Sustainability and Energy Statement

For

212 HIGH HOLBORN

Bloomsbury Parrs, WC1V 7BF

PROJECT 23

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Approvals

This document requires the following approvals.
Signed approval forms are filed in the Management section of the project files.

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Distribution

Name	**Organisation**	**Role**

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1. INTRODUCTION

Project 23 has been commissioned by Austringer Capital Limited to review the sustainability performance of the proposed development at 212 High Holborn, Bloomsbury Parrs.

The purpose of this Statement is to summarise the relevant policy background and requirements of London Borough of Camden (hereafter referred to as the council) and demonstrate the ways in which these policies have been addressed through their proposals, ensuring all practicable measures have been taken in order to deliver a sustainable development at this site.

This statement reviews the sustainable design features and appraises the energy strategy of the proposed scheme at the site. The potential BREEAM UK New Construction 2014 and BREEAM Refurbishment and Fit-Out ratings will also be reviewed. Details of the design attributes, specifications and characteristics of the scheme are appraised in order to demonstrate how the proposals contribute to sustainable development in Camden and seek to mitigate the environmental impacts of the scheme.

2. POLICY REVIEW

This section reviews the planning policy requirements and sustainability targets that are relevant to this scheme.

National Planning Policy

In addition to the local planning policies, the National Planning Policy Framework (NPPF) 2012 is a material consideration. Published on 27th March 2012, it replaces all previous PPSs and PPGs.

The NPPF states that the planning system should play an active role in guiding development to sustainable solutions. There are three dimensions to sustainable development, as stated within the NPPF: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:

- An economic role – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;

- A social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and

- An environmental role – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

These roles should not be undertaken in isolation, because they are mutually dependent. Economic growth can secure higher social and environmental standards, and well-designed buildings and places can improve the lives of people and communities. Therefore, to achieve sustainable development, economic, social and environmental gains should be sought jointly and simultaneously through the planning system.

Pursuing sustainable development requires careful attention to viability and costs in plan-making and decision-taking. To ensure viability, the costs of any requirements likely to be applied to development, such as requirements for affordable housing, standards, infrastructure contributions or other requirements should, when taking account of the normal cost of development and mitigation, enable the development to be deliverable.

At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development - for decision-taking this means approving development proposals that accord with the development plan without delay.

Local Planning Policy

Camden Local Plan (2017) - The Council will expect developments of five or more dwellings and/or more than 500 sqm of any gross internal floorspace to achieve a 20% reduction in Carbon dioxide emissions from on-site renewable energy generation.

Green Action for Change - Camden's environmental sustainability plan (2011- 2020) commits Camden to a 27% borough wide Carbon Dioxide (CO2) reduction by 2017 and a 40% borough wide CO2 reduction by 2020 (London carbon reduction target).

Camden Core Strategy (2010) - Development of new and refurbishment of existing buildings in the London Borough of Camden is guided by the **Camden Core Strategy (2010)** that contains a number of planning policies which promote sustainable construction, as follows:

DP22 – Promoting Sustainable Design and Construction states that the Council will promote and measure sustainable design and construction by expecting non-domestic developments of 500sqm of floorspace or above to achieve "very good" in BREEAM assessments and "excellent" from 2016 and encouraging zero carbon from 2019.

CS13 – Tackling Climate Change Through Promoting Higher Environmental Standards states that the Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable by:

a) ensuring patterns of land use that minimise car travel by and help support local energy networks;

b) promoting the efficient use of land and buildings;

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

The Camden Planning Guidance CPG3 - Sustainability document has been prepared to support the policies in the Local Development Framework (LDF). This guidance is consistent with the Core Strategy and Development Policies and forms a Supplementary Planning Document (SPD) which is an additional "material consideration" in planning decisions. It also highlights the Council's requirements and guidelines which support the relevant Local Development Framework (LDF) policies:

- CS13 - Tackling climate change through promoting higher environmental standards
- DP22 - Promoting sustainable design and construction
- DP23 - Water

In addition to these requirements, the Planning Guidance document includes specific expectations relating to the energy efficiency of existing buildings, as follows:

- All buildings, including refurbishments, are expected to reduce their carbon emissions by making improvements to the existing building. Work involving a change of use or an extension to an existing property is included;
- Where retro-fitting measures are not identified at application stage we will most likely secure the implementation of environmental improvements by way of condition; and
- Development of 5 or more dwellings or 500m^2 of any floorspace, will be expected to achieve 60% of the un-weighted credits in the Energy category, 40% in the materials category and 60% in the water category in the BREEAM assessment.

Regulatory Framework

Building Regulations, Part L - Conservation of Fuel and Power sets the compliance standards for energy demand and carbon dioxide emissions from buildings.

New Build non-domestic buildings –

Approved Document L2A addresses the conservation of fuel and power in new non-domestic buildings. The proposed development will be registered against Building Regulations, Part L (2013) which requires all newly constructed buildings to comply with the 5 criteria set out in Approved Document L2A:

I. Achievement of an acceptable Building CO_2 Emission Rate. i.e. the BER is less than the TER (target emission rate for a notional building);

II. Limits on design flexibility – including U-values, air permeability, air handling plant efficiency, duct leakage, insulation, lighting system efficiency;

III. Limiting solar gains in summer;

IV. Construction quality and commissioning - The BER must be recalculated as constructed; and

V. Provision of information - Information must be provided to the building operator.

Existing non-domestic buildings -

Approved Document L2B specifically addresses the conservation of fuel and power in existing non-domestic buildings and provides minimum standards for building services and thermal elements.

BREEAM

In accordance with the planning policy requirements, the developer is required to achieve a BREEAM 'Excellent' rating for the new build and refurbished elements of the scheme. Due to the nature of the development proposals two different BREEAM assessments are applicable to the development, these are as follows:

- BREEAM UK 2014 Non-Domestic New Construction; and
- BREEAM UK 2014 Non-Domestic Refurbishment and Fit-Out.

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's leading and most widely used environmental assessment method for buildings. The standard aims to mitigate the life cycle impacts of buildings on the environment and enable buildings to be recognised according to their environmental benefits.

The building's performance is assessed under a number of categories, including:

- Energy;
- Water;
- Transport;
- Materials;
- Land use and ecology;
- Pollution;
- Health and wellbeing; and
- Management.

The BREEAM rating benchmarks for BREEAM UK New Construction and BREEAM UK Non-Domestic Refurbishment and Fit-Out projects are assessed using the 2014 versions of BREEAM are presented in Table 1.1.

Table 1.1 – BREEAM Rating Benchmarks

BREEAM Rating	% Score Required
Outstanding	≥ 85
Excellent	≥ 70
Very Good	≥ 55
Good	≥ 45
Pass	≥ 30

BREEAM New Construction Assessment -

BREEAM UK New Construction scheme is a performance based assessment method and certification scheme for new non-domestic buildings.

The primary aim of BREEAM UK New Construction is to mitigate the life cycle impact of new buildings on the environment in a robust and cost effective manner. This is achieved through integration and the use of the scheme by clients and their project team at key stages in the design and construction process.

BREEAM UK Non-Domestic Refurbishment and Fit-out 2014 -

The BREEAM UK Non-Domestic Refurbishment and Fit-out 2014 scheme can be used to assess the environmental life cycle impacts of existing non-domestic buildings at the refurbishment and fit-out stages. The definition of 'refurbishment' encompasses a wide range of works to improve the performance, function and overall condition of an existing building. 'Fit-out' also encompasses a wide range of works, however it is more associated with internal works to the building including the first fit-out of a newly constructed building or re-fitting an existing building.

The BREEAM UK Non-Domestic Refurbishment and Fit-out 2014 scheme provides a modular set of criteria that are applied depending upon the scope of works for a particular project type including:

Part 1: Fabric and Structure
Part 2: Core Services
Part 3: Local Services
Part 4: Interior Design

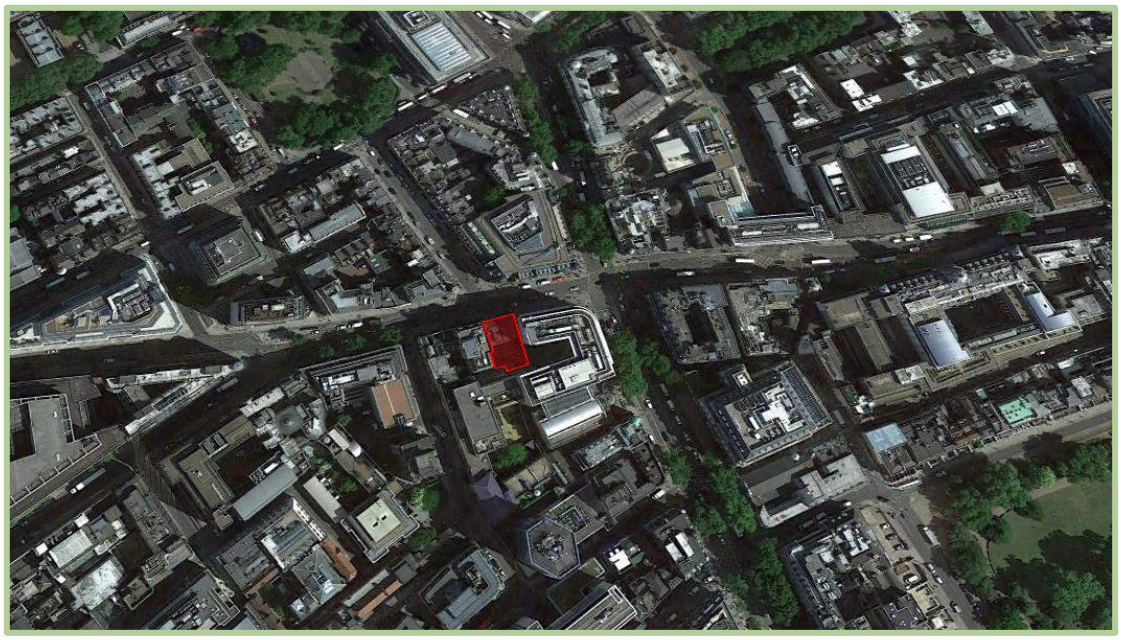
The scheme is split into these assessment parts to allow the scheme to reflect the aspects of a building that are tenant or landlord responsibilities, as well as the varied life cycle stages that each component or element is upgraded.

In accordance with the planning policy requirements, the developer is required to achieve a BREEAM 'Excellent' rating for the Non-Domestic elements of the scheme.

3. DEVELOPMENT PROPOSALS

The proposed development is located within a highly developed urban area within the London Borough of Camden. The proposed site currently includes the existing Grade II listed building and extension originally occupied a bank. The ground floor is currently occupied by a NatWest bank (see Figure 2.1). The plot fronts on to High Holborn to the north, a seven-storey building to the west and a nine-storey building to the south and east.

Figure 2.1 – Pre-Development Site



The proposals include the change of use, conversion, part demolition and rebuild of 212 High Holborn from a mix of Class A2 financial and professional services and Class B1 office uses to a mix of Class A1 shops and retail and Class B1 office uses. The proposed accommodation schedule can be found in Table 2.1.

Table 2.1 – Proposed Accommodation Schedule

Schedule of Accommodation

Level	GIA m2 (ft2)
Basement	344 (3,700)
Ground	370 (3,980)
Mezzanine	395 (4,250)
1st	393 (4,229)
2nd	357 (3,852)
3rd	360 (3,862)
4th	273 (2,940)
5th	273 (2,940)
Total	**2,765 (29,753)**

The proposed floor plans and elevations are presented in Figures 2.2, 2.3 & 2.4

Figure 2.2 – Proposed Basement, Ground, Mezzanine and First Floor Plans

Figure 2.3 – Proposed Second to Fifth Floor Plans

Figure 2.4 – Proposed Front, Side and Rear Elevations

4. SUSTAINABILITY PERFORMANCE

This section provides an appraisal of the proposed developments sustainability performance and details the specific approach, design features and specifications which may contribute to reducing the environmental impact of this scheme.

Two BREEAM Pre-Assessment reports have been completed to determine the feasible credits and potential BREEAM rating for new build extension and refurbished elements of the proposed scheme at the 212 High Holborn development. These are as follows:

- BREEAM 2014 UK Non-Domestic New Construction Shell and Core Pre-Assessment (Office); and
- BREEAM 2014 UK Non-Domestic Refurbishment and Fit-out Parts 2 and 3 Pre-Assessment.

Working alongside the qualified BREEAM assessor, the technical design team will review the individual credit criteria and award of credits within the Pre-Assessments to optimise the building's BREEAM performance.

In reviewing and assessing the feasibility of the BREEAM Credit award and the overall BREEAM performance of this scheme, constraints arising from the nature of the proposed development site and location have been considered. All credits allocated within this BREEAM Pre-Assessments will require further technical verification from the design team during the formal Design Stage and Post Construction BREEAM assessment.

BREEAM Credit Award Review

An overview of the BREEAM credit award for each issue is presented below. The BREEAM 2014 New Construction Pre-Assessment report and BREEAM 2014 Refurbishment and Fit-Out report are presented within the appendices of this document and contains a full commentary on the individual credit award and specification requirements.

Management

Project Brief and Design -

- Stakeholder consultation covering project delivery and relevant third parties.

Life cycle cost and service life planning –

- Reporting the capital cost of the building to promote economic sustainability.

Construction Site Impacts -

- All timber and timber-based products used on the project will be 'Legally harvested and traded timber';
- The principal contractor will demonstrate sound environmental management practices and consideration for neighbours across their activities on-site; and,
- Site related energy and water impacts are monitored and reported to ensure ongoing compliance during the Construction, Handover and Close Out stages and to improve awareness and understanding for future projects. Construction site impacts will be minimised as follows:

- Monitor, report and set targets for carbon dioxide or energy arising from site activities;
- Monitor, report and set targets for water consumption arising from site activities; and,
- Monitor and record data from the transport movements and impacts resulting from delivery of construction materials to site and construction waste from site.

Commissioning and Handover -

- Schedule of commissioning including optimal timescales and appropriate testing and commissioning of all building services systems and building fabric in line with best practice;
- Inspecting, testing, identifying and rectifying defects via an appropriate method; and,
- Provision of a non-technical Building User Guide and user/operator training timed appropriately around handover and proposed occupation.

Aftercare (applicable to the Refurbishment and fit-out assessment only) -

- Seasonal commissioning activities may be completed over a minimum of a 12 month period, once the building becomes substantially occupied; and,
- A commitment to carrying out a post occupancy evaluation one year after initial building occupation to review the building performance will also be employed. This will ensure the building operates as efficiently as possible.

Health and Wellbeing

Visual Comfort -

- Internal and external lighting systems are designed to avoid flicker and provide appropriate illuminance (lux) levels; and,
- The external lighting strategy will be designed to reduce unnecessary light pollution, energy consumption and nuisance to neighbouring properties;

Thermal Comfort -

- Thermal modelling will be carried out to appropriate standards;
- Projected climate change scenario(s) will be considered as part of the thermal model; and
- The thermal modelling analysis will informed the temperature control strategy for the building and its users.

