decentralised energy networks; Figures 4 and 5 of CPG3 show the location of existing and proposed/emerging networks; the London Heat Map (see below) also provides equivalent information.

5.12 In line with CPG3 the Council expects that developments which fall within 1km of an existing energy network or one that could be operational within 3 years of occupation should assess the feasibility of connecting to the network; or that developments which fall within 500m of a potential network which has no timetable for delivery should ensure that the development is capable of connecting to a network in the future.

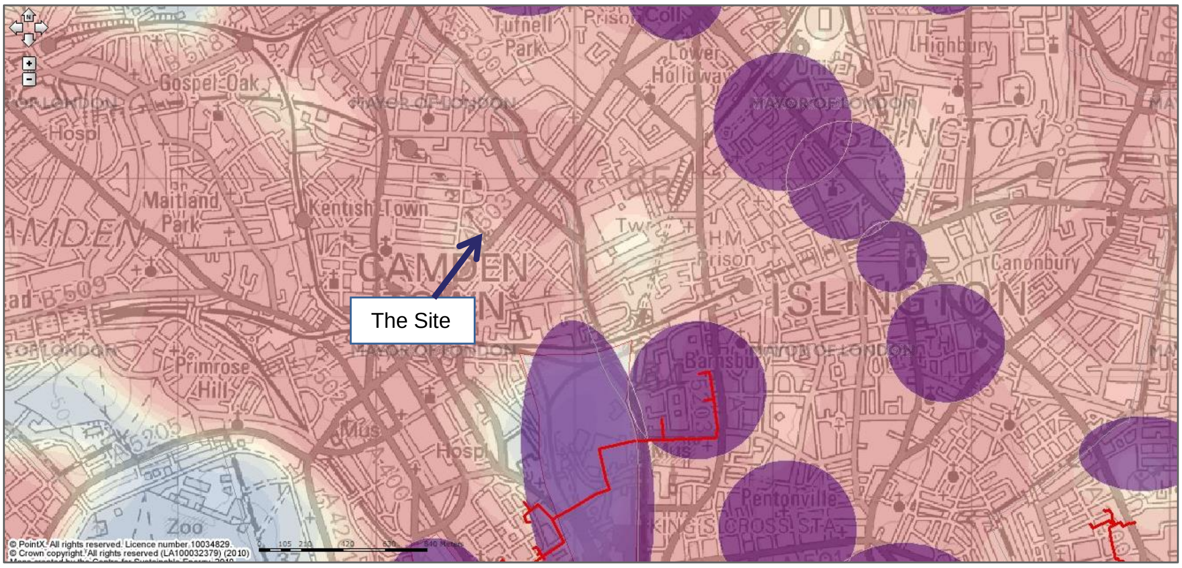
5.13 As shown in Figures 4 & 5 of CPG3, the proposed development lies outside the 1km and 500m boundaries of existing/emerging or potential district energy networks.

The London Heat Map

5.14 The London Heat Map is a tool provided by the Mayor of London to identify opportunities for decentralised energy projects in London. It builds on the 2005 London Community Heating Development Study.

5.15 The image below illustrates the London Heat Map in the vicinity of the application site. It shows that the proposed scheme is located in an area of modest heat demand and is 420m north-west of an opportunity area (designated in purple) and approx. >1000m north-west of an existing network.

Figure 5.1 Extract from the London Heat Map



6. PASSIVE DESIGN & ENERGY EFFICIENCY

6.1 This section considers features of the proposed design relevant to passive energy savings and energy efficiencies aiming to reduce the energy demand, in line with the first step of the Energy Hierarchy.

Bioclimatic Design Measures

6.2 The opportunities that arise to incorporate the principles of bioclimatic design differ between sites and can be limited in a dense urban context such as this. It is considered that the proposed design makes optimum use of the site; and whilst the orientation of the building is determined in part by the shape of the existing car park and the boundaries, the internal layout and elevations' design is in agreement with bioclimatic design principles.

