AUGUST 2017

Sustainability & Energy Statement

Da Vinci House, 44 Saffron Hill, London, EC1N 8FH

Iceni Projects Limited on behalf of
E&A (Saffron Hill) Limited

August 2017

ICENI PROJECTS LIMITED ON BEHALF OF E&A (SAFFRON HILL) LIMITED

Sustainability & Energy Statement
DA VINCI HOUSE, 44 SAFFRON HILL, LONDON, EC1N 8FH

Iceni Projects
London: Flitcroft House, 114-116 Charing Cross Road, London, WC2H 0JR
Glasgow: 2/1 Mercantile Chambers, 53 Bothwell Street, Glasgow, G2 6TS

t: 020 3640 8508 **| w:** iceniprojects.com | **e:** mail@iceniprojects.com
linkedin: linkedin.com/company/iceni-projects | **twitter**: iceniprojects

CONTENTS

1. EXECUTIVE SUMMARY

Iceni Projects Ltd has been commissioned by E&A (Saffron Hill) Limited (the Applicant) to develop a Sustainability and Energy Statement to support the proposed change of use scheme at Da Vinci House, 44 Saffron Hill, London, EC1N 8FH, in the London Borough of Camden.

The application site comprises of the existing lower ground, and part ground floor of 'Da Vinci House' at 44 Saffron Hill, within the Farringdon area of Central London.

The scheme proposes a change of use of existing lower ground and part ground floor to office use, together with minor external alterations.

There are three key elements to the approach to sustainability for Da Vinci House, as follows:

1. The change of use proposals have been assessed using the London Borough of Camden's Local Plan policies. This enables a holistic sustainability approach for the building, appropriate to the scale of development proposed.

2. The carbon dioxide (CO_2) emissions reduction strategy for the building is based on the GLA's London Plan Energy Hierarchy to provide a rigorous methodology which maximises opportunities for emissions reduction.

3. The proposed development has undergone a BREEAM Refurbishment and Fit Out 2014 Pre-Assessment. This found that achieving BREEAM 'Excellent' would be realistically impossible to achieve on a project of this nature. The Pre-Assessment demonstrates if the assessment was undertaken as the project is, a BREEAM rating of 'Pass' could be achieved. Although additional credits could be targeted to reach 'Very Good', some of the credits would likely not add to the sustainability value of the project and would be part of a "box ticking" exercise.

The proposed development therefore complies with the vast majority of London Camden's Local Plan policies CC1 – CC5, which aim to improve the environmental performance of developments and to adapt to the effects of climate change over their lifetime.

The Energy Strategy contained within this report identifies the energy efficiency measures that have been assessed and incorporated throughout the design to ensure compliance with, and where feasible, exceedance of relevant national, regional and local policy, including CO_2 emissions reduction targets. The proposed design measures were considered using current industry best practice and applying the London Plan Energy Assessment guidance, resulting in an overall

regulated CO_2 saving of 15.70%. This exceeds the standard for new buildings, despite this being a change of use project.

In as much as is possible within the constraints of the proposals, every effort has been made to pursue and promote sustainable behaviour, including the provision of cycling spaces and facilities, the specification of highly efficient lighting and building services and the use of water efficient fittings. These aspects of the design are complimentary to the passive design features of high ceilings, exposed thermal mass and minimised solar gain.

The proposals are therefore deemed to be in keeping with the principles of built environment sustainability by bringing an underutilised part of an existing building back into employment use, negating the need to build additional office space in the locality, which significantly reduces the embodied carbon of the scheme.

2. INTRODUCTION

2.1 Iceni Projects Ltd was commissioned by E&A (Saffron Hill) Limited to produce a combined Sustainability and Energy Statement for the proposed change of use development at Da Vinci House, 44 Saffron Hill, London, EC1N 8FH.

Report Objective

2.2 This document details the sustainability and carbon dioxide (CO_2) emissions reduction measures adopted by the proposed change of use at Da Vinci House and gives an overview of the design proposals that will ensure the development operates in a sustainable manner over the lifespan of the scheme. The Sustainability and Energy Statement report headlines will provide a framework for the project team to operate consistently within sustainability guidelines set out by the Greater London Authority and the London Borough of Camden.

2.3 The report is structured to meet these guidelines as follows:

- Section 3 discusses the planning context and policies which are relevant to sustainable development and energy;
- Section 4 discusses the development response to the policy drivers for sustainable development, energy and BREEAM; and
- Section 5 summarises the development's design response.

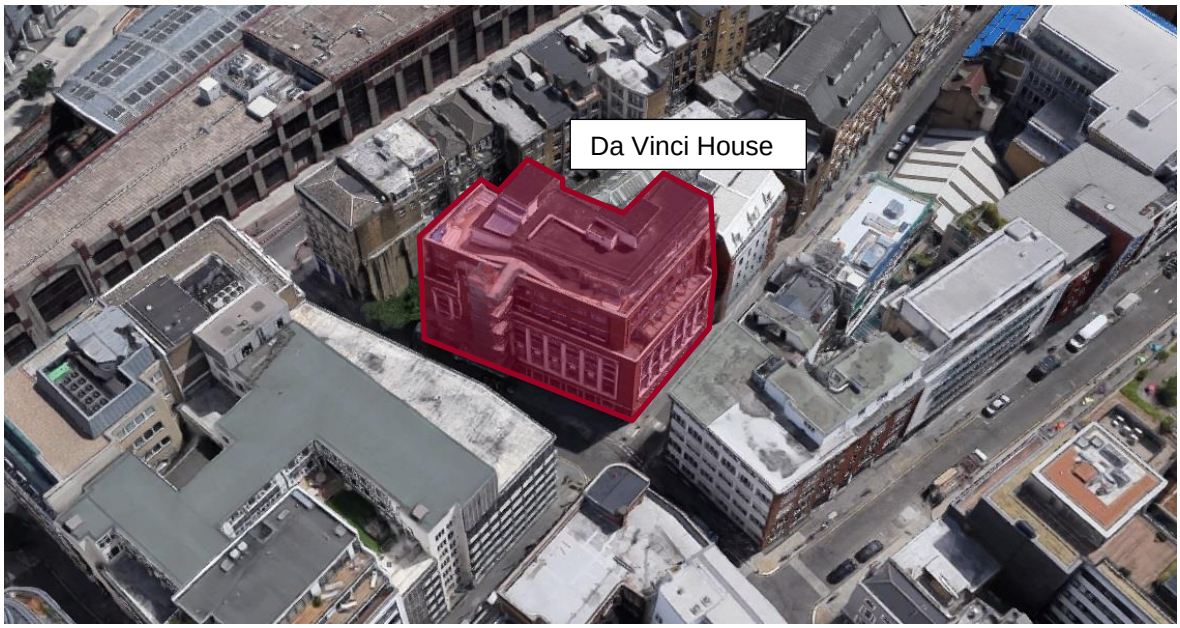
Site and Surroundings

2.4 The application site comprises of the existing lower ground, and part ground floor of 'Da Vinci House' at 44 Saffron Hill, within the Farringdon area of Central London.

2.5 Da Vinci House was originally constructed in the 1950's as a Printing Works, which was later amended to light industrial and warehouse use in 1971, and subsequently to office use in 1988. Planning permission for the current residential use of the building was permitted in 1996, and extensions were later allowed to the roof of the building in 2011/2012. Accordingly, the entire building now comprises of 8-storeys of residential accommodation, with car parking at ground and lower ground floor levels (which forms the extent of the application site).

Figure 2.1 – The Site

Figure 2.2 – The existing building



The Proposed Development

2.6 The scheme proposes a change of use of existing lower ground and part ground floor to office use Class B1 (a), together with minor external alterations.

2.7 The Lower Ground Floor car park has been underutilised for a prolonged period, as only 2 no. residents were leased car parking spaces within this area. Prior to the application submission, revised leases were agreed with the relevant parties, to relocate the 2 no. car parking spaces to the ground floor level. Accordingly, the ground floor car park will continue to facilitate vehicles, in line with the historic planning approval for the site.