Indoor Air Quality (applicable to the Refurbishment and fit-out assessment only) –

- An indoor air quality will be produced, with the objective of facilitating a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during occupation of the building.

Acoustic Performance –

- The building will meet appropriate acoustic performance standards and testing requirements in relation to sound insulation, indoor ambient noise level and reverberation times.

Safety and Security -

- Secure By Design - Security needs will be understood and taken into account in the design and specification.

Energy

Reduction of CO_2 Emissions –

- The proposed approach to emissions reduction at this site will be through a fabric led energy strategy plus low and/or zero technologies, in accordance with the principles of the Energy Hierarchy;

- The scheme will exceed current building regulation Part L, 2A criteria for the new build and Part L2B for the refurbished element of the scheme in accordance with the current local planning policies and the BREEAM mandatory 'excellent' rating requirement.

Low Carbon Design –

- A feasibility study will be carried out to establish the most appropriate on-site/near-site low or zero carbon (LZC) energy source(s) for the building and is specified.

Energy Monitoring -

- Energy metering systems will be installed to enable energy consumption to be assigned to end uses.

- Sub-meters will be provided for high energy load and tenancy areas. These are a powerful tool to help facilities management to organise and manage their consumption, target certain areas of over-use and streamline controls to improve efficiency over time and seasons.

External Lighting –

- All new external light fittings, where provided, within the construction zone will be dedicated low energy; and,

- External light fittings will be controlled through a time switch, or daylight sensor, to prevent operation during daylight hours.

Energy Efficient Transportation Systems -

- An analysis of the proposed transportation demand and usage patterns will determine the optimum number and size of lifts required. This would encourage the implementation of energy efficient and suitably sized systems; and,

- Energy efficient installations will be specified.

Transport

- The High Holborn site is a highly sustainable location in terms of transport connections with basic facilities all within easy walking distance of the site;

- Excellent public transport provision links the development site to the wider region, thus enabling building users to rely entirely upon modes of transport other than the car;

- The site is well located in close proximately to a range of local amenities, be it in the immediate vicinity, walking distance or via established public transport links;

- No vehicle parking provision will be provided; and,

- Secure cycle storage will be provided for the development.

Water

Water Consumption and Monitoring –

- A water efficiency strategy will be determined for the site. This will include 'A' rated appliances;

- The buildings will be specified with efficient water fixtures and controls. This will result in a reduction in water consumption (litres/person/day); The mandatory minimum criteria for the BREEAM Excellent' rating will be achieve and a potential improvement targeted, which is a 50% improvement over the set water consumption baseline;

- Leak detection would be incorporated, leakage especially in the case of water can be a drain on the resource and particularly difficult to establish without data collection;

- Flow control devices (e.g. a presence detector and controller) and shut off valves will be fitted to each WC area/facility to ensure water is supplied only when needed (and prevent minor water leaks); and,

- A water meter on the mains water supply to the building will be specified to monitor and manage consumption and sub- metered to tenant areas.

Materials –

This development will contribute towards making more efficient use of non-renewable material resources and to reducing the lifecycle impact of materials used in construction. This is demonstrated by the selection of:

Materials Lifecycle Impacts –

- Materials with a low environmental impact throughout their lifecycle will be specified. The BRE's Green Guide to specification will be consulted to optimise the material selection and their associated environmental performance and life cycle impact;

Hard Landscaping and Boundary Protection (where specified) –

- Hard landscaping and boundary protection elements with a low environmental impact throughout their lifecycle will be specified. The BRE's Green Guide to specification will be consulted to optimise the material selection to reduce the environmental impacts;

Responsible Sourcing of Materials -

- All timber used on the project will be responsibly sourced in accordance with the UK Government's Timber Procurement Policy (FSC sourced timber, for example);
- Materials will be selected which have a low environmental impact throughout their life cycle;
- Suppliers and manufacturers who operate Environmental Management Systems will be prioritised;
- Responsible sourcing of materials will be managed by the contractor. All timber used within the development will be responsibly sourced, verified by the FSC or PEFC standard; and,
- Consideration will be given to local sourcing of construction materials where feasible.

Insulation -

- The use of thermal insulation which has a low embodied environmental impact relative to its thermal properties will be specified throughout the development to reduce the construction phase impact of this scheme upon climate change.

Designing for Robustness –

- Adequate protection will be provided for exposed elements of the building and landscaped areas, therefore minimising the frequency of replacement materials.

Waste

Construction Waste -

Prior to commencement of the construction phase, a construction resource management plan will be produced by the developer to limit the on and off site environmental impacts of construction. The waste management strategy will also include the following:

- The development of a pre-refurbishment audit to identify options for reuse and recycling will be undertaken on the existing building.
- Procedures to reduce construction waste related to on-site construction and off site manufacture/fabrication; and,

- Diverting non-hazardous construction (on-site and dedicated off-site manufacture/fabrication), demolition and excavation waste (where applicable) generated by the project from landfill.

Operational Waste -

- Provision of suitable space and facilities to allow for segregation and storage of operational recyclable waste volumes generated by the building occupant(s) and activities will optimise recycling rates.

Speculative Floor and Ceiling Finishes –

- Specification of floor and ceiling finishes only where agreed with the occupant or for tenanted areas where the future occupant is not known, carpets, other floor finishes and ceiling finishes are installed in a show area only to reduce wastage.

Functional Adaptability –

- A building-specific functional adaptation strategy will be undertaken by the design team, which includes recommendations for measures to be incorporated to facilitate future adaptation.

Biodiversity (only applicable to BREEAM new construction assessment for the extension)

Selection and Ecological Value of the Site –

- The proposed scheme is located on a previously occupied site and will retain the Grade II listed existing building; and,

- The land within the construction zone has been confirmed to be of low ecological value;

Minimising Impact on Existing Site Ecology and Enhancement -

- There will be no negative impact on the ecological value of the site;

- Advice and recommendations will be sought from the suitably qualified; and,

- Any planting provision associated with the green roof will be designed to provide an enhancement to both the ecological and aesthetic value of the site.

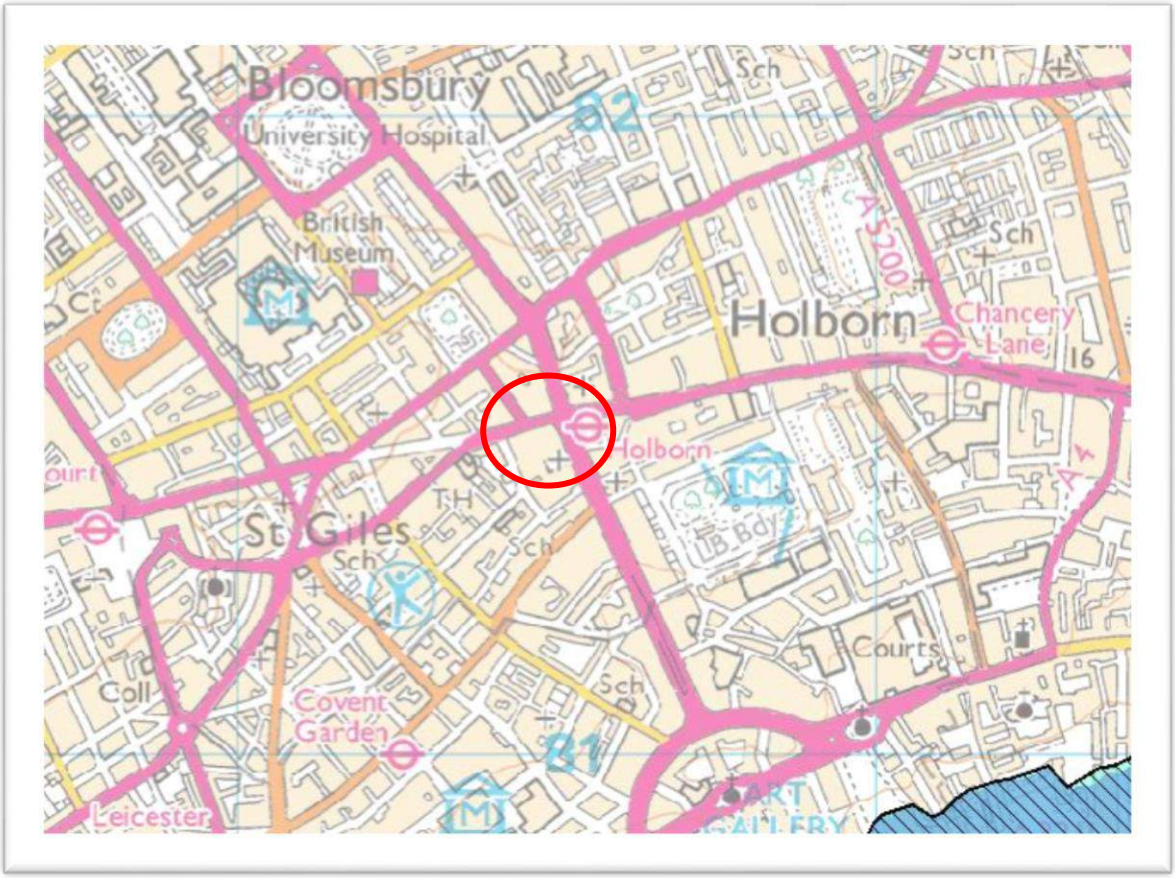
Pollution

Surface Water Management -

- The development site is located within Flood Risk Zone 1, low annual probability of flooding (see Figure 4.1); and,

- The volume of surface water run-off will be limited such that the development will not result in an increased discharge from the site and the peak rate of discharge will be reduced through the provision of flow control techniques and surface water attenuation.

Figure 4.1 - Flood Risk Map (212 High Holborn)



Reduction of night time light pollution -

- The external lighting strategy will be designed to reduce unnecessary light pollution through effective design, energy consumption and nuisance to neighbouring properties.

Reduction of noise pollution -

- Measures to reduce the likelihood of disturbance arising as a result of noise from fixed installations on the development.

5. BREEAM ASSESSMENTS

Two BREEAM Pre-Assessment reports has been prepared by a qualified BREEAM Assessor. This is to determine the feasible credits and potential BREEAM rating for the main building functions within the new build extension and existing refurbished building to the High Holborn development. This demonstrates a commitment to the principles of good construction, design and sustainability.

BREEAM Assessment Classification

The BREEAM assessment methodology applicable to this development is as follows:

- BREEAM 2014 New Construction due to the size of the extension in comparison to the existing building; and,
- BREEAM Refurbishment and Fit-Out for the works to be completed to the existing Grade II listed building.

Potential BREEAM Score and Rating

The BREEAM Pre-Assessments (presented in the Appendix A and B of this Statement) show that the building is expected to performs as follows (minimum required = 70% for BREEAM Excellent):

- BREEAM 2014 New Construction score = **70.2%**
- BREEAM Refurbishment and Fit-Out score = **75.3%**
- Overall BREEAM rating = Potential for **BREEAM 'Excellent' rating.**

Working alongside the qualified BREEAM assessor, the technical design team will review the individual credit criteria and award of credits within the Pre-Assessment in order to optimise the building's BREEAM performance.

In reviewing and assessing the feasibility of the BREEAM credit award and the overall BREEAM performance of this scheme, constraints arising from the nature of the proposed development site and location have been considered. All credits allocated within this BREEAM Pre-Assessment will require further technical verification and additional feasibility assessment during the formal Design Stage and Post Construction BREEAM assessment.

6. ENERGY STRATEGY

The following section of the report presents the overall energy strategy for the existing and new build elements of the proposed scheme. This energy statement details how the development will meet the following London Borough of Camden Core Strategy policy requirements:

- Application of the energy hierarchy as set out in the London Plan (2011) Chapter 5 (particularly Policy 5.2) to secure the following carbon reductions:

    a. A minimum of 35% reduction in regulated CO_2 emissions below the maximum threshold allowed under building regulation Part L2A 2013 for the new build non-residential parts of the development

    b. Provide the fullest contribution to CO_2 reduction in the refurbished parts (i.e. those areas of the building to be assessed under building regulation L2B).

- Secure a 20% reduction in CO_2 emissions through renewable technologies (the 3rd stage of the energy hierarchy) wherever feasible, and this should be demonstrated through the energy statement – this is site wide so also applies to the refurbished parts of the development.

- A minimum credit allocation of 60% under BREEAM energy issues.

Proposed Specification

Details of the material specification that will be incorporated within the new build element of the scheme at the site and enhancements that may be provided within the existing building are reviewed below.

Build Fabric and Thermal Performance, New Build Extension

The standard measurement of heat transfer through a given building material or construction type is the U-value (W/mK). The lower the U-value, the more slowly heat transfers and is lost out of a building. In buildings, heat loss generally occurs through the following areas and elements of the construction:

- Ground Floor;
- External Walls;
- Roofs;
- Doors and windows;
- Thermal (cold) Bridging (heat loss through construction joints); and
- Uncontrolled ventilation.

Table 6.1 presents the proposed material specification that will be incorporated to limit heat loss and ensure efficient operation of the new building extension.

Table 6.1 – Proposed Material Specification, New Build Extension

Construction Element	Proposed Fabric Specification
Ground Floor	U=0.15 W/m^{2}K
External Wall	U=0.22 W/m^{2}K
Roof	U=0.18 W/m^{2}K
Window	U=2.2 W/m^{2}K
Door	U=0.8 W/m^{2}K
Air Permeability	4m^3/hm^2 (@50Pa.)

The proposed mechanical and electrical specification that will be incorporated to ensure efficient servicing of the new building is presented in Table 6.2.

Table 6.2 – Proposed Mechanical and Electrical Specification, New Build Extension

Item	Proposed M&E Specification
	Mechanical ventilation (supply and extract) to all occupied areas with heat recovery at 70% efficiency
	Extract to WCs
	Extract to kitchens
Lighting	100% LED
Space heating and cooling	VRF split system heat pumps SEER 4.5 / EER 4.5
Water Heating	Instantaneous, point of use
Heating Control	Time and temperature zone control serving each area

Build Fabric and Thermal Performance, Existing Building

Table 6.3 presents the proposed material specification that will be incorporated to limit heat loss and optimise the operational efficiency of the existing, Grade II listed building at this site. This table also presents the current specification of the existing building (specifications determined by inference based on age and construction of the original building) which serves to demonstrate the measures taken to improve the thermal performance of the building, so far as reasonably practicable.

Due to the listed status of the existing building there are a number of constraints determining the feasibility of a number of energy efficiency measures hence the improvement are restricted to improving the insulation within the ground floor and roof elements, and specifying high performance secondary glazing.