Daylight

6.3 The proposed fully-glazed south-west facing façade will optimise the penetration of daylight to the internal parts of the office floors. Daylight availability in other office areas away from the proposed curtain wall will be further enhanced by suitable placement of full length windows. Enhanced levels of daylight in office spaces can help to remove the need for artificial lighting through either installing daylight sensors on lights or providing users with accessible controls.

Sunlight

6.4 The sun is a source of warmth or passive solar energy, and fabric/systems of a building can be designed to capture and use the solar energy, therefore minimising the need for mechanical heating of spaces. The glazed areas collect the sun's energy and directly heat occupied spaces; this process is called "passive solar heating" and has the potential to save considerable amounts of energy. Solar collecting facades require access to low angle sun during the winter (path from southeast to southwest) when its contribution is most valuable.

6.5 In terms of sunlight availability it is considered best practice to orientate the occupied spaces of the offices towards the elevations experiencing highest levels of winter sunlight, i.e. the south, southeast and southwest elevations. Orientation of the glazing to these preferred elevations is considered to have been maximised in the proposed scheme, with a large, fully glazed curtain wall orientated southwest.

6.6 Overshading by other buildings, which can significantly lessen the effectiveness of passive solar design, is minimal in the proposed development due to the comparative height of nearby properties and the limited opportunity for new development on all sides of the site.

6.7 Overall it is considered that the proposed design of glazed areas offers a good balance between sunlight/daylight harvesting, winter heat losses via the glazing and summer overheating (examined below).

Natural Ventilation

6.8 It is anticipated that all spaces in the proposed new offices will be predominantly ventilated naturally via natural façade ventilators (louvres with thermally insulated dampers) installed on the dual skin southwest facing curtain wall. Spaces not adjacent to the dual skin curtain wall will also be mechanically ventilated via demand controlled systems to minimise the risk of overheating during summer and aid in achieving the targeted flow rates of fresh air described in Building Regulations Part F.

Passive Design Measures

6.9 Much of the fabric design will be undertaken at the detailed design stage; however the following provides an indication as to the anticipated approach.

Heat Transfer Coefficients

6.10 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).

6.11 It is intended that the performance of the building fabric will incorporate relatively low U-Values to reduce the rate at which the building loses heat, preserving the heat within the spaces and reducing the requirement for mechanical heating.

6.12 The following U-values are provided as a guide for the basic building elements:

- External Walls ≤0.15W/m^{2}K;
- Roof ≤0.12 W/m^{2}K;
- Ground Floor ≤0.14 W/m^{2}K; and
- Glazing ≤1.40 W/m^{2}K.

Air Leakage

6.13 A high level of air tightness is proposed and a level below 3m^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.

Thermal Mass

6.14 Thermal mass is the ability of the fabric of a building to absorb heat, store it, and at a later time release it. Similar to the Heat Transfer Coefficients, this is a detail that will be considered more fully as the design progresses.

6.15 Nevertheless, it is recognised that thermal mass has the potential to capture and release energy and help regulate requirements throughout the day. Typically, a higher thermal mass helps reduce the cooling requirements for buildings in the UK during summer months. To maximise the benefits, consideration will be given to the specific climate and daytime occupation; particularly during winter months where the addition of thermal mass can increase winter heating. Furthermore, the removal of heat during summer months (e.g. night-time ventilation) is key to gains by having mass and the approach is not necessarily suited to buildings with 24 hour occupancy.

6.16 As a rule of thumb, the best place for thermal mass is inside the insulated building envelope and a better insulated envelope will mean more effective thermal mass. Furthermore, thermal mass should be left exposed internally to allow it to interact with the house interior.

Energy Efficiency Measures

Space Heating

6.17 Boiler components shall have a seasonal efficiency in the order of >90% and, if required, the thermal store and distribution pipework shall be pre-insulated to minimise heat wastage and overheating risk. For advanced energy savings and improved thermal comfort, an underfloor heating system can be considered for the distribution of heat in the building.

6.18 Advanced individual space heating controls shall be employed as appropriate for each space. (e.g. room thermostats, time programmers). The charging system will be linked to use; providing incentives to the tenants to efficiently manage consumption.