2.8 The footprint and bulk of the existing building is to be unaltered by these proposals, with the main changes being made in order to refurbish the building in line with the specifications of Category A modern office floorspace.

3. PLANNING AND REGULATORY CONTEXT

3.1 Sustainable development approaches are incorporated within policy and regulation at a national, regional and local level, as set out below:

National

Climate Change Act 2008

3.2 On 26th November 2008, the UK Government published the Climate Change Act 2008; the world's first long-term legally binding framework to mitigate against climate change. Within this framework, the Act sets legally binding targets to increase greenhouse gas emission reductions through action in the UK and abroad from the 60% target set out in the Energy White Paper, to 80% by 2050.

3.3 As required under Section 34 of the Climate Change Act, the Fifth Annual Carbon Budget was accepted by the Government in June 2016. This sets out a budget for UK emissions for the period 2028 – 2032.

National Planning Policy Framework

3.4 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. Accordingly the National Planning Policy Framework (NPPF), which came into force in March 2012, aims to strengthen local decision making.

3.5 Paragraph 14 of the NPPF confirms that the heart of this document is a "*presumption in favour of sustainable development*", being the golden thread that flows through decision-taking.

3.6 Paragraph 6 confirms that paragraphs 18 to 219 of the NPPF constitute the Government's view of what sustainable development means for the planning system. Three key pillars (or roles) of sustainable development are provided which must be performed by both local plan-making and decision-taking:

- **An Economic Role** – ensuring the provision of land and infrastructure needed to help build a strong, responsive and competitive economy.
- **A Social Role** – supplying the required amount of housing while at the same time ensuring and building strong, vibrant and healthy communities. Ensuring that the built environment is sited around accessible local services which help support a community's health, social and cultural well-being.

- **An Environmental Role** – ensuring development contributes to the protection and enhancement of the natural, built and historic environment through the improvement of biodiversity, minimising the use of natural resources and production of pollution / waste, and guaranteeing sufficient mitigation and adaptation to climate change.

National Planning Practice Guidance

- **Climate Change** – advises how planning can identify suitable mitigation and adaption measures in plan-making and the application process to address the potential for climate change.

- **Design** – design interacts on how people interact with places and can affect a range of economic, social and environmental objectives. The guidance states that planning policies and decisions should seek to ensure that the physical environment supports these objectives.

- **Natural Environment** – explains key issues in implementing policy to protect biodiversity, including local requirements.

- **Renewable and Low Carbon Energy** – 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.

Regional

3.7 Within Greater London, key sustainable development principles for economic, environmental and social improvement are set out below:

The London Plan (March 2015)

3.8 The London Plan is the overall strategic plan for London and includes policies for sustainable development and energy within Chapter 5 (London's response to climate change) as follows:

Policy 5.2: Minimising Carbon Dioxide Emissions – introduces the Energy Hierarchy which seeks to encourage the incorporation of 'Be Lean, Be Clean and Be Green' measures in all proposals.

Policy 5.3: Sustainable Design and Construction – seeks to encourage the incorporation of design standards contained within the London Plan Sustainable Design and Construction Supplementary Planning Guidance (SPG), and introduces major sustainability issues to be prioritised within all development in London. This includes minimising overheating, minimising pollution, promotion of green infrastructure, and sustainable procurement of materials.

Policy 5.15: Water Use and Supplies – encourages all development to minimise the use of mains water through the incorporation of water saving measures and equipment.

Sustainable Design and Construction Supplementary Planning Guidance (SPG) (April 2014)

3.9 This document provides guidance on the implementation of London Plan policy 5.3 as well as a range of policies relating to environmental sustainability. Best practice and priorities listed in this SPG that are of relevance are listed below:

2.2 Land – requires all development to be delivered on previously developed land, and encourages efficient use of that land while considering and adapting to the local context.

2.3 Site Layout and Building Design – requires consideration of access to public transport when siting development, the potential of the design to utilise the sun, wind, and natural shading, adaptability of buildings to cope with future changes, and potential to address local deficiencies / deprivation such as air quality.

2.4 Energy and Carbon Dioxide Emissions – requires all developments to minimise CO_2 emissions through the Energy Hierarchy, and to provide an energy demand assessment. It also encourages Building Regulations Part L targets to be met by passive design and energy efficiency alone, and that district energy opportunities should be assessed at the planning application stage.

2.6 Water Efficiency – encourages developers to maximise the opportunities for water saving measures and appliances in all developments, including the reuse and using alternative sources of water. It also encourages all developments to be designed to incorporate rainwater harvesting and for buildings to have individual water meters installed to allow users to monitor their own consumption.

2.7 Materials and Waste – encourages at least three of the key elements of the building envelope to be rated A+ to D in the BRE's *Green Guide to Specification*, and at least 50% of all timber used to be certified by FSC or PEFC.

2.8 Nature Conservation and Biodiversity – requires developers to contribute to biodiversity value on-site. This is also covered by section 3.3, which encourages green infrastructure and trees to be proposed for all developments.

4.3 Air Pollution – contractors should follow the guidance set out in the London Plan 'Minimising dust and emissions from construction and demolition' SPG during construction.

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

3.10 The guidance note provides further detail on addressing the London Plan's Energy Hierarchy through the provision of an energy assessment to accompany planning applications.

Local

3.11 In determining the local context, the London Borough of Camden Council policy is gained through the Local Plan, which was adopted in July 2017, and replaces the Core Strategy and Development Policies planning documents (adopted in 2010).

Camden Local Plan (July 2017)

3.12 The Local Plan provides an all-in-one statutory document for determining planning applications and guiding spatial development over the period 2016 – 2031. Sustainable development priorities form an integral part of the spatial planning issues affecting Camden. Policies of relevance to this proposal in the context of sustainability and energy are as follows:

3.13 **Policy CC1: Climate Change Mitigation -** requires all development to minimise the effects of climate change and encourages all developments to meet the highest feasible environmental standards that are financially viable during construction and occupation. The policy requires all development to

- Reduce carbon dioxide emissions through following the steps in the Energy Hierarchy;
- Ensure that the location of development and mix of land uses minimise the need to travel by car and help to support decentralised energy networks;
- Support and encourage sensitive energy efficiency improvements to existing buildings; and
- Optimise resource efficiency.

3.14 Policy CC2: Adapting to Climate Change – requires developments to be resilient to climate change by adopting measures such as:

- Protecting of existing green spaces and promoting new appropriate green infrastructure;
- Not increasing, and wherever possible reducing, surface water runoff through increasing permeable surfaces and use of Sustainable Drainage Systems;
- Incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and
- Reducing the impact of urban overheating, including application of the cooling hierarchy.

The policy also requires developments greater than 500m^2 (including conversions, extensions and changes of use) to achieve a BREEAM rating of 'Excellent'.

3.15 **Policy CC3: Water and Flooding –** aims to ensure that development does not increase flood risk and reduces the risk of flooding where possible by:

- Incorporating water efficiency measures;
- Avoiding harm to the water environment and improve water quality;
- Considering the impact of development in areas at risk of flooding (including drainage);
- Incorporating flood resilient measures in areas prone to flooding;
- Utilising Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible; and
- Not locating vulnerable development in flood-prone areas.

3.16 **Policy CC4: Air Quality –** aims to ensure that the impact of development on air quality is mitigated and ensure that exposure to poor air quality is reduced in the borough.

3.17 **Policy CC5: Waste –** requires that developments include facilities for the storage and collection of waste and recycling.