Table 6.3 – Proposed Material Specification, Existing Building

Construction Element	Original Specification	Enhanced Specification
Ground Floor	U=0.58 W/m^{2}K	U=0.15 W/m^{2}K
External Wall	U=1.53 W/m^{2}K	n/a
Roof	U=2.74 W/m^{2}K	U=0.18 W/m^{2}K
Window	U=5.0 W/m^{2}K	U=1.7 W/m^{2}K
Door	U=3.0 W/m^{2}K	n/a
Air Permeability	n/a	Target 4m^3/hm^2

The proposed mechanical and electrical specification that will be incorporated to ensure efficient servicing of the existing building will mirror the servicing strategy proposed for the new build element of the development (see Table 6.2).

This energy strategy will provide the following benefits:

- **Thermal insulation** and thermally efficient windows and doors will minimise heat loss through the main building elements;

- **Reduced air tightness** is targeted throughout this scheme in order to minimise uncontrolled ventilation. This will reduce heat losses and provide high levels of occupant comfort (in combination with the proposed mechanical ventilation strategy);

- **Mechanical ventilation with heat recovery (MVHR)** will be specified throughout the original and extension building (with the exception of WC and kitchen extract) to maintain a healthy environment and further reduce the heat losses and the energy demand of the building. The proposed MVHR system recovers heat from the extracted stale air from the building by using a counter flow heat exchanger which 'pre-heats' cool incoming, fresh air. The outgoing and incoming air pass next to each other, but do not mix;

- **VRF 'split' system heat pumps** allow precise control of the necessary refrigerant circulation amount required according to the system load facilitating a comfortable environment by use of smooth capacity control. This technology can reduce the energy consumption required for cooling by as much as 30 to 40% a year compared to traditional rotary or reciprocating type compressors and benefit from high seasonal efficiencies;

- **LED lighting** is highly efficient. An estimated energy efficiency of up to 90% when compared to traditional lighting and conventional light bulbs. This means that about c.90% of the electrical energy is converted to light, rather than wasted heat as in conventional bulbs.

In combination with renewable energy generation, these specifications will contribute to the emission reduction targets stipulated by the local planning policies.

Low and Zero Carbon Feasibility

To ensure the selection of the most appropriate solution, a number of renewable and low carbon energy technologies have been considered for this site, including:

- Solar Hot Water (SHW),

- Photovoltaics (PV),

- Wind,

- Biomass heating, and

- CHP.

When selecting an appropriate technology for a development, it is important to consider the energy demand profiles and end use as well as the site-specific location and physical constraints. A review of the

development proposals and site location concludes that only one of these renewable and low carbon options is feasible for this scheme, as detailed below.

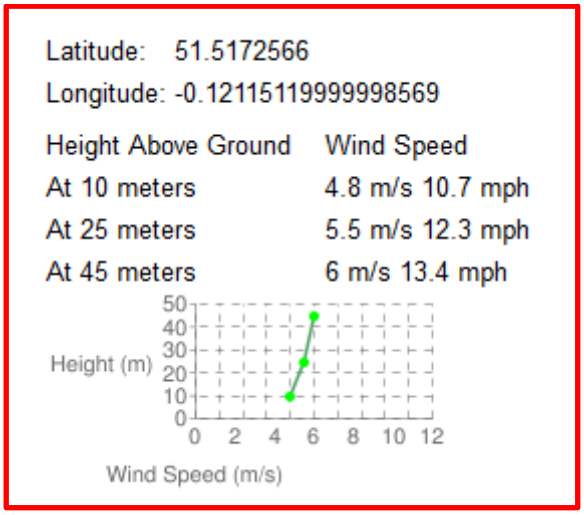
Solar Hot Water utilises the energy in sunlight and diffuse daylight to heat water for use in buildings. The main component of any solar water heating system is the collector, which absorbs the radiant energy of the sun and converts it to heat energy. This technology is not considered to be a feasible option for this site because, although the limited roof space would enable this technology to be installed, these solar thermal technologies only make a relatively limited contribution to reducing the building's energy demand and carbon dioxide emissions – insufficient to meet the emissions reduction target without additional technologies.

Photovoltaics (PV) Photovoltaic (PV) panels harness solar thermal energy and convert it into electricity which can then be used within a building. The panels may be orientated in a southerly direction in tilted arrays upon the flat roof area of the building extension, thereby enabling this technology to operate efficiently. This technology is therefore a technically feasible option for this site.

Wind Turbines are considered unsuitable for this site due to a poor wind resource. In order to operate efficiently a wind speed of at least 6m/s is typically required. The NOABL wind speed database records a wind speed of approximately 4.8m/s at 10m above ground level for this site (post code WC1V 7BF) as presented in Figure 6.1.

Biomass heating would be capable of delivering the target CO_2 emission reductions, but are inappropriate for this development due to the necessity for a large capacity fuel store and access that cannot be accommodated on this site. The ongoing maintenance requirement for such systems and high NOx emissions from this technology also preclude this from further consideration.

Figure 6.1 - Wind Speed Data



Decentralised energy has also been considered in response to the London Plan policies, as follows:

Combined Heat and Power (CHP) is effectively an on-site mini power plant providing both electrical power and thermal heat. It is an energy efficiency and low carbon measure rather than a renewable energy technology. A CHP system operates by burning a primary fuel (normally natural gas) by use of either a reciprocating engine or turbine, which in turn drives an alternator to generate electrical power. The heat emitted by the engine and exhaust gases is recovered and used to heat the building or to provide hot water.

The viability of CHP is dependent upon the building base load requirements for both heat and power. Buildings with high heat demands and constant power demands (such as leisure complexes) lend themselves to CHP. The energy demand profile for the proposed development does not lend itself to this technology.

Local district heating networks provide an opportunity to ensure efficient delivery of energy and consequently reduce the carbon dioxide emission of a building through the optimisation of heat supply. They can also extend the reach of renewables, by using renewable heat efficiently and providing opportunities for the deployment of renewable technologies that otherwise wouldn't be viable. Unfortunately there is no potential for such a connection at this location.

Proposed Low Carbon Energy Solution

It is therefore proposed that, in order to meet the 20% reduction in regulated CO_2 emissions through renewable technologies (i.e. the 3rd stage of the energy hierarchy) for both the existing and new build elements of the scheme, photovoltaic arrays (PV) generating zero carbon electricity are selected as the most appropriate renewable energy technology

Proposed PV System Details –

Photovoltaic panels are relatively straightforward to install, benefit from low maintenance costs and will reduce the operational cost of the building. The PV panels will be mounted due south at 30° to optimise their operating efficiency.

A total capacity of 50kWp PV panels will be installed at the site. In order to meet the respective renewable energy generation targets for the new build extension and existing building, this PV provision will be allocated as follows:

- New Build = 35kWP
- Existing Building = 15kWp

Available Roof Area -

- The scheme proposals include for PV (solar) panels to be located on the southerly, rear orientated roof space of the development. The available roof area is approximately 350m^2. In order to accommodate the required generating capacity, high efficiency PV panels in shallow profile mounting systems are necessary.

Land use –

- There are no land use issues associated with PV technology at this site.

Local Planning Issues –

- There are no planning policy constraints associated with this technology. PV is covered under permitted development for existing dwellings and encouraged at all tiers of planning policy.

Feed in Tariff and Payback –

- This size of array is eligible to claim the generation tariff, index linked and fixed for 20 years plus the export
  tariff based upon the metered value of the electricity exported.

- The typical financial payback period is around 9 years for installations such as this.

Noise Issues –

- PV is silent in operation.

Whole life cost and lifecycle impact –

- Current costs for PV are approximately £1,500 per kWp installed.

- Additional costs throughout the system's 30 year lifecycle are limited to:

  o Cleaning of the arrays;
  o Potential vandal damage to the arrays; and,
  o Replacement of the DC / AC inverter units which typically have a lifespan of around 10 years.

- Financial payback is estimated at 8 years.

- Energy payback estimates for rooftop PV systems are between 4 to 2 years for systems using current multi-crystalline, silicon PV modules.

- With energy paybacks of 2 to 4 years and assumed life expectancies of 30 years, 87% to 97% of the energy that PV systems generate will typically be 'clean' zero carbon energy.

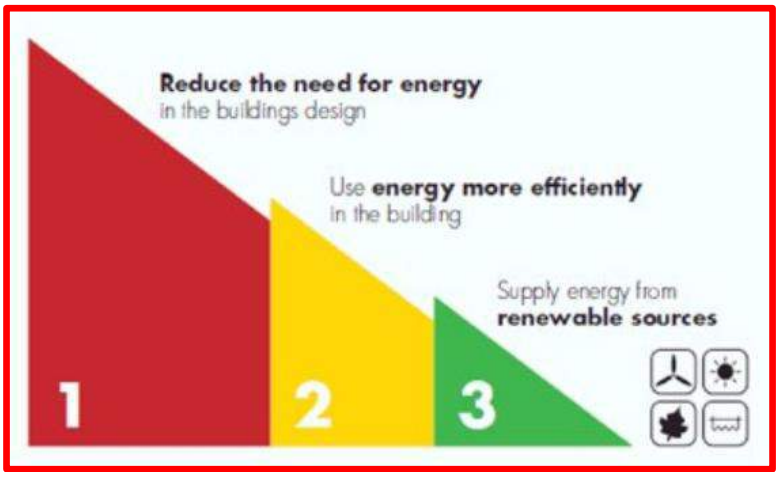
PV arrays will be more fully reviewed in the following Energy Demand Calculation section to demonstrate how this
technology will contribute to meeting the onsite renewable energy generation targets and the overall Building Emission Rate (BER) reduction targets.

Energy Hierarchy

The London Plan requires all development to follow the principles of the Energy Hierarchy. The Energy Hierarchy provides a framework to guide energy policy and decision making to achieve practical and cost effective carbon emission reductions. The hierarchy prioritises demand-side activities to reduce wastage and improve efficiency (see Figure 6.2).

The new build extension will incorporate a good specification along with quality design and construction standards in order to improve the energy efficiency of the whole building. Efficient servicing for both the new and existing elements of the scheme will also be specified along with renewable energy technology. The construction, design and specification proposed for this scheme will deliver a building that is energy efficient and cost effective to operate.

Figure 6.2 – The Energy Hierarchy



The proposals are aligned with the Energy Hierarchy, as follows:

1 - Be Lean.

First Principle – Reduce the need for energy

The new building will be constructed with high specification material and design criteria which exceeds current Building Regulation (L2A, 2013) standards for new buildings (see Table 6.1). Additionally, working within the constraint presented by the listed status of the original element of the scheme, measures to enhance the thermal performance of the existing building fabric will be implemented (see Table 6.3).

These efficiency measures are designed to reduce heat losses and minimise energy demand. This approach to minimising energy demand and associated carbon dioxide emissions is aligned with the first principle of the energy hierarchy which states that reduction in energy demand should be achieved initially by energy efficiency.

2 - Be Clean

Second Principle – Use energy more efficiently

Waste heat will be captured by high efficiency mechanical ventilation with heat recovery systems to reduce heating energy loads and provide healthy conditions for the building occupants. The proposed 100% LED provision and sophisticated control systems for the space and water heating within the building will also ensure the energy consumed is used efficiently. Photocell switching and automatic presence control of the lighting will be specified in order to further improve the efficiency of the lighting system.

Variable refrigerant flow (VRF) multi split systems will deliver space cooling; these systems benefit from extremely high coefficient of performance and seasonal efficiencies, thereby ensuring the efficient use of energy within the building.

The proposed heat recovery systems, low energy lighting provision, high efficiency space and water heating systems combined with sophisticated controls will therefore ensure the energy consumed by the building is used efficiently, in accordance with the second principle of the Energy Hierarchy.

3 - Be Green

Third Principle – Supply energy from renewables

The London Plan emissions reduction targets have been achieved in part through the application of the first two steps of the energy hierarchy – Be Lean and Be Clean.

Having optimised the building's energy and emissions performance in regard to the Be Lean and Be Clean stages of the energy hierarchy, The London Borough of Camden requires that renewable energy generation achieves a 20% reduction in CO_2 emissions through renewable technologies wherever feasible. Furthermore, an overall 35% building emission rate reduction is sought for the new build element of the scheme. This will necessitate the integration of on-site renewable energy generation.

Photovoltaic arrays have been selected as the most appropriate technology for this development. This approach is in accordance with the third principle of the energy hierarchy.

Details of the emissions performance associated with each step of the energy hierarchy are presented in the following Energy Performance Calculations section and demonstrate overall compliance with the regulatory and local planning policy criteria.

Energy Performance Calculations

In order to demonstrate the environmental benefits associated with the proposed energy strategy, SBEM (Design Builder) software has been used to generate representative energy demand models for both the existing and proposed new build element of the scheme.

SBEM calculates the regulated energy demand of the building and associated carbon dioxide emissions, in accordance with the requirements of Building Regulation, Part L. It also provides an estimate of the total energy demand of the building i.e. including energy demand associated with equipment and appliances used in the building.

Please note that these representative calculations are indicative of the proposed specification at this time and that additional calculations will be required for Building Regulation purposes further into the development cycle.

The London Plan stipulates that energy assessments should include the following details:

- Calculation of the energy demand and carbon dioxide emissions covered by the Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations at each stage of the energy hierarchy

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

- Proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.

The calculation results which respond to and evidence these requirements are presented in the appendices and an overview of the results are provided in the following sections.

Existing Building – Energy Performance Calculations

In order to generate the baseline energy data for the **existing element** of the building an SBEM energy calculation has been completed using inferred specifications from the iSBEM software as appropriate for a building of this construction and age.

Further iterations of the SBEM calculation for this area of the building have been completed to demonstrate the following energy performance associated with the steps of the energy hierarchy for the existing building:

- An enhancement to the fabric specification only – **Be Lean.**
- Enhancements to the fabric improvements and HVAC improvements – **Be Lean and Clean.**
- This is for the Be Lean and Be Clean stages of the energy hierarchy - **Be Lean, Clean and Green.**

The SBEM results for the existing building that respond to these steps of the energy hierarchy are presented in Tables 6.4 to 6.6. Further information relating to the BREEAM energy credit performance is presented in Figure 6.4.

Table 6.4 – SBEM Calculation Results; Be Lean

Original Building Specification Baseline ($kgCO_2/m^2/year$)	97.2
Be Lean BER ($kgCO_2/m^2/year$)	76.9
% Building Emission Reduction	20.8

A 20.8% reduction in the building's (carbon dioxide) emission rate has been calculated, solely as a result of the fabric energy efficiency measures specified for this build.

Table 6.5 – SBEM Calculation Results; Be Lean and Clean

Original Building Specification Baseline ($kgCO_2/m^2/year$)	97.2
Be Lean and Clean BER ($kgCO_2/m^2/year$)	37.9
% Building Emission Reduction	61.0

A 61% reduction in the building's (carbon dioxide) emission rate has been calculated, as a result of the fabric *and* efficient servicing measures specified for this build.

Table 6.6 – SBEM Calculation Results; Be Lean, Clean and Green

Original Building Specification Baseline ($kgCO_2/m^2/year$)	97.2
Be Lean and Clean and Green BER ($kgCO_2/m^2/year$)	30.0
% Building Emission Reduction	69%

A 69% reduction in the existing building's carbon dioxide emission rate has been calculated (relative the calculated baseline), as a result of the fabric and efficient servicing measures *plus* renewable energy (PV) generation specified for this build.