Mechanical Ventilation

6.19 Some spaces may require mechanical ventilation on the basis that some areas may be too deep to easily facilitate a natural ventilation strategy. Therefore, and if required, mechanical ventilation will be kept to a minimum commensurate with acceptable levels of indoor air quality on the basis that the system, if oversized, can significantly increase capital costs, running costs, energy use and associated emissions of carbon dioxide. Major supply and extract fans of the mechanical ventilation system shall be low-energy, with a specific fan power (SFP) no greater than 0.8 W/l/s; the regulation of the mechanical ventilation system shall also employ appropriate controls for further energy efficiency. Local extract fans within toilets and kitchen areas shall have a SFP below 0.3W/l/s.

Lighting

6.20 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. Lighting will be zoned and controlled as appropriate throughout the development; advanced lighting controls (e.g. daylight dimming with constant illuminance control) shall be considered for the occupied spaces in which desks are proposed and occupancy controls shall be employed throughout.

6.21 If required, external lighting shall be highly efficient and employ controls to avoid energy wastage from unnecessary operation during daytime.

Metering

6.22 The major energy uses shall be monitored via separate energy meters to allow at least 90% of the estimated total energy consumption of the spaces to be assigned to various end-use categories.

Overheating Mitigation

6.23 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.

6.24 Overheating can be caused by:

- External Heat Gains – e.g. sun shining through the windows;
- Internal Heat Gains – e.g. occupant activity, building services, inadequate ventilation, lighting and appliances;
- Construction Type & Layout – e.g. increased gains with lighter weight construction.
- Site Location – e.g. the ventilation strategy may be inhibited by other factors; such as reliance on openable windows in areas with noise / security concerns;
- Landscaping – e.g. if external surroundings are predominantly hard surfaces, the air available for ventilation may already be warm before it enters the property;
- Urban Heat Island – e.g. increased external temperatures due to thermal mass releasing heat during the night and the widespread use of refrigeration / cooling equipment.
- Orientation – e.g. certain orientations, especially west-facing buildings, are difficult to protect against solar gain.

Limiting Summer External Gains

6.25 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 of occupied spaces.

6.26 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.

6.27 The above shall be considered in conjunction and interrelationship with the ventilation strategy, to ensure thermal comfort for occupants and energy savings.

Limiting Internal Heat Gains

6.28 Heat losses from the Hot Water and Low Temperature Hot Water (LTHW) distribution network are considered to be the primary 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.

6.29 For the specific development, the following measures are considered that will contribute in managing overheating risks in accordance with the London Plan Cooling Hierarchy (Policy 5.9); and subject to further analysis at later design stages:

1. Energy efficient small power and plug-in equipment will be prioritised during the fit-out of the office spaces to minimise internal heat generation. BREEAM credit Ene08 (Energy Efficient Equipment) is prioritised subject to detailed design, and all office equipment will be either Energy Star rated or procured in accordance with Government Buying Standards. If pipework is installed for distribution of heat in the building, calculations will be undertaken assessing heat losses from the pipework relative to the heat losses from the spaces;

2. A proposed green roof and green wall will help provide passive cooling along with the nearby soft landscaping on the north and east boundaries of the site. Solar control glazing will be considered for the southwest façade;

3. Thermal mass shall be incorporated where appropriate and viable, and will be investigated during detailed design;

4. Natural ventilation is expected to be feasible throughout, by using the dual skin curtain wall ventilators;

5. Mechanical ventilation is proposed for a minimal amount of areas which are not exposed to the natural ventilation system through the dual-skin curtain wall; and

6. No cooling is proposed for any of the spaces due to the high associated carbon emissions this generates and the affect it has on amenity (both through noise and visual).

7. DECENTRALISED ENERGY

District Energy

7.1 District energy refers to the distribution of heat (normally as steam or hot water) and/or chilled water from a central energy centre to individual buildings to be used for space heating, domestic hot water and air conditioning. Energy is distributed via a network of pre-insulated pipework and the end-users connect to it via heat exchangers; networks can supply only heat (“district heating”), cool water (“district cooling”) or both (“district heating and cooling”).