Camden Planning Guidance on Sustainability (adopted July 2015)

3.18 This document supports Local Plan policies on sustainability and is a Supplementary Planning Document (SPD), which is an additional material consideration in planning decisions. The document provides additional guidance to support planning applications in matters relating to:

- Energy statements
- The Energy Hierarchy
    - Energy efficiency – in new and existing buildings
    - Decentralised energy and combined heat and power (CHP)
    - Renewable energy
- Water efficiency
- Sustainable use of materials
- Sustainability assessment tools - BREEAM

- Green roofs, brown roofs and green walls
- Flooding
- Climate change adaptation
- Biodiversity
- Urban food growing

4. SUSTAINABLE DEVELOPMENT STRATEGIC RESPONSE

4.1 The sustainability and energy strategy for the proposed development is divided into three main parts.

- The change of use proposals have been assessed using the London Borough of Camden's Local Plan policies, as detailed above. This enables a holistic sustainability approach for the building, appropriate to the scale of development proposed.

- The carbon dioxide (CO_2) emissions reduction strategy for the building is based on the Energy Hierarchy proposed in Local Plan policies to provide a rigorous methodology which maximises opportunities for emissions reduction.

- The proposed development has undergone a BREEAM refurbishment and fit out 2014 pre-assessment, as required by the London Borough of Camden. Although the full Pre-Assessment is provided in a separate document, a summary is provided here.

Sustainable Design and Construction

4.2 The London Borough of Camden's Local Plan policies relating to sustainability and climate change form a comprehensive approach to addressing built environment sustainability. The topics contained within each policy have therefore been adopted as part of the development response.

Energy and Carbon Dioxide Emissions

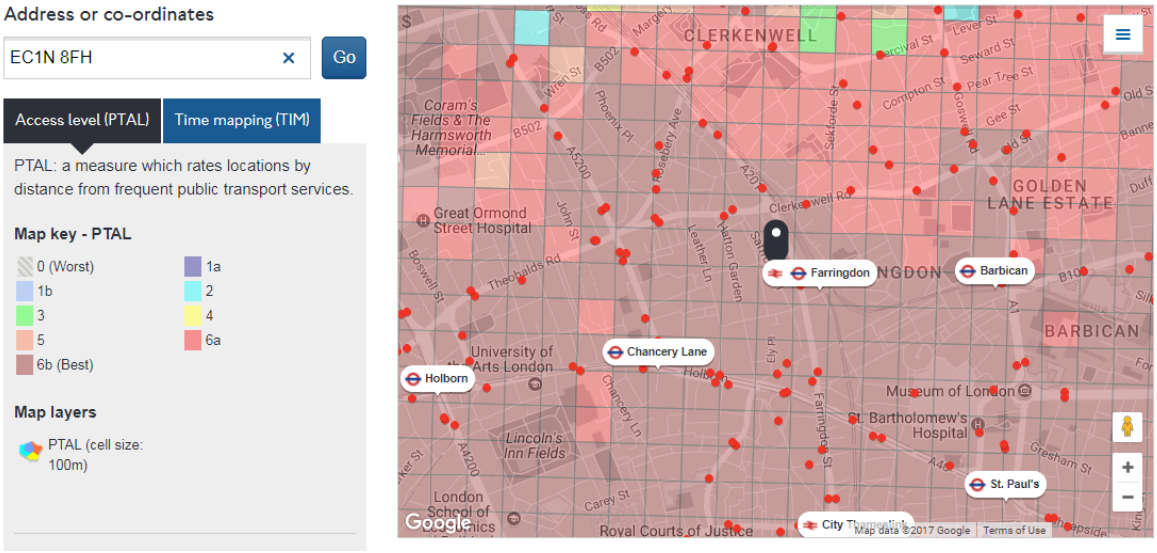
4.3 A detailed response to policy requirements relating to energy and CO_2 emissions is provided in a later section of this report.

Location

4.4 The location of the Site, three minutes' walk from London Farringdon station, provides excellent public transport connections, with the site scoring a highest possible PTAL rating of 6b. In addition to the proximity to a major London rail connection, there are numerous public transport connections for both London Underground and the London bus network. The connectivity of the Site will be further enhanced with the addition of Crossrail and Thameslink rail services in 2018 and 2019 respectively.

4.5 The location of the Site in relation to decentralised energy networks is provided in a later section of this report.

Figure 4.1 – Extract from TfL PTAL map



Resource Efficiency

4.6 As the change of use application involves work entirely within an existing building, the proposals make the most of existing resources, bringing an underutilised car park into employment use, with associated benefits for the local economy. This minimises the carbon dioxide embodied in building materials that would otherwise be required to construct a new building.

4.7 For new materials proposed for the change of use, consideration will be given to the lifecycle environmental performance with materials selected in consideration of the BRE's Green Guide to Specification.

4.8 Timber will be selected and purchased in consideration of sustainability certification. It is intended that all structural timber elements along with any timber used for temporary uses, will be sustainably sourced (e.g. from FSC and/or PEFC sources).

4.9 Due to the reuse of an existing building, the majority of waste associated with demolition and construction will be avoided.

Nature conservation and biodiversity

4.10 As the Site currently consists of an existing, occupied building with no ecological features in a busy city centre location, no ecological appraisals have been conducted. The Site is not subject to any statutory or non-statutory nature conservation designations.

4.11 As minimal external works are proposed as part of this change of use application, it is not possible to incorporate green walls or green/blue roofs into the proposals.

Overheating

4.12 In order to protect the development against overheating in the future, a number of key features are present in the scheme which will ensure the proposals are resilient to increased temperatures which may be experienced as a result of climate change and the urban heat island effect.

- Internal heat gains will be minimised through the use of energy efficient lighting and equipment. Any hot water distribution pipework will be highly insulated to prevent heat loss into office spaces.

- There are very few windows into the space which will limit solar gain.

- The location of the space below ground will offer a high degree of thermal mass from the surrounding ground, resulting in little heat gain from external air temperatures.

- The space has a large floor to ceiling height which will reduce heat build-up and overheating in occupied spaces.

- Mechanical ventilation and cooling will be provided to the building to ensure comfortable working conditions are maintained during periods of hot weather, using a reversible air source heat pump with a seasonal energy efficiency ratio of 6.0 and heat recovery unit. However, due to the high thermal mass of the building structure and minimal gains from external conditions, cooling is only expected to be provided in periods of high external temperatures.

Water Efficiency

4.13 As per the London Plan, the city often consumes more water than is available during dry weather. As the population of London grows, this situation will be further exacerbated with greater pressure on the supply of potable water.

4.14 In order to actively mitigate against this, water saving fittings and appliances shall be installed to target the ‘best practice’ levels of the AECB (Association of Environment Conscious Building) water standards. The following form a basis for the proposals, subject to changes at later detailed design stages:

- Low volume dual flush toilets of 6 / 4 litres;

- Water consumption levels not higher than 4 litres / minute in wash hand basins and 6 litres / minute in kitchen sink taps; and

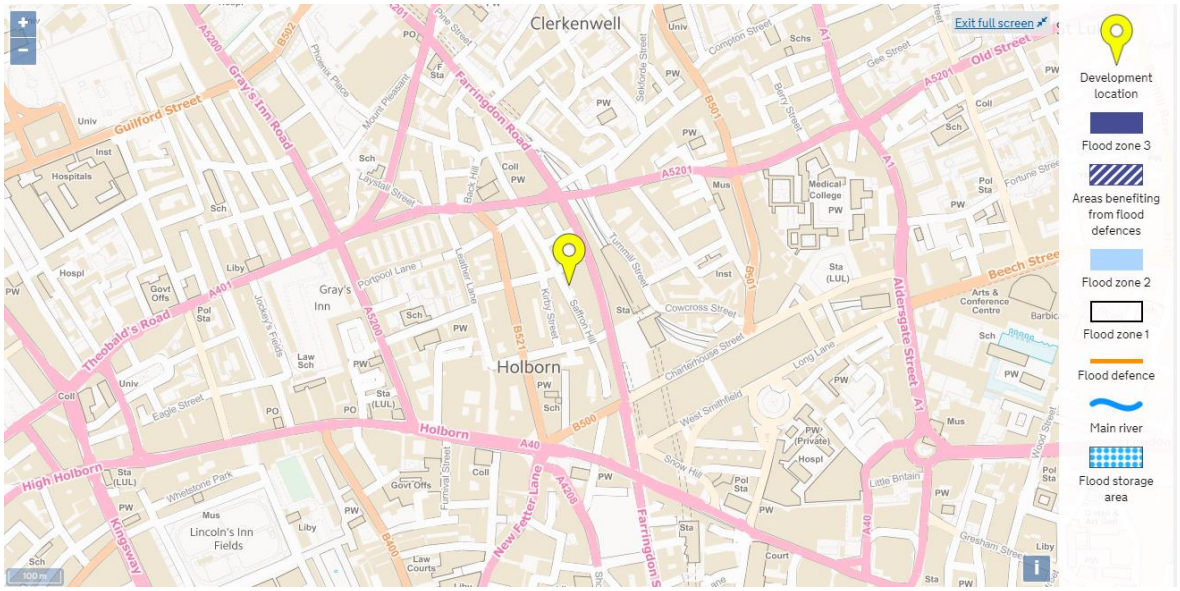
- Showers with a flow rate of 12 litres / minute using a flow restrictor.