The results below also detail how the 20% renewable energy provision target will be delivered on site. Table 6.7 presents the emissions reductions associated with the proposed photovoltaic array for the existing building, applied after the Be Lean and Clean step of the energy hierarchy.

Table 6.7 – Renewable Energy Provision Results

Be Lean and Clean BER ($kgCO_2/m^2/year$)	37.9
Be Lean, Clean and Green BER ($kgCO_2/m^2/year$)	30.0
% Building Emission Reduction from PV	21%

A 21% reduction in the building's (carbon dioxide) emission rate has been calculated, as a result of the renewable energy (PV) generation specified for the original part of the building.

Finally, overall these energy calculations also demonstrate how 60% of the BREEAM UK Refurbishment and Fit Out assessment energy credits are achieved with our proposed energy strategy for the refurbishment of the original building. Energy performance data for the existing building's baseline condition and also for the fully improved (i.e. Be Lean, Clean and Green) building specification has been entered into the BREEAM UK Refurbishment and Fit Out energy calculator tool. This shows that this energy strategy will secure >90% of the BREEAM energy credits (see Figure 6.4).

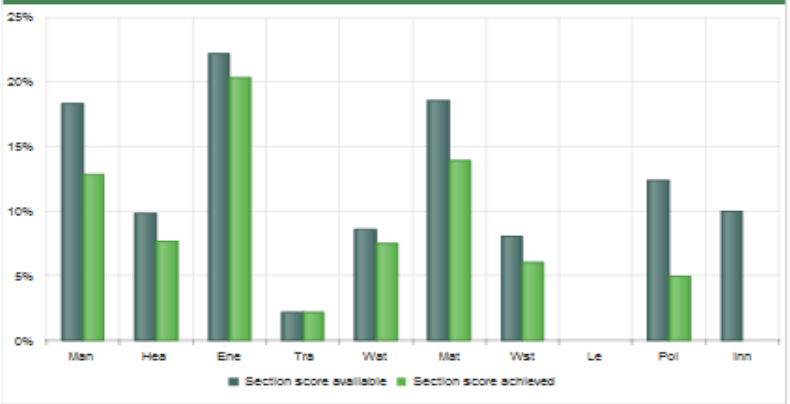
Figure 6.4 – BREEAM UK Refurbishment and Fit Out Energy Results

Pre-assessment: High Holborn (2016.287)

BREEAM Rating

	Credits available	Credits achieved	% Credits achieved	Weighting	Category score
Man	20.0	14.0	70.00%	18.35%	12.84%
Hea	9.0	7.0	77.78%	9.85%	7.66%
Ene	24.0	22.0	91.67%	22.19%	20.33%
Tra	2.0	2.0	100.00%	2.14%	2.14%
Wat	8.0	7.0	87.50%	8.56%	7.49%
Mat	12.0	9.0	75.00%	18.53%	13.89%
Wst	8.0	6.0	75.00%	8.03%	6.02%
Le	0.0	0.0	0.00%	0.00%	0.00%
Pol	10.0	4.0	40.00%	12.35%	4.94%
Inn	10.0	0.0	0.00%	10.00%	0.00%
Total	103.0	71.0	68.93%	-	75.33%
Rating	-	-	-	-	Excellent

Performance by environmental category



New Building Extension – Energy Performance Calculations

A number of iterations of the SBEM calculation for the **new build extension** to the building have been completed to demonstrate the following energy performance associated with the steps of the energy hierarchy for the existing building:

- Enhancements to the fabric improvements and HVAC improvements – **Be Lean and Clean.**
- This is for the Be Lean and Be Clean stages of the energy hierarchy - **Be Lean, Clean and Green.**

The SBEM results for the existing building that respond to these steps of the energy hierarchy are presented in Tables 6.8 and 6.9. Further information relating to the BREEAM energy credit performance is presented in Figure 6.4.

Table 6.8 – SBEM Calculation Results; Be Lean and Clean

Target Emission Rate Baseline ($kgCO_2/m^2/year$)	24.4
Be Lean and Clean BER ($kgCO_2/m^2/year$)	23.5
% Building Emission Reduction	4%

A 4% reduction in the building's (carbon dioxide) emission rate has been calculated (relative to the Target Emission Rate), as a result of the fabric *and* efficient servicing measures specified for this build.

Table 6.9 – SBEM Calculation Results; Be Lean, Clean and Green

Target Emission Rate Baseline ($kgCO_2/m^2/year$)	24.4
Be Lean and Clean and Green BER ($kgCO_2/m^2/year$)	15.1
% Building Emission Reduction	38.1%

A 38% reduction in the building's (carbon dioxide) emission rate has been calculated, as a result of the fabric and efficient servicing measures *plus* renewable energy (PV) generation specified for this build.

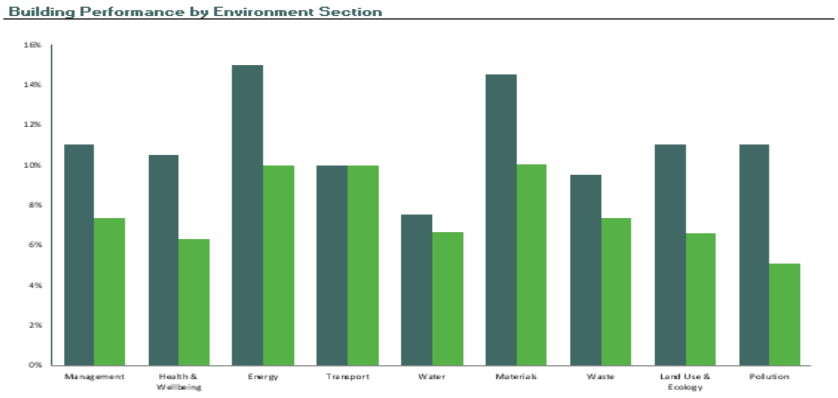
The results below also detail how the 20% renewable energy provision target will be delivered on site. Table 6.10 presents the emissions reductions associated with the proposed photovoltaic array for the existing building, applied after the Be Lean and Clean step of the energy hierarchy.

Table 6.10 – Renewable Energy Provision

Be Lean and Clean BER ($kgCO_2/m^2/year$)	23.5
Be Lean and Clean BER ($kgCO_2/m^2/year$)	15.1
% Building Emission Reduction	35.7%

A 36% reduction in the building's (carbon dioxide) emission rate has been calculated, as a result of the renewable energy (PV) generation specified for the extension building.

Figure 6.5 – BREEAM New Construction Energy Results



Environmental Section	No. credits available	Indicative no. credits Achieved	% credits achieved	Section Weighting	Indicative Section Score
Management	18	12	66.67%	11.00%	7.33%
Health & Wellbeing	10	6	60.00%	10.50%	6.30%
Energy	21	14	66.67%	15.00%	10.00%
Transport	9	9	100.00%	10.00%	10.00%
Water	9	8	88.89%	7.50%	6.66%
Materials	13	9	69.23%	14.50%	10.03%
Waste	9	7	77.78%	9.50%	7.38%
Land Use & Ecology	10	6	60.00%	11.00%	6.60%
Pollution	13	6	46.15%	11.00%	5.07%
Innovation	10	0	0.00%	N/A	0

Finally, overall these energy calculations also demonstrate how 60% of the BREEAM New Construction energy credits are achieved with our proposed energy strategy for the building extension. Energy performance data for the new build extension for the fully improved (i.e. Be Lean, Clean and Green) building specification has been entered into the BREEAM New Construction energy calculator tool. This confirms that this energy strategy will secure 66.7% of the BREEAM energy credits (see Figure 6.5).

The proposed energy strategy has therefore been proven to meet the myriad regulatory and local planning policy targets applied to this development.

7. CONCLUSION

This Statement has reviewed the sustainability performance of the proposed development at 212 High Holborn, Bloomsbury Parrs against national and local policies and detailed the potential BREEAM rating for the scheme. The material specification and servicing strategy for the scheme and the building (carbon dioxide) emission rates for the various uses throughout the development have also been reviewed.

Energy Performance -

The proposed energy strategy has therefore been proven to meet the key regulatory and local planning policy targets established by the London Borough of Camden Core Strategy Policy CS13 – Tackling Climate Change Through Promoting Higher Environmental Standards and Policy DP22 – Promoting Sustainable Design and Construction as well as the London Plan Policy 5.2, as follows:

- Application of the energy hierarchy as per the London Plan guidance – the scheme has been shown to perform well relative to the Be Lean, Clean and Green stages of the hierarchy.
- Securing the following carbon reductions:
    - A minimum of 35% reduction in regulated CO_2 emissions below the Part L 2013 compliance criteria for the new build element of the development
    - Providing the fullest contribution to CO_2 reduction in the refurbished parts of the scheme
        - In particular, thermal performance improvements have been targeted significantly beyond the minimum building fabric targets set in Part L of the building regulations, subject to the constraints associated with the building's listed status.
- Achieving at least a 20% reduction in CO_2 emissions through renewable technologies.
    - It is proposed that photovoltaics be applied in the final stage of the energy hierarchy in order to meet the target renewable energy provision and secure the overall 35% Building Emission Rate reduction for the new build element of the proposed scheme.
- For both the new build and existing element of the scheme respectively, a minimum of 60% of the available BREEAM energy credits are awarded within the BREEAM New Construction and Refurbishment and Fit-out assessments.

Sustainability Performance –

The key issues of the Camden Planning Guidance CPG3 – sustainability document in accordance with the Core Strategy have been achieved by the proposals. These are as follows:

- The proposed scheme will be designed in accordance with the BREEAM criteria and achieve the required 'Excellent' rating. This represents 'best practice' for new and refurbished non-domestic buildings in the UK and as detailed in Section 4, the scheme is expected to perform well in all areas of the assessments. This is in accordance with Core Strategy DP22.

- The proposals are expected to exceed the following unweighted credits in the following sections; 60% in the energy category, 40% in the materials category and 60% in the water category in the BREEAM assessment.

- Water management for the development will be specified consumption of the development will be minimised; Water management for the will target a 40% improvement upon the BREEAM 2014 baseline case further reducing the developments internal water demand. Also in accordance with Core Strategy DP23.

- The development site is located within Flood Risk Zone 1. The site drainage strategy will be designed to manage the surface water runoff to ensure that the peak rate and volume of surface water run-off will be no greater post-development than pre-development. In accordance with Core Strategy DP23.

- Waste arising during construction and occupation/operation will be minimised. A site waste management plan will be adopted during construction. The development will be provided with waste facilities and a comprehensive waste management plan for the site. The provision of suitable space and facilities will allow the main building functions to segregate and store operational recyclable waste.

- Construction site management procedures will minimise adverse impacts on the environment and control pollution generated during the construction phase. These include a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling of materials. A commitment will be made to minimise waste and pollution.

- In accordance with the BREEAM criteria materials are proposed to be responsibly sourced, materials with low environmental impact will be selected and local suppliers will be prioritised. In combination this procurement strategy will minimise and conserve energy associated with transportation and waste generation.

Furthermore, the proposals accord with the aims of the National Planning Policy Framework, as follows:

- The proposals include the redevelopment of a previously developed occupied site and represents a very efficient use of land.

- Construction practices that minimise adverse impacts on the environment will be adhered to including a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling, a commitment will be made to minimise waste and pollution; and

- Exceeding the regulatory compliance criteria and achieving BREEAM ‘Excellent’ across the mixed-use scheme will assist in mitigating the impact of climate change and it environmental impact.

In conclusion, the proposals reviewed within this statement for the scheme at 212 High Holborn will deliver an efficient and sustainable scheme, providing a quality development that accords with the guidance provided within the London Borough of Camden’s adopted policies.

8. APPENDIX A - BREEAM NEW CONSTRUCTION PRE-ASSESSMENT

BREEAM UK New Construction 2014 Pre-Assessment Estimator: Assessment Issue Scoring

Building name	212 High Holborn
Building score (%)	70.20%
Building rating	Excellent
Minimum standards level achieved	Excellent level

MANAGEMENT

Man 01 Project brief and design

No. of BREEAM credits available	4	Available contribution to overall score	2.44%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will stakeholder consultation (project delivery) take place?	Yes	1	1
Will stakeholder consultation (third party) take place?	Yes	1	1
Will a sustainability champion (design) be assigned?	No	1	0
Will a sustainability champion (monitoring progress) be assigned?	No	1	0

Total BREEAM credits achieved	2
Total contribution to overall building score	1.22%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

- Stakeholder consultation covering project delivery
- Stakeholder consultation covering relevant third parties.

Man 02 Life cycle cost and service life planning

No. of BREEAM credits available	4	Available contribution to overall score	2.44%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will an elemental life cycle cost (LCC)analyses be carried out?	No	2	0
Will a component level LCC plan be developed?	No	1	0
Will the predicted capital cost be reported?	Yes	1	1
Expected capital cost of the project (if available)	TBC	£/m^2	

Total BREEAM credits achieved	1
Total contribution to overall building score	0.61%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Predicted capital cost of the project to be provided (£/m2)

Man 03 Responsible construction practices

No. of BREEAM credits available	6	Available contribution to overall score	3.67%
No. of BREEAM innovation credits available	1	Minimum standards applicable	Yes

Assessment Criteria	Compliant?	Credits available	Credits achieved
Is all site timber used in the project 'legally harvested and traded timber'?	Yes		
Will/does the principal contractor operate a compliant Environmental Management System?	Yes	1	1
Will a construction stage sustainability champion be assigned?	No	1	0
Will a considerate construction scheme be used by the principal contractor? (One credit where 'compliance' has been achieved. Two credits where 'compliance' is significantly exceeded.)	2	2	2
Will construction site impacts be metered/monitored?	Yes		
Will site utility consumption be metered/monitored?	Yes	1	1
Will transport of construction materials and waste be metered/monitored?	Yes	1	1
Will exemplary level criteria be met?	No	1	0

Key Performance Indicators: Construction site energy use

Energy consumption (total) - site processes		Information not available at design stage
Energy consumption (intensity) - site processes		Information not available at design stage
Distance (total) - materials transport to site		Information not available at design stage
Distance (total) -waste transport from site		Information not available at design stage
Energy consumption (total) - materials transport to site		Information not available at design stage
Energy consumption (total) - waste transport from site		Information not available at design stage
Energy consumption (intensity) - materials transport to site		Information not available at design stage
Energy consumption (intensity) - waste transport from site		Information not available at design stage

Key Performance Indicators: Construction site greenhouse gas emissions

Process greenhouse gas emissions (total) - site processes		Information not available at design stage
Greenhouse gas emissions (intensity) - site processes		Information not available at design stage
Greenhouse gas emissions (total) - materials transport to site		Information not available at design stage
Greenhouse gas emissions (total) - waste transport from site		Information not available at design stage
Greenhouse gas emissions (intensity) - materials transport to site		Information not available at design stage
Greenhouse gas emissions (intensity) - waste transport from site		Information not available at design stage

Key Performance Indicators: Construction site use of freshwater resources

Use of freshwater resource (total) - site processes		Information not available at design stage
Use of freshwater resource (intensity) - site processes		Information not available at design stage

Total BREEAM credits achieved	5
Total contribution to overall building score	3.06%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Outstanding level

Comments/notes:

• Pre-requisite - All timber and timber-based products used on the project is 'Legally harvested and traded timber'.
• The principal contractor demonstrates sound environmental management practices (ISO 14001) and consideration for neighbours across their activities on-site.
• Beyond compliance for Considerate Contractors Scheme
• Site related energy, water and transport impacts are monitored and reported to ensure ongoing compliance during the Construction, Handover and Close Out stages and to improve awareness and understanding for future projects.