7.2 The term “district energy” applies to the energy distribution network, rather than the origins of the energy, which is normally either:

- Waste heat from power generation plants or other industrial processes;
- Waste heat from CHP plants;
- Conventional centralised systems (boilers).

7.3 The extent of any carbon savings will be largely determined by the energy source.

Heating Demand Characteristics

7.4 The heating demand for the office spaces will likely be characterised by an increased heating demand during the mornings and afternoons, and little or no use during weekends.

Identified Networks

7.5 The Camden Core Strategy and London Heat Maps have been used to identify district energy opportunities in the wider area (see Section 5); both these resources suggest a modest heat demand in the immediate vicinity of the site. Both maps suggest a District Energy opportunity area approximately 420m to the south-east of the Application Site, and the nearest existing network is approximately over 1km away.

Table 7.1 District Energy Appraisal

Criteria	
Opportunities	• A sufficient heating/cooling demand exists, which could be partially satisfied by a district energy system.
Limitations	• No existing networks exist in the vicinity;
Appraisal 	• Whilst technically feasible, the proposed scheme comprises a relatively low density development with minimal heating demand and connection costs will be relatively high; • District energy is therefore not proposed as part of the energy strategy; however, the building will be designed to ensure compatibility with such a system, should one be developed in the future within an economically viable distance of the site.

8. LOW CARBON FEASIBILITY

8.1 Low carbon technologies are energy generation systems which emit significantly lower levels of carbon dioxide than conventional technologies. The consideration of such systems following the application of energy efficiency measures is consistent with the second tier of the Energy Hierarchy.

Combined Heat & Power (CHP)

8.2 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 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).

8.3 Good practice CHP system design follows that engines are best sized to meet the base heating demand of a development. System sizing in response to the base load allows the CHP engine to run for the whole year without significant modulation, preventing engine wear, reduced life expectancy and efficiency drop.

Table 8.1 CHP Appraisal

Criteria	
Opportunities	• Given the nature of the proposed scheme, heating demands are likely to be insignificant and characterised by short periods of peak demand and longer periods of negligible demand.
Limitations	• The space heating demand presents a variable daily and weekly trend; this potentially introduces design complexity and viability implications for the technology; and • The potential impacts on amenity; primarily on air quality and secondary noise and vibration in a predominantly residential area are considered prohibitive to this technology.
Appraisal 	• On the grounds of technical feasibility and local air/noise pollution considerations, a CHP is not considered an appropriate technology. • CHP is therefore not a preferred technology for the scheme.

9. RENEWABLES FEASIBILITY

9.1 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”.

9.2 Consideration of renewables represents the third tier of the Energy Hierarchy and this section discusses their feasibility for the proposed scheme.

Biomass Systems

9.3 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.

Table 9.1 Biomass Systems Appraisal

Criteria	
Opportunities	• A sufficient heating demand exists, which biomass could accommodate.
Limitations	• Transport, storage and maintenance requirements, would increase the managerial requirements of operation; • The application of biomass has implications for local air quality as highlighted in the Camden CPG3; 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.
Appraisal 	• 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. Additionally, it is likely that application of biomass would lead to significant harm to local residents through air quality, noise, and transport of fuel to site. • Biomass is therefore not a preferred technology for the scheme.

Heat Pumps

9.4 Heat pumps draw thermal energy from the air, water or 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".

9.5 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.

Table 9.2 Air Source Heat Pumps Appraisal

Criteria	
Opportunities	• A sufficient heating/cooling demand exists, which ASHPs could accommodate.
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, which has implications for the residential surroundings. Additionally, the external element of ASHPs poses a visual amenity issue; and • Whilst less expensive than other heat pump systems, relative to other technologies, capital and maintenance costs are high.
Appraisal 	• Air source heat pumps are rejected for the energy strategy on the basis that they represent a higher capital expenditure than alternatives and have implications relating to maintenance, noise and visual amenity;

Table 9.3 Ground Source Heat Pumps Appraisal

Criteria	
Opportunities	• A sufficient heating demand exists, which GSHPs could accommodate.
Limitations	• Capital costs for GSHPs are typically greater than for alternative systems due to drilling costs; • Thermal properties of the ground will depend upon a number of factors including geology and depth, which would require extensive studies to demonstrate; and • 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).
Appraisal 	• Installed vertically, a GSHP system would be technically feasible for supplying heat to 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.