4.15 The inclusion of rainwater harvesting on the Site for use in toilet flushing is not possible due to the limited nature of the proposals. The complexity in installing such a system for a relatively small office space is such that this is not functionally viable due to the additional services that would have to be installed, causing disruption to existing tenants.

Flooding

4.16 Due to the nature of the proposed change of use application, no formal Flood Risk Assessment has been conducted for the Site. However, the Environment Agency's Flood Map for Planning service shows that the Site is in Flood Zone 1 and is therefore at a low risk of flooding.

Figure 4.2 - Extract from the Environment Agency's online flood map



4.17 As minimal external works are proposed on the Site as part of the change of use application, it is not possible to incorporate any additional sustainable urban drainage features, meaning that the proposed development will have no effect on surface water runoff rates.

Air Quality

4.18 The Environment Act 1995 requires all Local Authorities to review air quality within their districts. If it appears that any air quality 'Objective' prescribed in the regulations and in the National Air Quality Strategy is not likely to be achieved then the local authority must designate the affected area as an Air Quality Management Area (AQMA).

4.19 The Site location, and the whole of the London Borough of Camden, is specified as an AQMA due to excessive levels of nitrogen dioxide (NO_2) and particulate matter (PM_{10}). This is due to road transport. Extract from the 2013 London air pollution maps are shown below for NO_2 and PM_{10}.

Figure 4.3 – Map indicating annual levels of NO_2 exposure

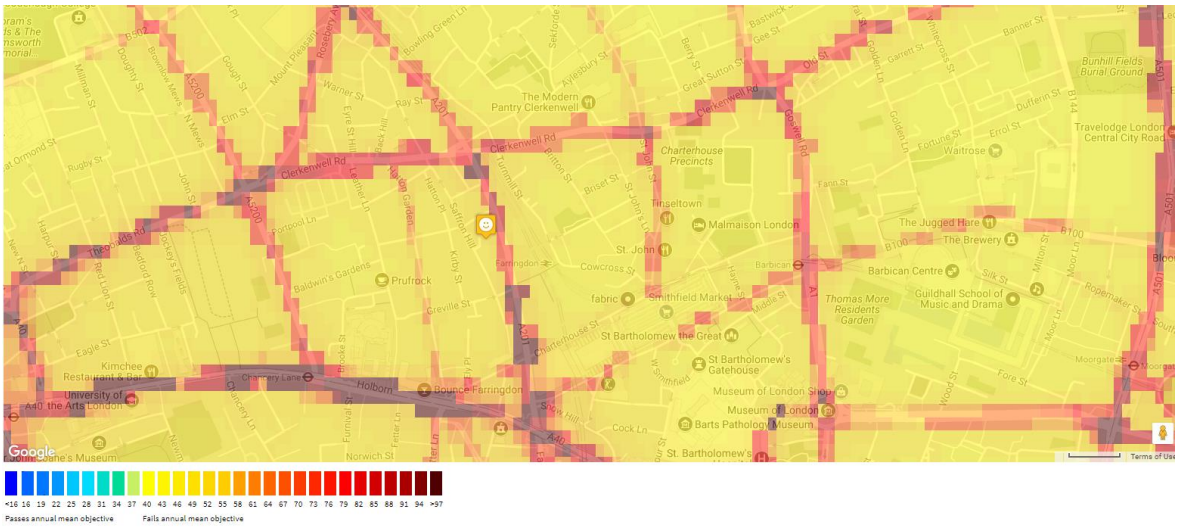
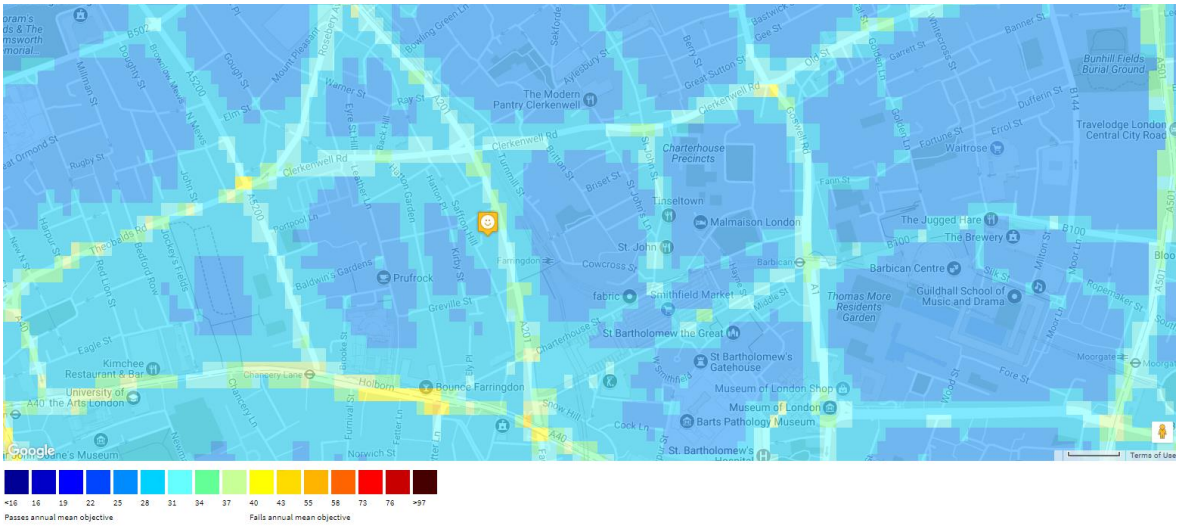


Figure 4.4 – Map indicating annual levels of PM_{10} exposure



4.20 An air quality assessment is not required for the proposed development, and it is not anticipated that the proposals will add to local air quality issues through the use of an air source heat pump for both heating and cooling. Since this technology uses grid electricity, it emits zero NOx at the point of use and will therefore make to no contribution to poor quality in the area.

4.21 There is no car parking proposed for the scheme as the Site has excellent connections to public transport. Again, this means that there will be no contribution to local air quality issues from transport as a result of the change of use.

Waste

4.22 To encourage a greater proportion of the operational waste to be diverted from landfill, it is proposed to provide a dedicated space of sufficient size and in convenient locations. Internal and external storage will be considerate of the Building Regulations, Council and other relevant requirements.

4.23 With reference to the policy requirements, guidance and industry best practice detailed in section 3, a comprehensive energy and carbon dioxide (CO_2) emissions assessment has been carried out for the proposed development. The energy performance of the scheme has been comprehensively analysed and evaluated in order to achieve a higher level of CO_2 emissions performance than that required by the 2013 Building Regulations Part L2A for new buildings, despite the fact that the works would require assessment under Part L2B for existing buildings. This ensures that the change of use works will be carried out to best practice standards, equivalent to new build, which futureproofs the proposed scheme and achieves an optimum balance between environmental, social and economic sustainability criteria.