Man 04 Commisioning and handover

No. of BREEAM credits available	4	Available contribution to overall score	2.44%
No. of BREEAM innovation credits available	0	Minimum standards applicable	Yes

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will commissioning schedule and responsibilities be developed & accounted for?	Yes	1	1
Will a commissioning manager be appointed?	Yes	1	1
Will the building fabric be commissioned?	Yes	1	1
Will a building user guide be developed prior to handover?	Yes	1	1
Will a training schedule be prepared for building occupiers/managers?			

Total BREEAM credits achieved	4
Total contribution to overall building score	2.44%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	Outstanding level

Comments/notes:

• Schedule of commissioning including optimal timescales and appropriate testing and commissioning of all building services systems and building fabric in line with best practice.
• Inspecting, testing, identifying and rectifying defects via an appropriate method.
• Provision of a non-technical Building User Guide and user/operator training timed appropriately around handover and proposed occupation.

Man 05 Aftercare

Assessment issue not applicable

No. of BREEAM credits available	N/A	Available contribution to overall score	N/A
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	N/A

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will aftercare support be provided to building occupiers?			
Will seasonal commissioning occur over 12months once substantially occupied?			
Will a post occupancy evaluation be carried out 1 year after occupation?			
Will exemplary level criteria be met?			

Total BREEAM credits achieved	N/A
Total contribution to overall building score	N/A
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

HEALTH & WELLBEING

Hea 01 Visual Comfort

No. of BREEAM credits available	3	Available contribution to overall score	3.15%
No. of BREEAM innovation credits available	1	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will the design provide adequate glare control for building users?			
How many credits will be targeted for the daylighting criteria?	0	1	0
Will the design provide adequate view out for building users?	No	1	0
Will internal/external lighting levels, zoning and controls be specified in accordance with the relevant CIBSE Guides/British Standards?	Yes	1	1
Will exemplary level criteria be met?	No	1	0

Total BREEAM credits achieved	1
Total contribution to overall building score	1.05%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

Credits awarded for the following:
- Internal and external lighting systems are designed to avoid flicker and provide appropriate illuminance (lux) levels.
- Internal lighting is zoned to allow for occupant control.

Hea 02 Indoor Air Quality

No. of BREEAM credits available	2	Available contribution to overall score	2.10%
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will an air quality plan be produced and building designed to minimise air pollution?			
Will building be designed to minimise the concentration and recirculation of pollutants in the building?	No	1	0
Will the relevant products be specified to meet the VOC testing and emission levels required?			
Will formaldehyde and total VOC levels be measured post construction?			
Will the building be designed to, or have the potential to provide, natural ventilation?	No	1	0
Will exemplary level VOCs (products)criteria be met?			

Key Performance Indicators: Indoor air quality

Concentration levels of formaldehyde		Information not available at design stage
Total volatile organic compound (TVOC) concentration		Information not available at design stage

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

Credits Not Sought at this stage

Hea 03 Safe containment in laboratories

Assessment issue not applicable

No. of BREEAM credits available	N/A	Available contribution to overall score	N/A
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	N/A

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will an objective risk assessment of proposed laboratory facilities' design be completed?			
Will the manufacture & installation of fume cupboards and containment devices meet best practice standards?			
Will containment level 2 & 3 labs meet best practice safety & performance criteria?			

Total BREEAM credits achieved	N/A
Total contribution to overall building score	N/A
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Hea 04 Thermal comfort

No. of BREEAM credits available	2	Available contribution to overall score	2.10%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will thermal modelling of the design be carried out?	Yes	1	1
Will the building design be adapted for a projected climate change scenario?	Yes	1	1

Key Performance Indicators: Thermal comfort

Predicted Mean Vote (PMV)	INA
Predicted Percentage Dissatisfied (PPD)	INA

Total BREEAM credits achieved	2
Total contribution to overall building score	2.10%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

- Thermal modelling carried out to appropriate standards.
- Projected climate change scenario(s) considered as part of the thermal model.
- The thermal modelling analysis has informed the temperature control strategy for the building and its users

Hea 05 Acoustic Performance

No. of BREEAM credits available	1	Available contribution to overall score	1.05%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Credits	Credits available	Credits achieved
Will the building meet the appropriate acoustic performance standards and testing requirements for: a. Sound insulation b. Indoor ambient noise level c. Reverberation times?	1	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	1.05%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

The building meets appropriate acoustic performance standards and testing requirements in terms of:
Sound insulation
Indoor ambient noise level
Reverberation times.

Hea 06 Safety and Security

No. of BREEAM credits available	2	Available contribution to overall score	2.10%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Where external site areas are present, will safe access be designed for pedestrians and cyclists?	N/A	0	0
Will a suitably qualified security consultant be appointed and security considerations accounted for?	Yes	2	2

Total BREEAM credits achieved	2
Total contribution to overall building score	2.10%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

The first credit is considered to not be applicable as there are no external site areas to accommodate pedestrian and cycle path within the site boundary. The second credit has been awarded - Secure By Design - Security needs are understood and taken into account in the design and specification.

ENERGY

Ene 01 Reduction of energy use and carbon emissions

No. of BREEAM credits available	12	Available contribution to overall score	8.57%
No. of BREEAM innovation credits available	5	Minimum standards applicable	Yes

How do you wish to assess the number of BREEAM credits achieved for this issue?	Enter building performance data into the Ene01 calculator

Ene 01 Calculator

Country of the UK where the building is located	England	Confirm building regulation and version to be used:	England Part L2A 2013

New Construction (shell and core)

Building floor area	1686	m2

Notional building heating and cooling energy demand	160.06	MJ/m2yr
Actual building heating and cooling energy demand	155.85	MJ/m2yr
Notional building primary energy consumption	136.82	kWh/m2yr
Actual building primary energy consumption	138.90	kWh/m2yr
Target emission rate (TER)	24.40	kgCO2/m2yr
Building emission rate (BER)	15.1	kgCO2/m2yr
Building emission rate improvement over TER	38.1%	
Heating & cooling demand energy performance ratio (EPR_{ED})	0.061	
Primary consumption energy performance ratio (EPR_{PC})	0.000	
CO_2 Energy performance ratio (EPR_{CO2})	0.334	
Overall building energy performance ratio (EPR_{NC})	0.395	

Where specified, please confirm the energy production from onsite or near site energy generation technologies	
Equivalent % of the building's 'regulated' energy consumption generated by carbon neutral sources and used to meet energy demand from 'unregulated' building systems or processes?	

Is the building designed to be 'carbon negative' ?	
If the building is defined as 'carbon negative' what is the total (modelled) renewable/carbon neutral energy generated and exported?	

Total BREEAM credits achieved	5
Total contribution to overall building score	3.57%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Excellent level

Comments/notes:

Nine credits awarded for this issue - Discussions with the M&E indicate that this is achievable.
• Recognise improvements in the energy performance of the building above national building regulations in relation to heating and cooling energy demand, primary energy consumption and carbon dioxide emissions

Ene 02 Energy monitoring

No. of BREEAM credits available	2	Available contribution to overall score	1.43%
No. of BREEAM innovation credits available	0	Minimum standards applicable	Yes

Assessment criteria	Compliant?	Credits available	Credits achieved
Will a BMS or sub-meters be specified to monitor energy use from major building services systems?	Yes	1	1
Will a BMS or sub-meters be specified to monitor energy use by tenant/building function areas?	Yes	1	1

Total BREEAM credits achieved	2
Total contribution to overall building score	1.43%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	Outstanding level

Comments/notes:

Credits awarded for the following:

- Energy metering systems are installed to enable energy consumption to be assigned to end uses.
- Sub-meters are provided for high energy load and tenancy areas.

Ene 03 External lighting

No. of BREEAM credits available	1	Available contribution to overall score	0.71%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment criteria	Compliant?	Credits available	Credits achieved
Will external light fittings and controls be specified in accordance with the BREEAM criteria?	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	0.71%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credits awarded for the following:

• Specification of energy efficient light fittings for external areas of the development and controls to prevent use during daylight hours or when not needed.

Ene 04 Low carbon design

No. of BREEAM credits available	3	Available contribution to overall score	2.14%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment criteria	Compliant?	Credits available	Credits achieved
Will passive design measures be used in line with an analysis be carried out during concept design stage (RIBA stage 2 or equivalent)?	Yes	1	1
Will free cooling measures be implemented in the whole building in line with the passive design analysis?	Yes	1	1
Will a LZC technology be specified in line with a feasibility study carried out by the completion of the Concept Design stage (RIBA Stage 2 or equivalent)?	Yes	1	1

KPI - Low and/or zero carbon energy generation

Total on-site and/or near-site LZC energy generation	INA	kWh/yr

Total BREEAM credits achieved	3
Total contribution to overall building score	2.14%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

• A feasibility study will be carried out to establish the most appropriate on-site/near-site low or zero carbon (LZC) energy source(s) for the building and is specified.

Ene 05 Energy efficient cold storage

Assessment issue not applicable

No. of BREEAM credits available	N/A	Available contribution to overall score	N/A
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	N/A

Assessment criteria	Compliant?	Credits available	Credits achieved
Will the refrigeration system be designed, installed & commissioned in accrodance with BREEAM criteria?	No	N/A	N/A
Will the refrigeration system demonstrate a saving in indirect greenhouse gas emissions?	No	N/A	N/A

Total BREEAM credits achieved	N/A
Total contribution to overall building score	N/A
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Ene 06 Energy efficient transportation systems

No. of BREEAM credits available	3	Available contribution to overall score	2.14%
No. of BREEAM innovation credits available	0	Minimum standards applicable	N/A

Assessment criteria	Compliant?	Credits available	Credits achieved
Will a transportation system analysis be carried out to determine and specify the optimum number, size and type of lifts that is most energy efficient?	Yes	1	1
Will the relevant energy-efficient features criteria be met?	Yes	2	2

Total BREEAM credits achieved	3
Total contribution to overall building score	2.14%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

All credits have been awarded for this issue.
Credits are awarded for the following:
• An analysis of the transport demand and usage patterns is undertaken to determine the optimum number and size of lifts, escalators and/or moving walks.
• Energy efficient installations are specified.

Ene 07 Energy efficient laboratory systems

Assessment issue not applicable

No. of BREEAM credits available	N/A	Available contribution to overall score	N/A
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	N/A

Assessment criteria	Compliant?	Credits available	Credits achieved
Pre-requisite: Criterion 1 of Hea 03 - risk assessment of laboratory facilities			
Have the occupants' laboratory requirements & performance criteria been confirmed during the preparation of the initial project brief to minimise energy demand?			
Best Practice Energy Practices in Laboratories (table 27)			
Will the laboratory meet criteria item b) Fan power?			
Will the laboratory criteria item c) Fume cupboard volume flow rates?			
Will the lab meet item d) Grouping / isolation of high filtration/ventilation activities?			
Will the laboratory meet criteria item e) Energy recovery - heat?			
Will the laboratory meet criteria item f) Energy recovery - cooling?			
Will the laboratory meet criteria item g) Grouping of cooling loads?			
Will the laboratory meet criteria item h) Free cooling?			
Will the laboratory meet criteria item i) Load responsiveness?			
Will the laboratory meet criteria item j) Cleanrooms?			
Will the laboratory meet criteria item k) Diversity?			
Will the laboratory meet criteria item l) Room air-change rates?			

Total BREEAM credits achieved	N/A
Total contribution to overall building score	N/A
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Ene 08 Energy efficient equipment

Assessment issue not applicable

No. of BREEAM credits available	N/A	Available contribution to overall score	N/A
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	N/A

Assessment criteria

Which of the following will be present and likely to be a/the major contributor to 'unregulated' energy use?	Present	Major impact
Ref A Small power and plug in equipment?		
Ref B Swimming pool?		
Ref C Communal laundry?		
Ref D Data centre?		
Ref E IT-intensive operation areas?		
Ref F Residential areas?		
Ref G Healthcare?		
Ref H Kitchen and catering facilities?		

	Compliant	Credits available	Credits achieved
Will the significant majority contributor(s) to 'unregulated' energy use above meet the BREEAM criteria?			

Total BREEAM credits achieved	N/A
Total contribution to overall building score	N/A
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Ene 09 Drying space

Assessment issue not applicable

No. of BREEAM credits available	N/A	Available contribution to overall score	N/A
No. of BREEAM innovation credits available	N/A	Minimum standards applicable	N/A

Assessment criteria	Compliant?	Credits available	Credits achieved
Will internal/external drying space and fixings be provided?			

Total BREEAM credits achieved	N/A
Total contribution to overall building score	N/A
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

TRANSPORT

Tra 01 Public Transport Accessibility

No. of BREEAM credits available	3	Available contribution to overall score	3.33%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Building type category (for purpose of Tra01 issue assessment)	Business (office/industrial)

Assessment Criteria	Compliant	Credits available	Credits achieved
Indicative public transport accessibility index (AI):	75.72	3	3
Will the building have a dedicated bus service?			N/A

AI	Indicative Accessibility Index for pre-assessment
0	Poor or no public transport provision
1	A single BREEAM compliant public transport node available
2	Some BREEAM compliant public transport nodes/services available
4	A selection of BREEAM compliant public transport nodes/services available
8	Good provision of public transport i.e. small urban centre / suburban area
10	Very Good provision of public transport i.e. small/medium urban centre
12	Excellent provision of public transport, i.e. medium urban centre
18	Excellent provision of public transport, i.e. large urban/metropolitan city centre

Total BREEAM credits achieved	3
Total contribution to overall building score	3.33%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

PTAL 6b Report states AI of + 75. A highly sustainable location in terms of accessibility and public transport. Three credits awarded - Recognition for developments in proximity to good public transport networks, thereby helping to reduce transport-related pollution and congestion.

Tra 02 Proximity to Amenities

No. of BREEAM credits available	1	Available contribution to overall score	1.11%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will the building be in close proximity of and accessible to applicable amenities?	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	1.11%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

The site is located within an urban area of central London, with amenities within easy walking distance. Credit awarded in recognition of developments in close proximity of, and accessible to, local amenities which are likely to be frequently required and used by building occupants.