Table 9.4 Water Source Heat Pumps Appraisal

Criteria	
Opportunities	• A sufficient heating demand exists, which WSHPs could accommodate.
Limitations	• There is no suitable surface water body available in the vicinity of the site and site constraints render the development of appropriate water basins non feasible.
Appraisal 	• WSHP is not considered an option for the site; primarily for technical feasibility considerations.

Micro Hydro Power

9.6 Micro hydro power systems harness energy from flowing water by using height differences (called "head"); the minimum allowable head is 1.5m and ideally not lower than 10m.

Table 9.5 Micro Hydro Power Appraisal

Criteria	
Opportunities	• A sufficient electricity demand exists, which micro hydro power could address.
Limitations	• No suitable water body is found in the vicinity of the site.
Appraisal 	• Micro hydro is therefore not considered an option for the site, for technical feasibility reasons.

Micro Wind Power

9.7 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.

Table 9.6 Micro Wind Power Appraisal

Criteria	
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 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 building with associated aesthetic and planning considerations in a predominantly low-rise residential area; 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; • Given the uncertainty over performance, the fact that any contribution will likely be quite minor, micro wind turbines are not proposed for the development.

Solar Systems

9.8 Both solar thermal and photovoltaic (PV) systems convert energy from the sun 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.

9.9 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°.

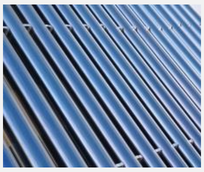
Table 9.7 PV Panels Appraisal

Criteria	
Opportunities	• A sufficient electricity demand exists, which PV could partially address, especially considering the peak electricity production of this technology would coincide with the predicted usage times for the office space; • PV is a unique technology with little or no operational costs once installed; and • An extent of flat roof space exists which is not subject to overshading.
Limitations	• 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.
Appraisal 	PV is considered to be a technically feasible and viable option for the site.

Table 9.8 PV-T Panels Appraisal

Criteria	
Opportunities	• A sufficient electricity and heating demand exists, which PV-T could partially address; • An extent of flat roof space exists on the site, which is not subject to 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;
Appraisal 	• The high capital costs compared to anticipated savings render this option financially unviable; • This technology would directly interfere with the proposed PV solution, which in comparison achieves the required site-wide energy savings for a lower cost per unit of carbon saved; • PV-T panels are therefore not a preferred option for the energy strategy.

Table 9.9 Solar Thermal Panels Appraisal

Criteria	
Opportunities	• A sufficient heating demand exists, which Solar Thermal could partially address.
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; • Due to the predicted Monday-Friday operation of the building, the panels would absorb heat across weekends during the summer, which is likely to impact their durability.
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; • Solar Thermal panels are therefore not a preferred option for the energy strategy.

10. ENERGY STRATEGY

10.1 The proposed energy strategy for the scheme at 145-147 Camden Road is based upon the current planning policy regime as detailed within the London Borough of Camden Council Core Strategy, Development Policies document and the CPG3: *Sustainability* SPD.

10.2 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 or zero carbon technologies.

10.3 Section 6 highlights the key proposed energy efficiency measures; and the feasibility study detailed in Sections 7, 8 & 9 highlighted that decentralised energy (via connection to a decentralised energy network or on-site CHP) is not suitable for the proposed development; and has promoted the use of photovoltaics to achieve the desired carbon savings. The PV would be incorporated on the flat roof in conjunction with the proposed green roof, as both these design features would work well in tandem. The proposed approach therefore makes best use of the potential of the site for renewable energy generation, as the full extent of the usable flat roof will be used, to be further developed as part of the detailed design.

10.4 The energy strategy proposed shall reduce carbon emissions by ≥35% against the relevant Building Regulations 2013 Target Emission Rate, with ≥20% of savings attributed to the renewable energy generation by the photovoltaics. This level of performance is consistent with the Core Strategy CS13 preferred level of carbon savings from renewables (see paragraph 13.11), and the London Plan's required level of carbon savings for major developments as per Policy 5.2 and the update provided in the Sustainable Design & Construction SPG. These proposed carbon savings are also consistent with the minimum requirements of BREEAM 'Excellent' rating, with further details on this provided in the Sustainability Statement, produced by Iceni Projects Ltd.