4.24 The following section includes a breakdown of measures proposed at each level of the Energy Hierarchy, including a renewable energy options study, and a calculation of the CO_2 savings achieved for the proposed scheme.

Energy Hierarchy

4.25 The proposed energy strategy is based upon the principles of the Energy Hierarchy on the basis that it is preferable to reduce carbon dioxide emissions through reduced energy consumption above decarbonisation through alternative energy sources.

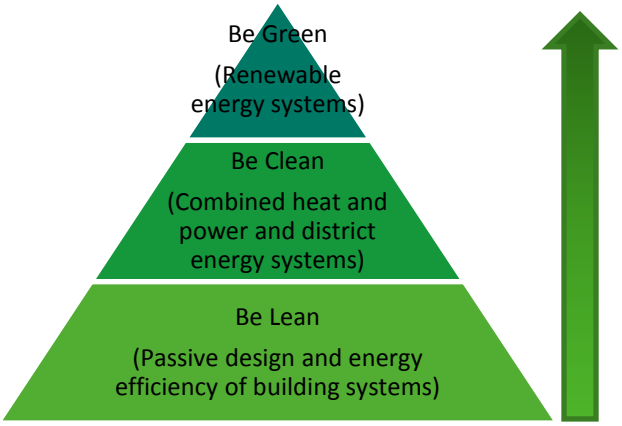
4.26 The tiers of the Energy Hierarchy are:

1. Be Lean Reduce energy demand through the passive design and layout of the scheme, using natural lighting and ventilation.

2. Be Clean Supply energy efficiently using either combined heat and power or district energy systems

3. Be Green Use renewable energy systems to further reduce emissions

Figure 4.6 - The Energy Hierarchy



4.27 By applying the Energy Hierarchy during the design process, the residual energy demand that needs to be supplied via burning fossil fuels is therefore minimised, and significant CO_2 savings are achieved during the operational phase of the development's lifecycle. This first principle relies on energy efficient design and the site characteristics such as local climate, surroundings, scale and size, which can all influence the energy savings that can be achieved.

4.28 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.

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

'Be Lean' (Use Less Energy)

4.30 Within the first stage of the Energy Hierarchy, it was proposed to incorporate high levels of passive and energy efficient design measures in order to reduce the development's energy consumption and associated CO_2 emissions. This approach has identified the following viable features and design that will be incorporated into the development.

4.31 Office spaces tend to require cooling more often than heating due to internal gains from lighting, people and equipment. Therefore, minimising heat gain to the space will provide greater levels of energy savings than minimising heat loss. The passive design principles of the proposed scheme aim to utilise the thermal mass, high ceilings and shading provided by the basement to minimise heat build-up from external sources.

4.32 Given the nature of the proposals function as an office space within an existing building, it is not possible to incorporate additional passive design features due to practical design concerns.

4.33 Building fabric U-values are a measure of the rate of heat transfer through a building element over a given area, under standardised conditions. They measure the rate at which heat is lost or gained through a fabric. The following U-values are provided as an indicative guide for the building elements and will be further evaluated during detailed design, in order to best minimise heat loss/gain as required by the season:

Table 4.1 Proposed building fabric U-values

Building Fabric Performance	Part L2A:2013 backstop U-values (W/m²K)	Proposed U-values (W/m²K)
External/basement wall	0.35	0.26
Windows	2.20	1.6
Roof	0.25	n/a
Ground floor	0.25	0.22

4.34 A summary of the proposed glazing performance for each of the different glazed elements in set out in the table below.

Table 4.2 Proposed building glazing properties

Window Location	Proposed U-value (including frame) (W/m²K)	Proposed light transmission (%)	Proposed g-value
Walls	1.6	71	0.4

4.35 A high level of air tightness is proposed, where a level equal to or below 5m^3/h/m^2 shall be targeted throughout, meaning that air infiltration between the internal and the external environment will be largely controlled and space heating/cooling demand further reduced.

4.36 High efficiency plant and equipment is proposed in order to limit the energy consumed to provide the required level of indoor environmental performance and control. Performance efficiency values were tested and improved in EDSL Tas models to benchmark the resulting predicted CO_2 reduction.

4.37 Lighting in all spaces will be provided by high efficiency LED systems, with a lighting power density of 2 W/m² per 100 lux for all office spaces.

4.38 Lighting controls will employ presence detection to ensure that lighting energy consumption is minimised.

4.39 Heating and cooling will be provided using a reversible air source heat pump VRF system, with a heating coefficient of performance of 4.0 and a cooling seasonal energy efficiency ratio of 6.0.

4.40 Outside air will be provided to the office spaces via central plant, with a supply and extract SFP of 2.0 W/l/s. The system will also utilise heat recovery through a plate heat exchanger with an efficiency of 75%.

4.41 The design was developed in line with the GLA's recommended 'Cooling Hierarchy' approach which applies a similar principle to the thorough decision-making process of the 'Energy Hierarchy' applied specifically with the aim of reducing CO_2 emissions from cooling:

Minimisation of internal heat generation through energy efficient design

- Heat gain from lighting is kept to a minimum as a result of an energy-efficient lighting design solution.
- Heat gains from equipment will be minimised through the specification of low energy systems.

Reduction of the amount of heat entering the building in summer

- Basement walls and floor provide a high degree of in-built thermal mass.
- Fenestration is extremely limited due to site constrains, minimising solar gain.

Management of the heat within the building through exposed thermal mass and high ceilings

- The space has high ceilings of 3.49m, reducing heat build-up in occupied areas

Passive ventilation

- Passive ventilation is not possible due to the below ground nature of the scheme, with no opportunity for openings in facades to provide ventilation.

Mechanical and active cooling

- Cooling is delivered to the building by a highly efficient air source heat pump VRF system with a seasonal energy efficiency rating (SEER) of 6.0. Due to the passive design features incorporated within the proposals, it is only anticipated that mechanical cooling will be employed during periods of hot weather.

‘Be Clean’ (Supply Energy Efficiently)

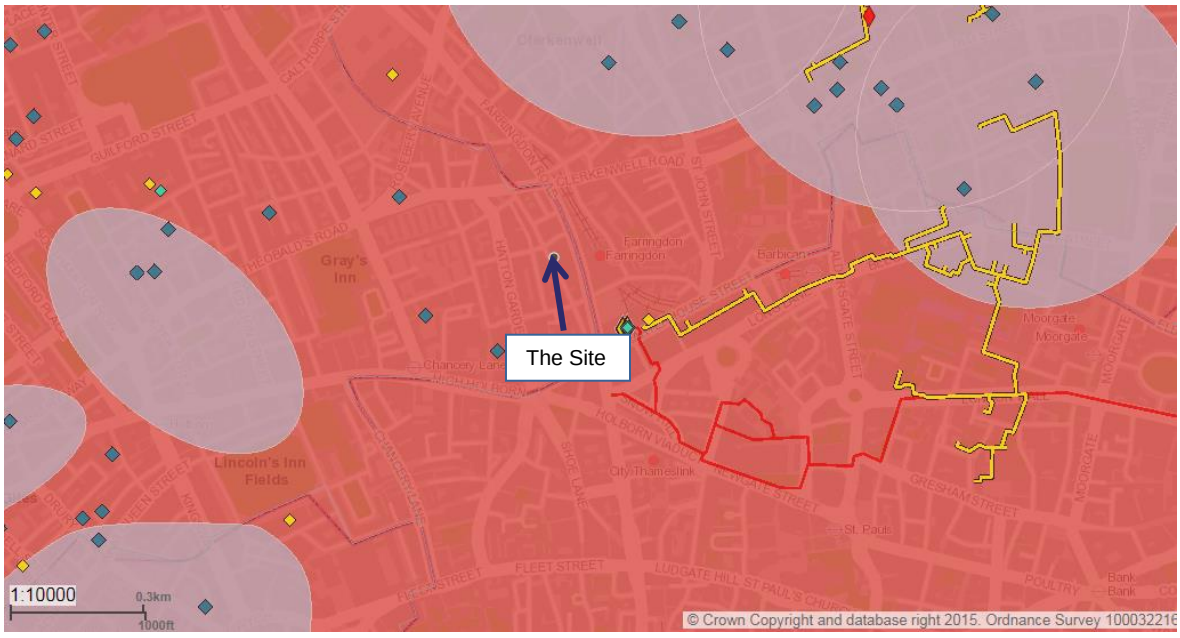
4.42 The potential for the proposed development to incorporate a low carbon heating/cooling system has been reviewed for the scheme.