Tra 03 Cyclist facilities

No. of BREEAM credits available	2	Available contribution to overall score	2.22%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Building type category (for purpose of Tra03 issue assessment)	Business - (office/Industrial)
How many compliant cycle storage spaces will be provided?	30
What cyclist facilities will be provided?	Showers, changing facilities and drying space

Assessment Criteria	Compliant?	Credits available	Credits achieved
Cycle storage spaces	Yes	2	2
Cyclist facilities	Yes		

Total BREEAM credits achieved	2
Total contribution to overall building score	2.22%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Both credits awarded for compliant cycle storage spaces and facilities.
Number of spaces:
Office - 1 cycle space per 10 staff
(See guidance for compliant space and facility criteria)

Tra 04 Maximum Car Parking Capacity

No. of BREEAM credits available	2	Available contribution to overall score	2.22%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Building type category (for purpose of Tra04 issue)	Business - (office/Industrial)
Building's indicative Accessibility Index (sourced from issue Tra01)	75.72

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will BREEAM's maximum parking capacity criteria for the building type/Accessibility Index be met?	Yes	2	2

Total BREEAM credits achieved	2
Total contribution to overall building score	2.22%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

No car parking spaces proposed - credit awarded by default.

Tra 05 Travel Plan

No. of BREEAM credits available	1	Available contribution to overall score	1.11%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will a transport plan based on site specific travel survey/assessment be developed?	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	1.11%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

A transport Statement has been prepred for planning - A site specific travel plan will be required in line with the BREEAM criteria to promote sustainable reductions in transport burdens by undertaking a site specific travel assessment/statement and developing a travel plan based on the needs of the particular site.

WATER

Wat 01 Water Consumption

No. of BREEAM credits available	5	Available contribution to overall score	4.17%
No. of BREEAM innovation credits available	1	Minimum standards applicable	Yes

How do you wish to assess the BREEAM credits to be achieved for this issue?	Define a target % improvement over baseline sanitary fittings
What is the target for % reduction in potable water consumption for sanitary use in the building?	55% - five credits

Please select the calculation procedure used	
Components are not being specified and installed by the developer, but they will be specified by the tenant	No

Standard approach data

Water Consumption from building micro-components	
Water demand met via greywater/rainwater sources	
Total net water consumption	
Improvement on baseline performance	

Key Performance Indicator - use of freshwater resource

Total net Water Consumption	
Default building occupancy	

Alternative approach data

Overall microcomponent performance level achieved	

Total BREEAM credits achieved	5
Total contribution to overall building score	4.17%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Outstanding level

Comments/notes:

Four credits awarded - Minimum performance levels for components can be provided as a guide to meet required specification.
Reducing the demand for potable water through the provision of efficient sanitary fitting, rainwater collection and water recycling systems

Wat 02 Water Monitoring

No. of BREEAM credits available	1	Available contribution to overall score	0.83%
No. of BREEAM innovation credits available	0	Minimum standards applicable	Yes

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will there be a water meter on the mains water supply to the building(s)?	Yes	1	1
Will metering/monitoring equipment be specified on the water supply to any relevant plant/building areas?	Yes		
Will all specified water meters have a pulsed output?	Yes		
If the site/building has an existing BMS connection, will all pulsed meters be connected to the BMS?	Yes		

Total BREEAM credits achieved	1
Total contribution to overall building score	0.83%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	Outstanding level

Comments/notes:

Specification of a water meter/s on the mains water supply to encourage water consumption management and monitoring to reduce the impacts of inefficiencies and leakage.

Wat 03 Water Leak Detection and Prevention

No. of BREEAM credits available	2	Available contribution to overall score	1.67%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will a mains water leak detection system be installed on the building's mains water supply?	Yes	1	1
Will flow control devices be installed in each sanitary area/facility?	Yes	1	1

Total BREEAM credits achieved	2
Total contribution to overall building score	1.67%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

- Recognition of leak detection systems capable of detecting a major water leak on the mains water supply
- Flow control devices that regulate the supply of water to each WC area/facility to reduce water wastage.

Wat 04 Water Efficient Equipment

No. of BREEAM credits available	1	Available contribution to overall score	0.83%
No. of BREEAM innovation credits available	No	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Has a meaningful reduction in unregulated water demand been achieved?		1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	0.83%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

no landscaped areas proposed - green roof will form part of the proposals but will rely soley on precipitation throughout the year.

MATERIALS

Mat 01 Life Cycle Impacts

No. of BREEAM credits available	5	Available contribution to overall score	5.58%
No. of BREEAM innovation credits available	3	Minimum standards applicable	No

How do you wish to assess the number of BREEAM credits to be achieved for this issue?	Define the number of Mat 01 credits achieved

Assessment Criteria

Predicted total Mat01 credits achieved	4
Predicted total Mat01 points achieved	
Number of building elements assessed	
Green Guide exemplary level compliant?	
Has IMPACT compliant software been used?	

Key Performance Indicator - embodied green house gas emissions by element

	Total area of element m^2	Total impact $kgCO_2$ eq.	Area of element impact data relevant to m^2
External walls			
Windows			
Roof			
Upper floor construction			
Internal wall			
Floor finishes/coverings			

Key Performance Indicator - embodied green house gas emissions for building (assessed elements only)

Total embodied green house gas emissions for building (by assessed elements)	Missing data	$kgCO_2$ eq.		$kgCO_2$ eq./m^2
Proportion of applicable building elements that data reported covers				

Total BREEAM credits achieved	4
Total contribution to overall building score	4.46%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

Reductions in the building's environmental life cycle impacts through assessment of the main building elements. As follows:
- External Walls
- Windows
- Roof
- Upper floor slab
- Floor finishes/covering

Credits are awarded on the basis of the total number of points achieved, as set out in Table (BREEAM guidance), and calculated using the BREEAM Mat 01 calculator. This point's score is based on the Green Guide rating(s) achieved for the specifications that make-up the main building elements.

Mat 02 Hard Landscaping and Boundary Protection

No. of BREEAM credits available	1	Available contribution to overall score	1.12%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will ≥80% of all external hard landscaping and boundary protection achieve a Green Guide A or A+ rating?	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	1.12%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Only hard landscaping assessed for this issue and boundary protection is not present. Reductions in the environmental life cycle impacts through assessment of the hard landscaping elements.

Mat 03 Responsible Sourcing

No. of BREEAM credits available	4	Available contribution to overall score	4.46%
No. of BREEAM innovation credits available	1	Minimum standards applicable	Yes

Assessment Criteria	Compliant	Credits available	Credits achieved
All timber and timber based products are 'Legally harvested and trader timber'	Yes		
Is there a documented sustainable procurement plan?	Yes	1	1
Percentage of available responsible sourcing of materials points achieved	18.00%	3	1

Please confirm the route used to assess Mat03	Route 1: Lowest RSCS point score

Total BREEAM credits achieved	2
Total contribution to overall building score	2.23%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Outstanding level

Comments/notes:

Credits have been awarded as follows:
First credit -Materials sourced in accordance with a sustainable procurement plan.
Second credit - Key building materials are responsibly sourced to reduce environmental and socio-economic impacts (conservative award of credits).

Mat 04 Insulation

No. of BREEAM credits available	1	Available contribution to overall score	1.12%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria		Credits available	Credits achieved	
What is the building's targeted insulating index?	2.50	1	1	Note: An insulatio

Total BREEAM credits achieved	1
Total contribution to overall building score	1.12%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credit awarded - Recognition of the use of thermal insulation which has a low embodied environmental impact relative to its thermal properties

Mat 05 Designing for durability and resilience

No. of BREEAM credits available	1	Available contribution to overall score	1.12%
No. of BREEAM innovation credits available	0	Minimum standards applicable	N/A

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will suitable durability/protection measures be specified and installed to vulnerable areas of the building?	Yes	1	1
Will suitable durability/protection measures be specified and installed to exposed parts of the building?	Yes		

Total BREEAM credits achieved	1
Total contribution to overall building score	1.12%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credits awarded for the following:

- The building incorporates measures to reduce impacts associated with damage and wear-and-tear.
- Relevant building elements incorporate appropriate design and specification measures to limit material degradation due to environmental factors.

Mat 06 Material efficiency

No. of BREEAM credits available	1	Available contribution to overall score	1.12%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will material efficiency measures be identified & implemented during all RIBA stages?	No	1	0

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credit Not Sought at this stage

WASTE

Wst 01 Construction Waste Management

No. of BREEAM credits available	4	Available contribution to overall score	4.22%
No. of BREEAM innovation credits available	1	Minimum standards applicable	Yes

How do you wish to assess the number of BREEAM credits to be achieved for this issue?	Define a target number of BREEAM credits		
Select the number of BREEAM credits being targeted for issue Wst 01:	4	BREEAM Wst01 Innovation credits:	0

Assessment Criteria	Compliant?
Construction resource management plan	
Compliant Pre-demolition audit	
Does the excavation waste meet the exemplary level requirements?	

Key Performance Indicators - Construction Waste

Measure/units for the data being reported		
Non-hazardous construction waste (excluding demolition/excavation)		
Total non-hazardous construction waste generated		Note: At the pre-assessment stage this
Non-hazardous non-demolition const. waste diverted from landfill		Note: At this stage this will be a target l
Total non-hazardous non-demolition const. waste diverted from landfill		Note: At the pre-assessment stage this
Total non-hazardous demolition waste generated		Note: At this stage this will be a target l
Non-hazardous demolition waste diverted from landfill		Note: At this stage this will be a target l
Total non-hazardous demolition waste to disposal		Note: At the pre-assessment stage this
Material for reuse		Note: At this stage this will be a target l
Material for recycling		Note: At this stage this will be a target l
Material for energy recovery		Note: At this stage this will be a target l
Hazardous waste to disposal		Note: At this stage this will be a target l

Total BREEAM credits achieved	4
Total contribution to overall building score	4.22%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	Outstanding level

Comments/notes:

Credits awarded for the following:
• Development of a construction resource management plan.
• Reducing construction waste related to on-site construction and off-site manufacture/fabrication.
• Diverting non-hazardous construction (on-site and dedicated off-site manufacture/fabrication), demolition and excavation waste (where applicable) generated by the project from landfill.

Wst 02 Recycled Aggregates

No. of BREEAM credits available	1	Available contribution to overall score	1.06%
No. of BREEAM innovation credits available	1	Minimum standards applicable	No

Assessment Criteria	Total
What is the target total % of high-grade aggregate that will be recycled/secondary aggregate?	0%

% of high-grade aggregate that is recycled/secondary aggregate - by application

Structural frame	
Bitumen/hydraulically bound base, binder and surface courses	
Building foundations	
Concrete road surfaces	
Pipe bedding	
Granular fill and capping	

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

credit not sought at this stage

Wst 03 Operational Waste

No. of BREEAM credits available	1	Available contribution to overall score	1.06%
No. of BREEAM innovation credits available	0	Minimum standards applicable	Yes

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will operational recyclable waste volumes be segregated and stored?	Yes	1	1
Will static waste compactor(s) or baler(s) be specified where appropriate?	N/A		
Will vessel(s) for composting suitable organic waste where appropriate?	N/A		

Total BREEAM credits achieved	1
Total contribution to overall building score	1.06%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	Outstanding level

Comments/notes:

Provision of suitable space and facilities to allow for segregation and storage of operational recyclable waste volumes generated by the assessed building/unit, its occupant(s) and activities.

Wst 04 Speculative Floor and Ceiling Finishes

No. of BREEAM credits available	1	Available contribution to overall score	1.06%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
The building's occupant(s)/tenant(s) will specify floor/ceiling finishes	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	1.06%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

The building occupants/tenants will specifiy floor/ceiling finishes.

Wst 05 Adaption to climate change

No. of BREEAM credits available	1	Available contribution to overall score	1.06%
No. of BREEAM innovation credits available	1	Minimum standards applicable	N/A

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will a climate change adaptation strategy appraisal for structural and fabric resilience be conducted by the end of Concept Design (RIBA Stage 2 or equivalent)?	No	1	0

Will exemplary level criteria – Responding to adaptation to climate change be met?	No	1	0

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	0
Minimum standard(s) level	N/A

Comments/notes:

Credit Not Soughtat this stage

Wst 06 Functional adaptability

No. of BREEAM credits available	1	Available contribution to overall score	1.06%
No. of BREEAM innovation credits available	0	Minimum standards applicable	N/A

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will a building specific functional adaptation strategy appraisal be conducted by Concept Design (RIBA Stage 2 or equivalent) and will functional adaptation measures be implemented?	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	N/A

Minimum standard(s) level	N/A

Comments/notes:

Completion of a functional adaptability strategy to encourage consideration and implementation of measures to accommodate future changes to the use of the building and its systems over its lifespan.

LAND USE & ECOLOGY

LE 01 Site Selection

No. of BREEAM credits available	2	Available contribution to overall score	2.20%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will at least 75% of the proposed development's footprint be located on previously occupied land?	Yes	1	1
Is the site deemed to be significantly contaminated?	No	1	0

Total BREEAM credits achieved	1
Total contribution to overall building score	1.10%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

First credit awarded as the development site is a pre-developed site and at least 75% of the proposed building footprint is on a previously developed site. Second credit has been withheld as no evidence has been provided to confirm contamination levels at the site.

LE 02 Ecological Value of Site and Protection of Ecological Features

No. of BREEAM credits available	2	Available contribution to overall score	2.20%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Ecological value of the land defined using	A Suitably Qualified Ecologist

Assessment Criteria	Compliant?	Credits available	Credits achieved
Can the land within the construction zone be defined as 'land of low ecological value'?	Yes	1	1
Will all features of ecological value surrounding the construction zone/site boundary be protected?	Yes	1	1

Total BREEAM credits achieved	2
Total contribution to overall building score	2.20%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Land defined as 'land of ecological value' and existing ecological features will be adequately protected.
Where there are no ecological features present the second credit can be awarded by default.

LE 03 Mitigating Ecological Impact

No. of BREEAM credits available	2	Available contribution to overall score	2.20%
No. of BREEAM innovation credits available	0	Minimum standards applicable	Yes

Data sourced for calculating the change in ecological value from	Suitably Qualified Ecologist site survey of plant species

Assessment Criteria

What is the likely change in ecological value as a result of the sites development?	≥0 species (i.e. no negative change)	Plant species richn

Total BREEAM credits achieved	2
Total contribution to overall building score	2.20%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	Outstanding level

Comments/notes:

There will be no negitive change in the ecological value of the site as a result of the proposed development.

LE 04 Enhancing Site Ecology

No. of BREEAM credits available	2	Available contribution to overall score	2.20%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved	
Will a suitably qualified ecologist be appointed to report on enhancing and protecting site ecology?	Yes	2	1	
Will the suitably qualified ecologist's general recommendations be implemented?	Yes			
What is the targeted/intended improvement in ecological value as a result of enhancement actions?	<6 species (small positive change)			Plant species richı

Total BREEAM credits achieved	1
Total contribution to overall building score	1.10%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

A suitably Qualifed Ecologist woulkd need to be appointed to award these credits. The Ecologist will need to provide recommendations to be implemented within the proposed development site. A green roof may form part of the development proposals, a small positive change may be achievable.