Carbon Savings

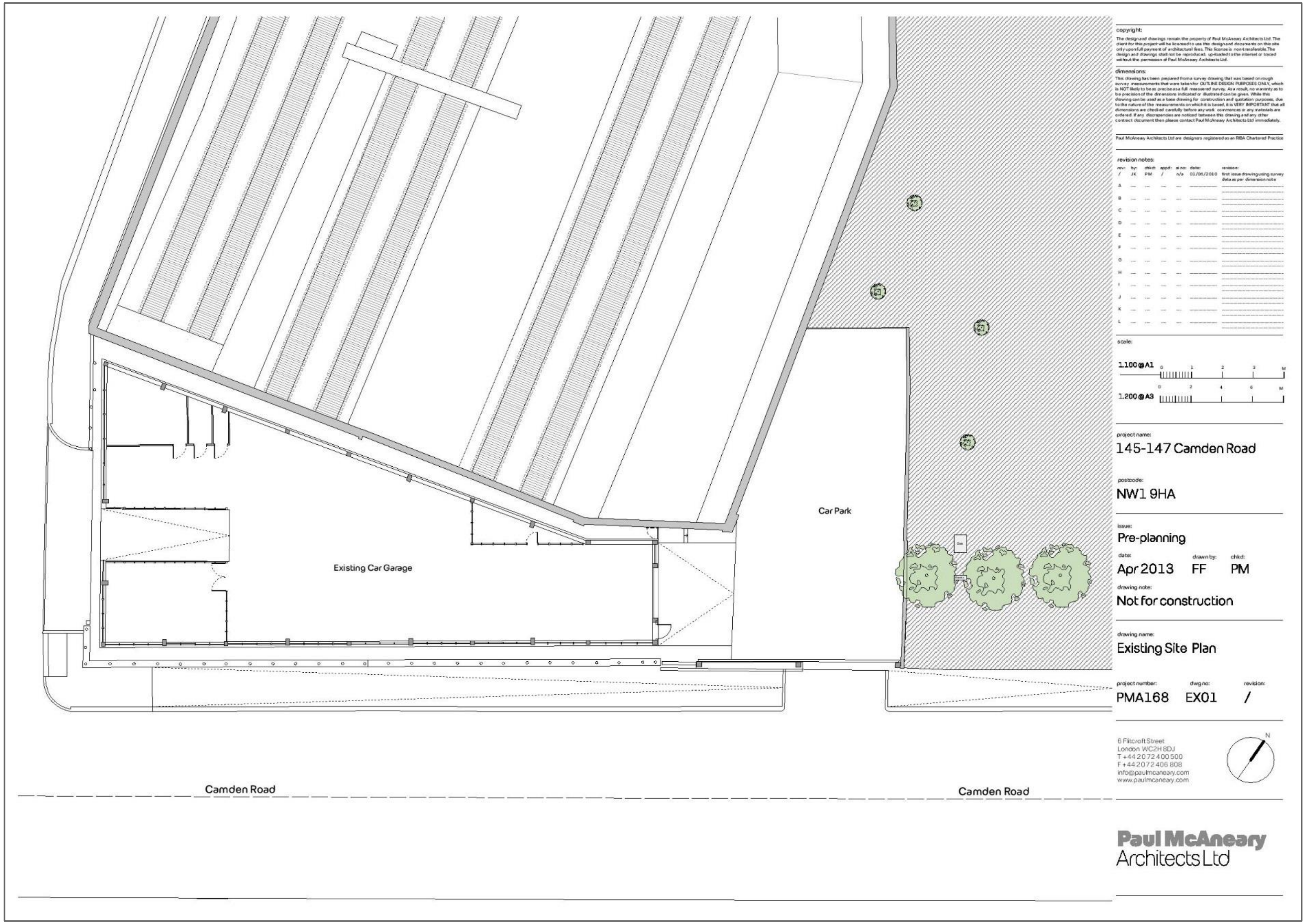
10.5 Energy modelling has been undertaken using SBEM (output report given in Appendix A2), and these carbon savings delivered by the proposed energy strategy have been estimated using this model.