4.43 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.

4.44 The image below illustrates the heat demand (shown as areas of red (high heat demand) and blue (low heat demand)), major energy supply plants (shown as blue and yellow rhombuses; referred to as communal boilers and CHP sites, respectively), proposed energy centres (shown as red rhombuses), existing and potential district energy networks (shown as yellow and red lines, respectively), and opportunity areas for these networks in the vicinity of the Site (highlighted in light purple). This shows that the Site is fairly close to the existing Citigen district heating network, which provides both heating and cooling to a number of buildings in the City of London and London Borough of Islington.

4.45 In order to connect to this network, pipes would have to be laid along St Cross Street, down Farringdon road and across Charterhouse Street, over a distance of approximately 450m. Indicative infrastructure connection costs are £1,000 per metre, with an approximate pipework infrastructure cost alone of £450,000. This renders a potential connection unviable, given the scale of the proposed scheme.

Figure 4.7 – Extract from London Heat Map



4.46 Although a number of communal boilers exist within the vicinity of the site, the likely costs and complexity of connection to the proposed scheme that has a limited demand for heating and hot water means that connection to these boilers is unviable.

4.47 The potential integration of conventional gas-fired CHP plant to provide low carbon heat and power on site has been evaluated for the development, in compliance with industry best practice and appropriate planning policies.

4.48 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.

4.49 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. Therefore CHP is not considered viable for the scheme.

'Be Green' (Utilise Renewable Technologies)

4.50 A full review of potentially applicable renewable technologies has been carried out, considering both the effectiveness and viability of the different technologies. Further details of each technology and their associated assessment in relation to the development are provided below.

- **Biomass** – this technology is not considered a practical solution to reducing CO_2 emissions, in the view of limited storage space for the combustible material, air quality issues associated with the combustion of material in urban environments, accessibility of Site for regular deliveries of the material, and associated carbon emissions of this technology which are not normally accounted for within energy modelling;

- **Air Source Heat Pump (ASHP)** – air source heat pump technology is already proposed to serve the building's cooling demand. It is therefore practical to utilise a reversible air source heat pump to provide the heating and hot water. As stated above, a high efficiency VRF system has been modelled for the building with a heating coefficient of performance of 4.0 and a cooling seasonal energy efficiency ratio of 6.0;

- **Ground Source Heat Pump (GSHP)** – this technology is presently rejected on the basis that there are uncertainties concerning the thermal properties of the ground and testing and installation costs are likely to be excessive for a project of this scale;

- **Photovoltaics (PV)** – due to the fact that minimal external works are included as part of these proposals, it is not possible to add PVs to the roof of the building. The use of PV panels is therefore rejected;

- **Solar Thermal** – again, as minimal external works are proposed, the use of solar thermal panels is not possible. This technology is therefore rejected;

- **Wind Turbines** – this technology is rejected on the basis of its potential impact on visual amenity and relatively low efficiency from unpredictable, turbulent wind conditions in urban locations.

4.51 The following graph and table shows the breakdown of the energy strategy performance resulting from Energy Hierarchy measures adopted by the proposed development:

Figure 4.8 – Proposed building regulated CO_2 emissions

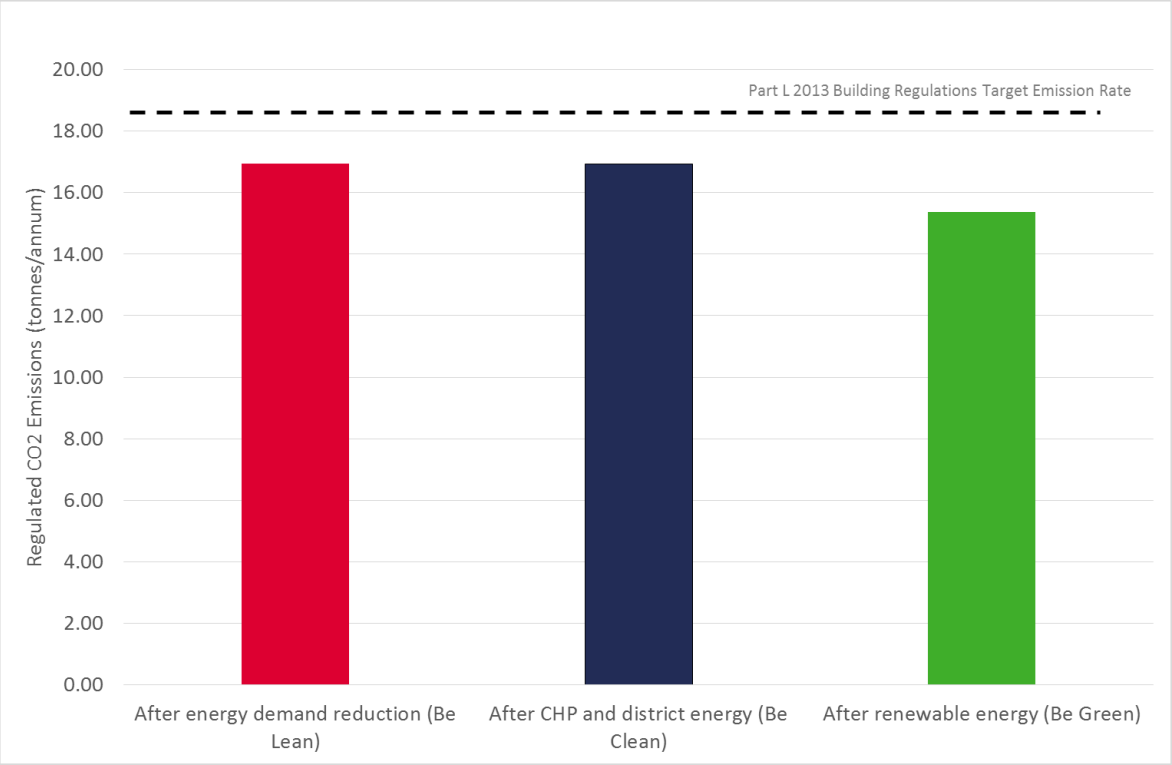


Table 4.3 Regulated CO_2 emissions after each stage of the Energy Hierarchy

Energy Hierarchy Stage	Unregulated CO_2 emissions	Regulated CO_2 emissions	Regulated CO_2 emissions reduction	
	(Tonnes CO_2/annum)	(Tonnes CO_2/annum)	(Tonnes CO_2/annum)	% development regulated emissions
Baseline: Building Regulations Part L:2013 compliant development	24.14	18.24	-	-
After energy demand reduction (Be Lean)	24.14	16.93	1.31	7.17%
After CHP and district energy (Be Clean)	24.14	16.93	0.00	0.00%
After renewable energy (Be Green)	24.14	15.38	1.55	8.52%
Total cumulative savings			2.86	15.70%

4.52 As shown above, the combination of energy efficiency and renewable energy measures can be seen to provide a 15.70% reduction in regulated CO_2 emissions over the Part L2A:2013 baseline.

4.53 BRUKL output sheets showing the results from the 'Be Lean' and 'Be Green' stages of assessment are provided in Appendix A2.