LE 05 Long Term Impact on Biodiversity

No. of BREEAM credits available	2	Available contribution to overall score	2.20%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will a Suitably Qualified Ecologist be appointed to monitor/minimise impacts of site activities on biodiversity?	Yes	2	0
Will a landscape and habitat management plan be produced covering at least the first five years after project completion in accordance with British Standards?	N/A		
Number of applicable measures to improve biodiversity confirmed by SQE:	0		
Number of applicable measures implemented:	0		

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credits not sought at this stage.

POLLUTION

Pol 01 Impact of Refrigerants

No. of BREEAM credits available	3	Available contribution to overall score	2.54%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria		Credits available	Credits achieved
Refrigerant containing systems installed in the assessed building?		2	FALSE
Do all systems (with electric compressors) comply with the requirements of BS EN 378:2008 (parts 2 & 3) & where refrigeration systems containing ammonia are installed, the IoR Ammonia Refrigeration Systems Code of Practice?			
Global Warming Potential of the specified refrigerant(s) 10 or less?			
What is the target range Direct Effect Life Cycle CO2eq. emissions for the system?		kgCO2eq/kW coolth capacity	
Cooling/Heating capacity of the system		kW	
Will a refrigerant leak detection and containment system be specified/installed?		1	0

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credits Not Sought at this stage.

Pol 02 NO_x Emissions

No. of BREEAM credits available	3	Available contribution to overall score	2.54%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria

NO_x emission level - space heating		mg/kWh
NO_x emission level - cooling		mg/kWh
NO_x emission level - DHW		
Does this building meet BREEAM's definition of a highly insulated building?		
Energy consumption: heating and hot water		kWh/m2 yr

Total BREEAM credits achieved	0
Total contribution to overall building score	0.00%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Credits not sought at this stage - heating strategy to be established and reviewed.

Pol 03 Surface Water Run off

No. of BREEAM credits available	5	Available contribution to overall score	4.23%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
What is the actual/likely annual probability of flooding for the assessed site?	Low	2	2
Will a Flood Risk Assessment be undertaken?	Yes		
Will the site meet the BREEAM criteria for peak rate surface water run off?	Yes	1	1
Will the site meet the criteria for surface water run off volume, attenuation and/or limiting discharge?	Yes	1	1
Will the site be designed to minimise watercourse pollution in accordance with the BREEAM criteria?	No	1	0

Total BREEAM credits achieved	4
Total contribution to overall building score	3.38%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

- The development site is situated within flood risk zone one and has a low annual probability of flooding. A Flood Risk Assessment will be undertaken.
- Two credit has been awarded where the site will meet the BREEAM criteria for peak rate surface water runoff.

A drainage consultant should be instructed ASAP to determine the credits awarded for this issue.

Pol 04 Reduction of Night Time Light Pollution

No. of BREEAM credits available	1	Available contribution to overall score	0.85%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Will the external lighting specification be designed to reduce light pollution?	Yes	1	1

Total BREEAM credits achieved	1
Total contribution to overall building score	0.85%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

External light pollution is eliminated through effective design or the removal of the need for unnecessary external lighting.

Pol 05 Noise Attenuation

No. of BREEAM credits available	1	Available contribution to overall score	0.85%
No. of BREEAM innovation credits available	0	Minimum standards applicable	No

Assessment Criteria	Compliant	Credits available	Credits achieved
Will there be noise-sensitive areas/buildings within 800m radius of the development?	Yes	1	1
Will a noise impact assessment be carried out and, if applicable, noise attenuation measures specified?	Yes		

Total BREEAM credits achieved	1
Total contribution to overall building score	0.85%
Total BREEAM innovation credits achieved	N/A
Minimum standard(s) level	N/A

Comments/notes:

Measures to reduce the likelihood of disturbance arising as a result of noise from fixed installations on the development.

INNOVATION

Inn 01 Innovation

No. of BREEAM innovation credits available	10	Available contribution to overall score	10.00%
		Minimum standards applicable	No

Assessment Criteria	Compliant?	Credits available	Credits achieved
Man 03 Responsible construction practices	No	1	0
Man 05 Aftercare	N/A	N/A	0
Hea 01 Visual Comfort	No	1	0
Hea 02 Indoor Air Quality	N/A	N/A	0
Ene 01 Reduction of energy use and carbon emissions	No	5	0
Wat 01 Water Consumption	No	1	0
Mat01 Life Cycle Impacts	No	3	0
Mat03 Responsible Sourcing of Materials	No	1	0
Wst01 Construction Waste Management	No	1	0
Wst02 Recycled Aggregates	No	1	0
Wst 05 Adaption to climate change	N/A	N/A	0

Number of 'approved' innovation credits achieved?	

Total BREEAM innovation credits achieved	0
Total contribution to overall building score	0.00%
Minimum standard(s) level	N/A

9. APPENDIX B - BREEAM REFURBISHMENT AND FIT-OUT PRE-ASSESSMENT

BREEAM®

Code for a Sustainable Built Environment
www.breeam.com

BREEAM UK Refurbishment & Fit-out 2014 - Pre-assessment

High Holborn

Pre-assessment

212 High Holborn

20 January 2017 Assessment Report

PwC's BREEAM Outstanding rated One Embankment Place in London. Image Hofton + Crow.

bre

Assessment details

Assessment references

Registration number:	2016.287	**Date created:**	14/12/2016
Created by:	Stacey Downes {Element Sustainability Ltd}		
Architect name:			
Developer name:			
Property owner			

Site details

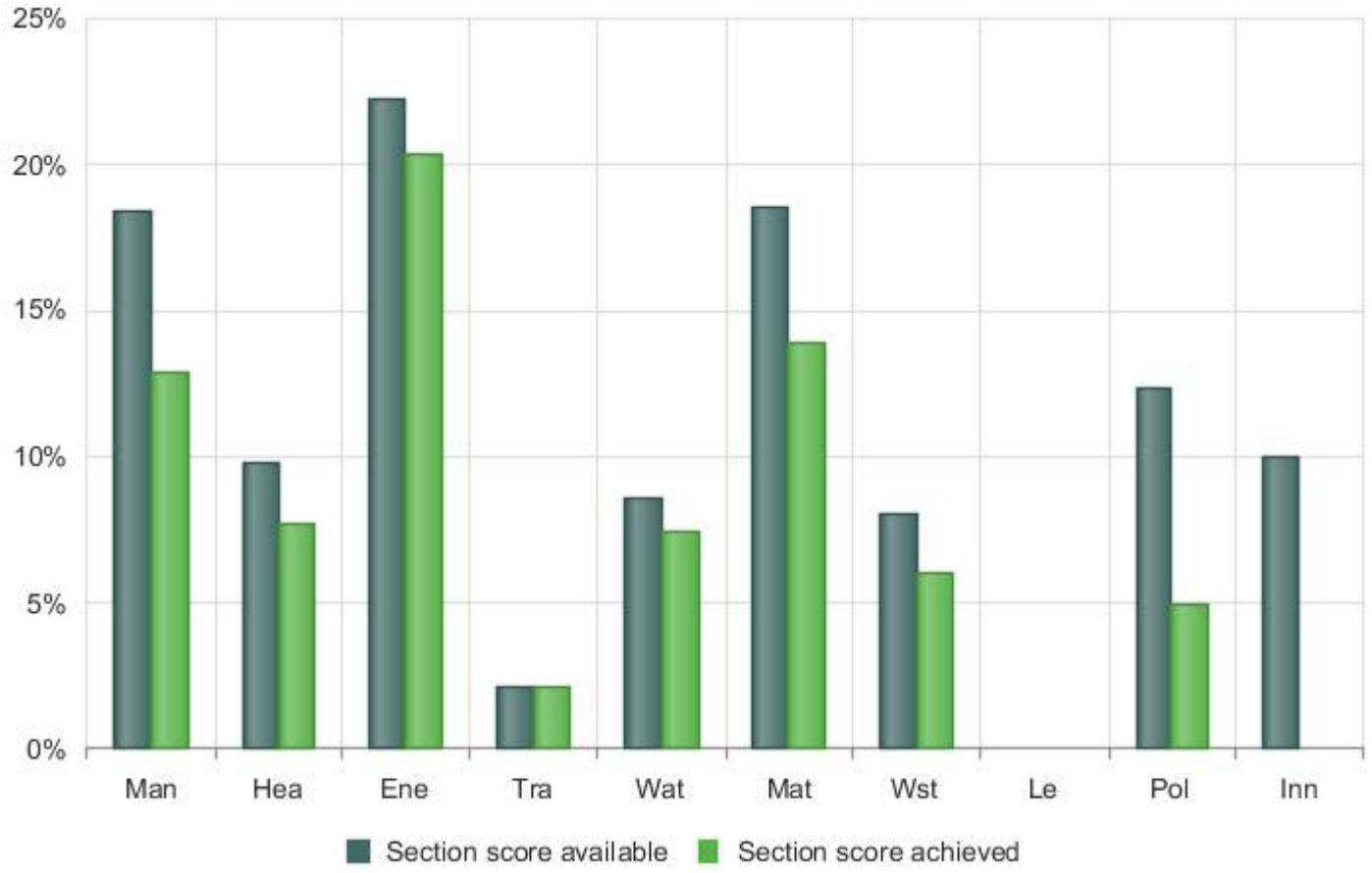
Site name:	212 High Holborn
Address:	212 High Holborn
Town:	London
County:	
Post code:	WC1V 7BF
Country:	United Kingdom

BREEAM rating

BREEAM Rating

	Credits available	Credits achieved	% Credits achieved	Weighting	Category score
Man	20.0	14.0	70.00%	18.35%	12.84%
Hea	9.0	7.0	77.78%	9.85%	7.66%
Ene	24.0	22.0	91.67%	22.19%	20.33%
Tra	2.0	2.0	100.00%	2.14%	2.14%
Wat	8.0	7.0	87.50%	8.56%	7.49%
Mat	12.0	9.0	75.00%	18.53%	13.89%
Wst	8.0	6.0	75.00%	8.03%	6.02%
Le	0.0	0.0	0.00%	0.00%	0.00%
Pol	10.0	4.0	40.00%	12.35%	4.94%
Inn	10.0	0.0	0.00%	10.00%	0.00%
Total	103.0	71.0	68.93%	-	75.33%
Rating	-	-	-	-	Excellent

Performance by environmental category



Issue scores

Please Note: X means the exemplary credit for the relevant issue

Management

Man Management	ManX
14 / 20	0 / 2

Health and Wellbeing

Hea Health & Wellbeing
7 / 9

Energy

Ene Energy	EneX
22 / 24	0 / 5

Transport

Tra Transport
2 / 2

Water

Wat Water	WatX
7 / 8	0 / 1

Materials

Mat Materials	MatX
9 / 12	0 / 2

Waste

Wst Waste	WstX
6 / 8	0 / 1

Land use and ecology

Le Land use and ecology
N/A

Pollution

Pol Pollution
4 / 10

Innovation

Inn Innovation	InnX
N/A	0 / 10

Initial details

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Stage 1 filtering: Scope of the assessment

Part 1 : Fabric and structure : No

Part 2 : Core services : Yes

Part 3 : Local services : Yes

Part 4 : Interior design : No

Stage 2 filtering: Project specific filtering

Is the project a change of use? (e.g. change from office to a hotel) : Yes

Are transportation systems specified or present within the refurbishment or fit-out zone? (lifts, escalators, moving walks) : Yes, newly specified transportation systems

Are there laboratories present and if so what % of total building area do they represent : No laboratories present

Project Type : Major, whole building refurbishment

Laboratory containment area : No laboratories present

Is cold storage specified or present within the refurbishment or fit-out zone? : No

Are there landscaping areas within the refurbishment or fit-out zone/within developer control? : No

If the asset undergoing refurbishment or fit-out is part of a larger building, is the cooling generation plant centralised or localised? : Central

If the asset undergoing refurbishment or fit-out is part of a larger building, is the heating generation plant centralised or localised? : Central

Is Wat01 within the scope of the assessment in accordance with Table 42? : Yes

What is the building type? : Offices

Is this an assessment of a speculative office building? : No

If Industrial, does the building have office areas? : N/A

Does the building have any unregulated water demands? e.g. irrigation, car washing, or other process related water use : No

Does the building have unregulated energy demands from significantly contributing systems? : No

Is the project a simple building? : No

Does the building have external lighting within the scope of works? : Yes

Does the building have any existing or newly specified externally mounted plant? : Yes

If undertaking a Part 4 assessment, is there any equipment specified that requires commissioning (see Man04 CN13) : N/A

Historic building (listed building or building in a conservation area) : Yes, grade 2* listed (England or Wales)

Category assessment

Management | Man

Man Management

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MAN 01 PROJECT BRIEF AND DESIGN	
Stakeholder consultation (project delivery) :	1
Stakeholder consultation (third party) :	1
Sustainability champion (design) :	0
Sustainability champion (monitoring progress) :	0
MAN 02 LIFECYCLE COST AND SERVICE LIFE PLANNING	
Elemental lifecycle cost :	0
Componnent level LCC plan :	0
Capital cost reporting :	1
MAN 03 RESPONSIBLE CONSTRUCTION PRACTICES	
Is all timber used in the project 'legally harvested and traded timber'? :	Yes
Environmental management :	1
Construction stage sustainability champion :	0
Considerate construction :	2
Exemplary level criteria :	
Has the project achieve the minimum standard for an Excellent or Outstanding rating? :	Minimum standard for Outstanding rating
Monitoring of refurbishment or fit-out site impacts :	2
Utility consumption :	Yes
Transport of construction materials and waste :	Yes
MAN 04 COMMISSIONING AND HANDOVER	
Commissioning and testing schedule and responsibilities :	1
Commissioning building services :	1
Handover :	1
Has criterion 9 been met? :	Yes
MAN 05 AFTERCARE	
Aftercare support :	1
Exemplary level criteria :	No
Seasonal commissioning :	1
Post occupancy evaluation :	1

Credits awarded : 14.0

Comments :
Man 01 Project Brief and Design - Stakeholder consultation covering project delivery and relevant third parties.
Man 02 Life Cycle Cost and Service Life Planning - Report the capital cost for the refurbishment/fit-out works in pounds per square metre (£k/m2 via the BREEAM Assessment Scoring and Reporting tool.
Man 03 Construction Site Impacts -The principal contractor demonstrates sound environmental management practices and consideration for neighbours across their activities on-site.
Site related energy, water and transport impacts are monitored and reported to ensure ongoing compliance during the Refurbishment, Handover and Close Out stages and to improve awareness and understanding for future projects.
Man 04 Commissioning and Handover -Schedule of commissioning including optimal timescales and appropriate testing and commissioning of all building services systems and building fabric in line with best practice.
Inspecting, testing, identifying and rectifying defects via an appropriate method.
Provision of a non-technical Building User Guide and user/operator training timed appropriately around handover and proposed occupation.
Man 05 Aftercare - Provision of the necessary infrastructure and resources to provide aftercare support to the building occupier(s).
Seasonal commissioning activities will be completed over a minimum 12 month period, once the building becomes substantially occupied.
The client or building occupier commit to carrying out a post occupancy evaluation (POE) exercise one year after initial building occupation and to disseminate the findings in terms of the buildings post occupancy performance.