Table 10.1 The implementation of the energy hierarchy & estimated carbon savings for the new build office

The Energy Hierarchy Implementation for the new build offices			
	Carbon Emissions [tonnes/annum]	Carbon Savings [tonnes/annum]	Carbon Savings [%]
Baseline (BR 2013 Part L2A Compliant)	13.74	n/a	n/a
Energy efficiency	12.17	1.57	11.42%
Efficient Supply/CHP	n/a	n/a	n/a
Renewable energy	8.67	3.50	25.47%
Total Carbon Savings	**5.07 tonnes/annum**		**36.89%**

10.6 Overall, the proposed energy strategy for 145-147 Camden Road is considered consistent with the London Plan and the policies of the London Borough of Camden development plan and, when implemented, will provide an efficient and low carbon development.

A1. SITE PLAN



Existing Car Garage
Car Park
Camden Road
Camden Road
copyright:
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dimensions:
This drawing has been prepared from a survey drawing that was based on rough survey measurements that were taken for OUTLINE DESIGN PURPOSES ONLY, which is NOT likely to be as precise as a full measured survey. As a result, no warranty as to be precision of the dimensions indicated or illustrated can be given. While this drawing can be used as a base drawing for construction and quotation purposes, due to the nature of the measurements on which it is based, it is VERY IMPORTANT that all dimensions are checked carefully before any work commences or any materials are ordered. If any discrepancies are noticed between this drawing and any other contract document then please contact Paul McAneary Architects Ltd immediately.
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revision notes:
rev: by: chkd: appd: ai no: date: revision:
/ JK PM / n/a 01/06/2010 first issue drawing using survey data as per dimension note
A
B
C
D
E
F
G
H
I
J
K
L
scale:
1:100@A1
1:200@A3
project name:
145-147 Camden Road
postcode:
NW1 9HA
issue:
Pre-planning
date: drawn by: chkd:
Apr 2013 FF PM
drawing note:
Not for construction
drawing name:
Existing Site Plan
project number: dwg no: revision:
PMA168 EX01 /
6 Flitcroft Street
London WC2H 8DJ
T +44 2072 400 500
F +44 2072 406 808
info@paulmcaneary.com
www.paulmcaneary.com
N
Paul McAneary
Architects Ltd

A2. INDICATIVE ENERGY MODELLING RESULTS

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name **Shell and Core**

145-147 Camden Road

As designed

Date: Mon Mar 14 11:33:23 2016

Administrative information

Building Details

Address: 145-147 Camden Road, London, NW1 9HA

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: ISBEM

Interface to calculation engine version: v5.2.g

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

Owner Details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, Information not provided by the user

Certifier details

Name: Information not provided by the user

Telephone number: Information not provided by the user

Address: Information not provided by the user, Information not provided by the user, XX XX

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	14.4
Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	14.4
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	9.1
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	0.15	0.2	WC male/sw
Floor	0.25	-	-	"No heat loss floors"
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	1.4	1.4	Glazed curtain wall
Personnel doors	2.2	-	-	"No external personnel doors"
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	3

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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	NO
Whole building electric power factor achieved by power factor correction	>0.95

1- Panel heaters

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	-	-	-
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

2- Office

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.9	-	-	-	-
Standard value	0.91*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for gas single boiler systems <=2 MW output. For single boiler systems >2 MW or multi-boiler systems, (overall) limiting efficiency is 0.86. For any individual boiler in a multi-boiler system, limiting efficiency is 0.82.