BREEAM Pre-Assessment Summary

4.54 Sustainable Construction Services were appointed by E&A (Saffron Hill) Limited to undertake a BREEAM UK Refurbishment and Fit Out Pre-Assessment for the proposed development. The report seeks to discuss the option of a 'realistic' BREEAM score and a 'potential' BREEAM score. The BREEAM Pre-Assessment credit tracker can be seen in the accompanying document. The tracker demonstrates if the assessment was undertaken as the project is, a BREEAM rating of 'Pass' could be achieved. Although additional credits could be targeted to reach 'Very Good', some of the credits would likely not add to the sustainability value of the project and would be part of a "box ticking" exercise. The Pre-Assessment review found that achieving BREEAM 'Excellent' would be realistically impossible to achieve on a project of this nature.

4.55 Due to the scope of size and scope of the works, it is not recommended that BREEAM 'Very Good' becomes a key target for the scheme. Nonetheless, the scheme will prioritise relevant and achievable sustainability features, bringing tangible value rather than spending money on specific items simply to achieve BREEAM credits.

4.56 Rather than disregard BREEAM, we advocate that some of the underlying principles of BREEAM can be adhered to should the project team follow a set of recommended measures to maximise the sustainability value of the project without any extra costs and administration.

4.57 Recommendations for the design team;

- The design team shall continue to facilitate consultation amongst the design team to help identify ways to improve building performance;
- The project team shall seek advice on commissioning at an early stage to ensure commissioning is fully accounted for within the programme of works;
- The project team shall specify products with a low VOC content;
- The project team shall specify low flow taps, showers and WCs;
- The project team shall specify materials that have a lower environmental impact and are covered by an ISO 14001 or better where possible;
- The project team shall specify insulation with a green guide rating of 'A' and low GWP;
- The project team shall ensure all lighting is in line with CIBSE guidelines and is zoned appropriately to allow for occupant control;

- The project team shall specify high efficiency heat pumps with a lower GWP and refrigerant charge where possible; and

- The project team shall consider the impact of plant noise on the local environment and providing attenuators or additional sound insulation to the plant room if necessary.

4.58 Recommendations for the contractor;

- The contractor shall ensure the client is fully trained in all new systems and provide information on how the systems can be managed which can be made available to the building user;

- The contractor shall allow for aftercare provision that include meetings with the client and ensure any defects are rectified and the building operates efficiently and comfortably;

- The contractor to ensure the services are sized to ensure the correct levels of heating and cooling can be provided;

- The contractor to ensure all meters are labelled to ensure that building users can take meter readings and monitor energy use;

- The contractor shall aim to procure local materials where possible;

- The contractor to re-use demolition waste where possible; and

- The contractor to split waste streams on site, limit construction waste levels and use recycling schemes where possible.

5. SUMMARY

5.1 This Sustainability and Energy Statement provides an overview as to how the proposed change of use scheme at Da Vinci House, 44 Saffron Hill contributes to sustainable development in the context of the strategic, design and construction considerations.

5.2 The level of detail submitted for the Sustainability and Energy Statement is proportionate to the scale of the change of use works proposed.

5.3 Consideration has still been given to the London Borough of Camden's Local Plan and the Greater London Authority's London Plan in the formulation of this statement, with three key elements proposed for the approach to the scheme's sustainability proposals, as follows:

1. The change of use proposals have been assessed using the London Borough of Camden's Local Plan policies, as detailed above. This enables a holistic sustainability approach for the building, appropriate to the scale of development proposed.

2. The carbon dioxide (CO_2) emissions reduction strategy for the building is based on the GLA's London Plan Energy Hierarchy to provide a rigorous methodology which maximises opportunities for emissions reduction.

3. The proposed development has undergone a BREEAM Refurbishment and Fit Out 2014 Pre-Assessment. This found that achieving BREEAM 'Excellent' would be realistically impossible to achieve on a project of this nature. The Pre-Assessment demonstrates if the assessment was undertaken as the project is, a BREEAM rating of 'Pass' could be achieved. Although additional credits could be targeted to reach 'Very Good', some of the credits would likely not add to the sustainability value of the project and would be part of a "box ticking" exercise.

5.4 Section 4 of this statement demonstrates that the siting and design of the proposals support relevant policy relating to sustainable development. This shows that, despite not achieving the desired BREEAM rating, the proposed development:

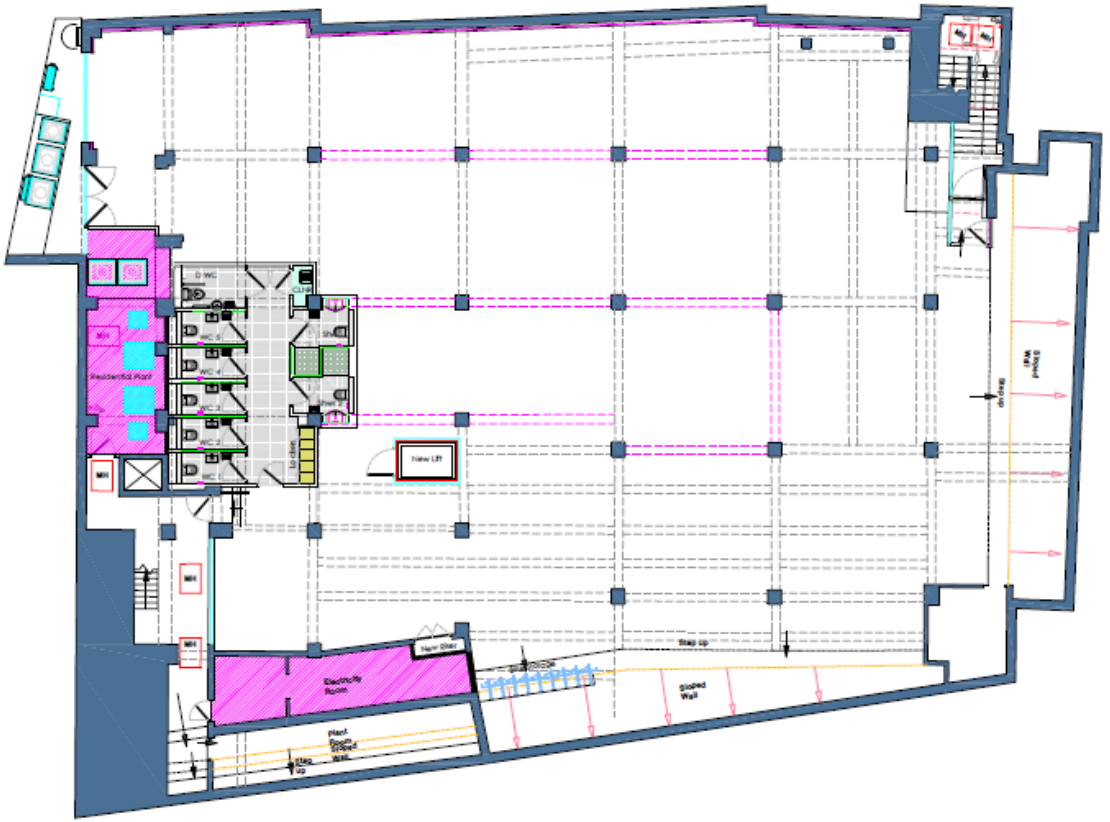
- Retains an existing building, bringing an underutilised car park space back into employment uses, with associated benefits for the local economy;

- Will include cycle parking and associated facilities to promote sustainable transport;

- Will utilise low flow fittings to reduce potable water consumption;
- Has a limited glazed area to reduce solar gains;
- Has a high degree of thermal mass, due to the below ground nature of the proposals;
- Has a high floor to ceiling height of 3.49m, minimising heat build-up in occupied spaces;
- Will utilise high efficiency LED lighting internal lighting, with presence detection also employed to further reduce lighting energy consumption in appropriate areas of the building;
- Will include a high efficiency reversible air source heat pump system to provide heating, hot water and supplementary cooling to the building; and
- Proposes to achieve a 15.70% reduction in regulated carbon dioxide emissions, when compared with the Part L2A:2013 target emission rate, exceeding the standard for new buildings, despite this being a change of use project.

5.5 Overall, the proposals constitute sustainable development in accordance with the vast majority of local policy requirements, and will provide a development that seeks to promote these principles in operation.

A1. SITE PLAN



LOWER GROUND FLOOR PROPOSED LAYOUT

FOR PLANNING

Estates & Agency

Da Vinci House
44 Saffron Hill
London EC1N 8FH

Lower Ground Floor

EAA 349	LG 001
1:100 on A2	Proposed
A.V	July 2017

BASE

A2. INDICATIVE SBEM ENERGY DATA

‘Be Lean’ measures only

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Da Vinci House - Be Lean

As designed

Date: Fri Jul 14 15:31:32 2017

Administrative information

Building Details

Address: 44 Saffron Hill, London, EC1N 8FH

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.1

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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/m².annum	22.3
Target CO_2 emission rate (TER), kgCO_2/m².annum	22.3
Building CO_2 emission rate (BER), kgCO_2/m².annum	20.7
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.26	0.26	Basement Wall
Floor	0.25	0.22	0.22	Ground Floor
Roof	0.25	-	-	No roofs in project
Windows***, roof windows, and rooflights	2.2	1.59	1.59	Basement window2
Personnel doors	2.2	-	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = 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
m³/(h.m²) 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	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Toilets (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	-	-	-	-
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					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.

2- Office (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.91	6	-	2	0.75
Standard value	0.91*	2.6	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 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- New HWS Circuit

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	0.91	0
Standard value	0.9*	N/A

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

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
B1_Office 1	-	-	-	2	-	-	-	0.3	-	-	N/A
B1_Toilet 1	-	-	0.5	-	-	-	-	-	-	-	N/A
B1_Changing 1	-	-	0.5	-	-	-	-	-	-	-	N/A
Comms 1	-	-	-	2	-	-	-	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	
B1_Circulation 1	-	-	-	56
B1_Circulation 2	-	-	-	105
B1_Office 1	-	-	-	5338
B1_Plant 1	-	-	-	109
B1_Plant 2	-	-	-	241
B1_Toilet 1	-	-	-	167
B1_Changing 1	-	-	-	44
Comms 1	-	-	-	25

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?
B1_Office 1	NO (-91%)	NO
Comms 1	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?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	818	818
External area [m²]	1316	1316
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	327	479
Average U-value [W/m²K]	0.25	0.36
Alpha value* [%]	6.44	6.44

* 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
99	**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
1	**Others: Miscellaneous 24hr activities**
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	4.06	3.44
Cooling	2.55	8.23
Auxiliary	11.66	9.77
Lighting	17.49	17.9
Hot water	15.78	15.78
Equipment*	56.86	56.86
TOTAL**	**51.54**	**55.11**

* 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	0	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]	66.02	122.87
Primary energy* [kWh/m²]	121.51	130.88
Total emissions [kg/m²]	20.7	22.3

* 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] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	50.4	0	16.2	0	7.1	0.86	0	0.91	0
	Notional	33.6	0	11.4	0	5.9	0.82	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	13	64	4.2	3.3	14.5	0.86	5.46	0.91	6
	Notional	10.8	136.2	3.7	10.5	12.1	0.82	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.26	External Wall
Floor	0.2	0.22	Ground Floor
Roof	0.15	-	No roofs in project
Windows, roof windows, and rooflights	1.5	1.59	Basement window1
Personnel doors	1.5	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project

$U_{i\text{-}Typ}$ = 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	5

‘Be Green’ measures

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Da Vinci House - Be Green

As designed

Date: Fri Jul 14 15:29:32 2017

Administrative information

Building Details

Address: 44 Saffron Hill, London, EC1N 8FH

Certification tool

Calculation engine: TAS

Calculation engine version: "v9.4.1"

Interface to calculation engine: TAS

Interface to calculation engine version: v9.4.1

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name:

Telephone number:

Address: , ,

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/m².annum	21.4
Target CO_2 emission rate (TER), kgCO_2/m².annum	21.4
Building CO_2 emission rate (BER), kgCO_2/m².annum	18.8
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.26	0.26	Basement Wall
Floor	0.25	0.22	0.22	Ground Floor
Roof	0.25	-	-	No roofs in project
Windows***, roof windows, and rooflights	2.2	1.59	1.59	Basement window2
Personnel doors	2.2	-	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	-	No vehicle doors in project
High usage entrance doors	3.5	-	-	No high usage entrance doors in project

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [W/(m²K)]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]
$U_{i\text{-}Calc}$ = 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
m³/(h.m²) 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	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Toilets (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	-	-	-	-
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					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.

2- Office (2 Zones)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	6	-	2	0.75
Standard value	0.91*	2.6	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 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- New HWS Circuit

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	4	0
Standard value	0.9*	N/A

* Standard shown is for gas boilers >30 kW output. For boilers <=30 kW output, limiting efficiency is 0.73.

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
B1_Office 1	-	-	-	2	-	-	-	0.3	-	-	N/A
B1_Toilet 1	-	-	0.5	-	-	-	-	-	-	-	N/A
B1_Changing 1	-	-	0.5	-	-	-	-	-	-	-	N/A
Comms 1	-	-	-	2	-	-	-	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	
B1_Circulation 1	-	-	-	56
B1_Circulation 2	-	-	-	105
B1_Office 1	-	-	-	5338
B1_Plant 1	-	-	-	109
B1_Plant 2	-	-	-	241
B1_Toilet 1	-	-	-	167
B1_Changing 1	-	-	-	44
Comms 1	-	-	-	25

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?
B1_Office 1	NO (-91%)	NO
Comms 1	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?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Area [m²]	818	818
External area [m²]	1316	1316
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	5	3
Average conductance [W/K]	327	479
Average U-value [W/m²K]	0.25	0.36
Alpha value* [%]	6.44	6.44

* 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
99	**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
1	**Others: Miscellaneous 24hr activities**
	Others: Car Parks 24 hrs
	Others - Stand alone utility block

Energy Consumption by End Use [kWh/m²]

	Actual	Notional
Heating	0.92	1.16
Cooling	2.55	8.23
Auxiliary	11.66	9.77
Lighting	17.49	17.9
Hot water	3.59	5.32
Equipment*	56.86	56.86
TOTAL**	**36.21**	**42.37**

* 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	0	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]	66.02	122.87
Primary energy* [kWh/m²]	111.17	126.83
Total emissions [kg/m²]	18.8	21.4

* 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] Central heating using water: radiators, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	50.4	0	3.7	0	7.1	3.8	0	4	0
	Notional	33.6	0	3.8	0	5.9	2.43	0	----	----
[ST] Fan coil systems, [HS] LTHW boiler, [HFT] Electricity, [CFT] Electricity										
	Actual	13	64	1	3.3	14.5	3.8	5.46	4	6
	Notional	10.8	136.2	1.2	10.5	12.1	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	$U_{i\text{-}Typ}$	$U_{i\text{-}Min}$	Surface where the minimum value occurs*
Wall	0.23	0.26	External Wall
Floor	0.2	0.22	Ground Floor
Roof	0.15	-	No roofs in project
Windows, roof windows, and rooflights	1.5	1.59	Basement window1
Personnel doors	1.5	-	No personal doors in project
Vehicle access & similar large doors	1.5	-	No vehicle doors in project
High usage entrance doors	1.5	-	No high usage entrance doors in project

$U_{i\text{-}Typ}$ = 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
$m^3/(h.m^a)$ at 50 Pa	5	5

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.

A3.6 The report is provided for sole use by the Client and is confidential to them and their professional advisors. No responsibility whatsoever for the contents of the report will be accepted to any person other than the client, unless otherwise agreed.

A3.7 These terms apply in addition to the Iceni Projects Ltd "Standard Terms of Business" (or in addition to another written contract which may be in place instead thereof) unless specifically agreed in writing. (In the event of a conflict between these terms and the said Standard Terms of Business the said Standard Terms of Business shall prevail.). In the absence of such a written contract the Standard Terms of Business will apply.