1- Default HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	-
Standard value	N/A	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
Server room	-	-	-	-	-	-	-	-	-	-	N/A
Entrance & Lobby	-	-	-	-	-	-	-	-	-	-	N/A
WC male	0.3	-	-	-	-	-	-	-	-	-	N/A
Disabled WC	0.3	-	-	-	-	-	-	-	-	-	N/A
WC female	0.3	-	-	-	-	-	-	-	-	-	N/A
office	-	-	-	-	-	-	-	-	-	-	N/A
Staff room and dining	0.3	-	-	-	-	-	-	-	-	-	N/A
Meeting room	-	-	-	-	-	-	-	-	-	-	N/A
Reception	-	0.8	-	-	-	-	-	-	-	-	N/A

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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
Open office	-	0.8	-	-	-	-	-	-	-	-	N/A

Shell and core configuration

Zone	Assumed shell?
Server room	NO
Entrance & Lobby	NO
WC male	NO
Disabled WC	NO
WC female	NO
office	NO
Staff room and dining	NO
Meeting room	NO
Reception	NO
Open office	NO

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
Server room	71	-	-	48
Entrance & Lobby	-	167	-	140
WC male	-	143	-	19
Disabled WC	-	143	-	16
WC female	-	143	-	21
office	71	-	-	60
Staff room and dining	-	143	-	96
Meeting room	89	-	-	99
Reception	-	167	15	83
Open office	83	-	-	342

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?
Server room	YES (+15%)	NO
office	YES (+2.5%)	NO
Staff room and dining	YES (+103%)	NO
Meeting room	YES (+94.8%)	NO
Reception	N/A	N/A
Open office	NO (-37.6%)	NO

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	YES
Are any such measures included in the proposed design?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	187.9	187.9
External area [m²]	142.8	142.8
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	5
Average conductance [W/K]	78.94	113.69
Average U-value [W/m²K]	0.55	0.8
Alpha value* [%]	24.75	22.54

* 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
100	**B1 Offices and Workshop businesses**
	B2 to B7 General Industrial and Special Industrial Groups
	B8 Storage or Distribution
	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/m²]

	Actual	Notional
Heating	8.09	7.07
Cooling	0	0
Auxiliary	4.19	3.68
Lighting	13.16	17.98
Hot water	8.28	8.19
Equipment*	33.19	33.19
TOTAL**	**33.71**	**36.92**

* 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/m²]

	Actual	Notional
Photovoltaic systems	7.1	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	239.05	169.55
Primary energy* [kWh/m²]	74.86	83.22
Total emissions [kg/m²]	9.1	14.4

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

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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] No Heating or Cooling										
	Actual	47.8	170.5	0	0	0	0	0	0	0
	Notional	115.3	121.7	0	0	0	0	0	---	---
[ST] Other local room heater - unfanned, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	56.8	14.9	19.7	0	10.6	0.8	0	1	0
	Notional	64.7	92.9	21.9	0	14.2	0.82	0	---	---
[ST] Central heating using water: floor heating, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	26	238.9	9	0	4.6	0.8	0	0.9	0
	Notional	21.5	130.6	7.3	0	3.5	0.82	0	---	---

Key to terms

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

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Key Features

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

Building fabric

Element	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.12	office/nw
Floor	0.2	-	"No heat loss floors"
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	1.4	Glazed curtain wall
Personnel doors	1.5	-	"No external personnel doors"
Vehicle access & similar large doors	1.5	-	"No external vehicle access doors"
High usage entrance doors	1.5	-	"No external high usage entrance doors"

$U_{i\text{-}Typ}$ = Typical individual element U-values [W/(m²K)] $U_{i\text{-}Min}$ = 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
$m^3/(h.m^2)$ at 50 Pa	5	3

A3. GENERAL NOTES

A3.1 The report is based on information available at the time of the writing and discussions with the client during any project meetings. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by Iceni Projects Ltd for inaccuracies in the data supplied by any other party.

A3.2 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.

A3.3 No site visits have been carried out, unless otherwise specified.

A3.4 This report is prepared and written in the context of an agreed scope of work and should not be used in a different context. Furthermore, new information, improved practices and changes in guidance may necessitate a re-interpretation of the report in whole or in part after its original submission.

A3.5 The copyright in the written materials shall remain the property of Iceni Projects Ltd but with a royalty-free perpetual licence to the client deemed to be granted on payment in full to Iceni Projects Ltd by the client of the outstanding amounts.

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