Health and Wellbeing | Hea

Hea Health & Wellbeing

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HEA 01 VISUAL COMFORT	
Internal and external lighting :	1
HEA 02 INDOOR AIR QUALITY	
Indoor air quality plan :	1
Ventilation :	0
Potential for natural ventilation :	0
HEA 03 SAFE CONTAINMENT IN LABORATORIES - NA	
HEA 04 THERMAL COMFORT	
Thermal modelling :	1
Adaptation - for a projected climate change scenario :	1
Thermal zoning and controls :	1
HEA 05 ACOUSTIC PERFORMANCE	
Acoustic performance :	2
HEA 06 SAFETY AND SECURITY - NA	
Credits awarded : 7.0	

Comments :
Hea 01 External and Internal Lighting - Internal and external lighting systems are designed to avoid flicker and provide appropriate illuminance (lux) levels. Internal lighting is zoned to allow for occupant control.
Hea 02 - Indoor Air Quality - Minimising sources of air pollution through careful design specification and planning, through an Indoor Air Quality Plan.
Hea 04 Thermal Modelling - Thermal modelling carried out to appropriate standards.
Projected climate change scenario(s) considered as part of the thermal model.
The thermal modelling analysis has informed the temperature control strategy for the building and its users.
Hea 05 - The building meets appropriate acoustic performance standards and testing requirements in terms of: Sound insulation, Indoor ambient noise level and Reverberation times.
Hea 06 Site Security - Security needs are understood and taken into account in the design and specification.

Energy | Ene

Ene Energy

212 High Holborn

ENE 01 ASSESSMENT OPTION

Which option is being followed :	Option 1: Whole building energy model

ENE 01 - OPTION 1

Country :	England
Credits :	15.0
Actual (existing) building energy demand (DemEx) :	303.3 kWh/m2
Reference building energy demand (DemRef) :	399.16 kWh/m2
Actual (proposed) building energy demand (DemProp) :	162.45 kWh/m2
Actual (existing) building primary energy consumption (PEEx) :	493.4 kWh/m2
Reference building primary energy consumption (PERef) :	380.64 kWh/m2
Actual (proposed) building primary energy consumption (PEProp) :	165.8 kWh/m2
Actual (existing) building CO2 emissions (BEREx) :	97.25 KgCO2/m2
Reference building CO2 emissions (SER) :	57.98 KgCO2/m2
Actual (proposed) building CO2 emissions (BERProp) :	29.96 kgCO2/m2
Building energy demand individual parameter EPR (Energy performance Ratio) :	1.0
Primary energy consumption individual parameter EPR (Energy performance Ratio) :	1.0
Building CO2 emissions individual parameter EPR (Energy performance Ratio) :	0.94
EPRNDR (Energy Performance Ratio Non Domestic Refurbishment) :	0.97
Additional assessment criteria :	
Historic buildings study compliant :	
Zero regulated carbon :	
Equivalent % of the building's 'regulated' energy consumption generated by carbon neutral sources and used to meet energy demand from 'unregulated' building systems or processes? :	
Is the building designed to be carbon negative? :	
If the building is defined as 'carbon negative' what is the total (modelled) renewable/carbon neutral energy generated and exported? :	
Historic credits scored :	0
Exemplary credits scored :	0

ENE 02 ENERGY MONITORING

Sub-metering of major energy consuming systems :	1
Sub-metering of high energy load and tenancy areas :	1

ENE 03 EXTERNAL LIGHTING

External lighting :	1

ENE 04 LOW CARBON DESIGN

Passive design analysis :	0
Free cooling :	0
Low and zero carbon technologies :	1

ENE 05 ENERGY EFFICIENT COLD STORAGE - NA

ENE 06 ENERGY EFFICIENT TRANSPORTATION SYSTEMS

Energy consumption :	1
Energy efficient measures :	2

ENE 07 ENERGY EFFICIENT LABORATORY SYSTEMS - NOTAPPLICABLE

ENE 08 ENERGY EFFICIENT EQUIPMENT

ENE 09 DRYING SPACE

Credits awarded : 22.0

Transport | Tra

Tra Transport

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TRA 01 SUSTAINABLE TRANSPORT SOLUTIONS - NA

TRA 02 PROXIMITY TO AMENITIES - NA

TRA 03 CYCLIST FACILITIES - NA

TRA 04 MAXIMUM CAR PARKING CAPACITY

Car parking capacity :	2

TRA 05 TRAVEL PLAN - NA

Credits awarded : 2.0

Comments :
TRA 04 - Maximum Car Parking Facilities - No Car parking spaces are to be provided.

Water | Wat

Wat Water

212 High Holborn

WAT 01 WATER CONSUMPTION

Water consumption :	4
Exemplary level criteria :	

WAT 02 WATER MONITORING

Water monitoring :	1
Has criterion 1 been met? :	Yes

WAT 03 LEAK DETECTION

Leak detection system :	1
Flow control devices :	1

WAT 04 WATER EFFICIENT EQUIPMENT - NA

Credits awarded : 7.0

Comments :
Comments :
Wat 01 Water Consumption - Reducing the demand for potable water through the provision of efficient sanitary fitting, rainwater collection and water recycling systems (4 credits sought here).
Wat 02 Water Monitoring - Specification of a water meter/s on the mains water supply to encourage water consumption management and monitoring to reduce the impacts of inefficiencies and leakage.
Wat 03 Leak Detection - Flow control devices that regulate the supply of water to each WC area/facility to reduce water wastage AND leak detection for major leak detection.

Materials | Mat

Mat Materials

212 High Holborn

MAT 01 ENVIRONMENTAL IMPACT OF MATERIALS

Options :	Option 1
Environmental impact of materials :	5
Exemplary level criteria :	No

MAT 03 RESPONSIBLE SOURCING OF MATERIALS

Sustainable procurement plan :	1
Has criterion 1 been met? :	Yes
Responsible sourcing of materials :	2
Exemplary level criteria :	No

MAT 04 INSULATION

Insulation :	1

MAT 05 DESIGNING FOR DURABILITY AND RESILIENCE - NA

MAT 06 MATERIAL EFFICIENCY

Material efficiency :	0

Credits awarded : 9.0

Comments :
Mat 01 Life Cycle Impact - Reductions in the building?s environmental life cycle impacts through the reuse of materials and the use of tools to analyse the life cycle impact of any new materials using robust environmental information assessment of the main building elements.
Mat 03 Responsible Sourcing of Materials- Materials sourced in accordance with a sustainable procurement plan.Key building materials are responsibly sourced to reduce environmental and socio-economic impacts.
Mat 04 Insulation - Recognition of the use of thermal insulation which has a low embodied environmental impact relative to its thermal properties.
Mat 05 Designing for Durability and Resiliance - The building incorporates measures to reduce impacts associated with damage and wear-and-tear. Relevant building elements incorporate appropriate design and specification measures to limit material degradation due to environmental factors.

Waste | Wst

Wst Waste

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WST 01 CONSTRUCTION WASTE MANAGEMENT

Pre-refurbishment audit :	1
Re-use and direct recycling of materials :	0
Resource efficiency :	3
Diversion of waste from landfill :	1
Exemplary level criteria :	

WST 02 RECYCLED AGGREGATES - NA

WST 03 OPERATIONAL WASTE - NA

WST 04 SPECULATIVE FINISHES

WST 05 ADAPTATION TO CLIMATE CHANGE - NA

WST 06 FUNCTIONAL ADAPTABILITY

Functional adaptabiliy :	1

Credits awarded : 6.0

Comments :
Wst 01 Refurbishment Waste - Development of a pre-refurbishment audit to identify options for reuse and recycling. Actions to reuse or directly recycle materials. Development of a refurbishment resource management plan. Reducing project waste related to on-site construction and off-site manufacture/fabrication. Diverting non-hazardous construction (on-site and dedicated off-site manufacture/fabrication), demolition and excavation waste (where applicable) generated by the project from landfill.
Wst 06 Functional Adaptability - Encourage consideration and implementation of measures to accommodate future changes to the use of the building and its systems over its lifespan.

Land use and ecology | Le

Le Land use and ecology

212 High Holborn

LE 02 PROTECTION OF ECOLOGICAL FEATURES - NA

LE 05 LONG TERM IMPACT ON BIODIVERSITY - NA

Credits awarded : 0.0

Comments :
N/A

Pollution | Pol

Pol Pollution

212 High Holborn

POL 01 IMPACT OF REFRIGERANTS	
Impact of refrigerants :	0
Leak detection :	0
POL 02 NOX EMISSIONS	
NOx emissions :	0
POL 03 FLOOD RISK AND REDUCING SURFACE WATER RUN-OFF	
Flood risk management :	2
POL 04 REDUCTION OF NIGHT TIME LIGHT POLLUTION	
Reduction of night time light pollution :	1
POL 05 NOISE ATTENUATION	
Noise attenuation :	1
Credits awarded : 4.0	

Comments :
Pol 3 Surface Water - Identifying the buildings flood risk and where applicable adopting flood resilience or resistance measures through refurbishment or fit-out works. Surface water run-off is managed to be no worse as a result of refurbishment works.
Pol 04 Night Time Light Pollution - External light pollution is eliminated through effective design or the removal of the need for unnecessary external lighting.
Pol 05 Acoustic Attenuation - Measures to reduce the likelihood of disturbance arising as a result of noise from fixed installations on the development.

Innovation | Inn

Inn Innovation

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INN 01 APPROVED INNOVATIONS

Approved innovations :	0

Credits awarded : 0.0

10. EXISTING BUILDING SBEM DATA

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Old Section as-built- PLANNING USE UNLY

As designed

Date: Fri Jan 20 11:47:51 2017

Administrative information

Building Details

Address: 212-214 High Holborn, London, WC1V 7BF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.7.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Russell Pridgeon

Telephone number: 0161 337 4353

Address: The Warehouse, Denton, M43 3DS

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	26.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	26.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	97.2
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	1.7	1.7	B1F - Plant Room_W_5
Floor	0.25	0.18	0.18	B1F - Plant Room_S_3
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	5.01	5.01	0F - Restaurant_G_10
Personnel doors	2.2	3	3	0F - Restaurant_D_9
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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	25

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- Default Central Heating with Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.65	-	-	-	-
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- HW from CH with Tank

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	0.143
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
B1F - Plant Room	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Restaurant	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Reception Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Offices Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
B1F - Plant Room	15	-	-	296

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
0F - Restaurant	-	36	100	1448
0F - Reception Old	-	32	100	392
0F Mezz - Circulation Old	-	34	-	234
1F - Office Old	17	-	-	2966
1F - Circulation Old	-	23	-	148
2F - Office Old	18	-	-	2853
2F - Circulation Old	-	27	-	126
3F - Offices Old	18	-	-	2824
3F - Circulation Old	-	29	-	120

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?
0F - Restaurant	NO (-62.4%)	NO
0F - Reception Old	N/A	N/A
1F - Office Old	N/A	N/A
2F - Office Old	N/A	N/A
3F - Offices Old	NO (-74.7%)	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?	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]	698.7	698.7
External area [m²]	321.1	321.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	582.71	221.56
Average U-value [W/m²K]	1.81	0.69
Alpha value* [%]	4.38	18.87

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
55	**A1/A2 Retail/Financial and Professional services**
25	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
21	**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	21.18	1.04
Cooling	0	0
Auxiliary	7.82	5.7
Lighting	64.89	30.03
Hot water	254.33	37.5
Equipment*	62.57	62.57
TOTAL**	**348.22**	**74.28**

* 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]	303.3	229.14
Primary energy* [kWh/m²]	559.34	153.99
Total emissions [kg/m²]	97.2	26.4

* 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] Natural Gas, [CFT] Natural Gas										
	Actual	44.2	259.1	21.2	0	7.8	0.58	0	0.65	0
	Notional	3.1	226.1	1	0	5.7	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

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	1.7	B1F - Plant Room_W_5
Floor	0.2	0.18	B1F - Plant Room_S_3
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	5.01	0F - Restaurant_G_10
Personnel doors	1.5	3	0F - Restaurant_D_9
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
m³/(h.m²) at 50 Pa	5	25

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Old Section fabric improvements- PLANNING USE UNLY

As designed

Date: Fri Jan 20 10:55:54 2017

Administrative information

Building Details

Address: 212-214 High Holborn, London, WC1V 7BF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.7.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Russell Pridgeon

Telephone number: 0161 337 4353

Address: The Warehouse, Denton, M43 3DS

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

The building does not comply with England Building Regulations Part L 2013

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	26.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	26.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	76.9
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	1.53	1.7	0F - Restaurant_W_8
Floor	0.25	0.12	0.12	B1F - Plant Room_S_3
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	2.2	2.2	0F - Restaurant_G_10
Personnel doors	2.2	0.7	0.7	0F - Restaurant_D_9
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = 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
$m^3/(h.m^2)$ at 50 Pa	10	25

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- Default Central Heating with Radiators

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	0.65	-	-	-	-
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- HW from CH with Tank

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	0.143
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
B1F - Plant Room	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Restaurant	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Reception Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Offices Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
B1F - Plant Room	100	-	-	81

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
0F - Restaurant	-	100	100	398
0F - Reception Old	-	100	100	108
0F Mezz - Circulation Old	-	100	-	64
1F - Office Old	100	-	-	816
1F - Circulation Old	-	100	-	41
2F - Office Old	100	-	-	785
2F - Circulation Old	-	100	-	35
3F - Offices Old	100	-	-	777
3F - Circulation Old	-	100	-	33

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?
0F - Restaurant	NO (-80.1%)	NO
0F - Reception Old	N/A	N/A
1F - Office Old	N/A	N/A
2F - Office Old	N/A	N/A
3F - Offices Old	NO (-86.6%)	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?	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]	698.7	698.7
External area [m²]	321.1	321.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	471.79	221.56
Average U-value [W/m²K]	1.47	0.69
Alpha value* [%]	5.41	18.87

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
55	**A1/A2 Retail/Financial and Professional services**
25	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
21	**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	24.61	1.04
Cooling	0	0
Auxiliary	7.82	5.7
Lighting	24.32	30.03
Hot water	254.33	37.5
Equipment*	62.57	62.57
TOTAL**	**311.08**	**74.28**

* 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]	198.47	229.14
Primary energy* [kWh/m²]	438.99	153.99
Total emissions [kg/m²]	76.9	26.4

* 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] Natural Gas, [CFT] Natural Gas										
	Actual	51.4	147.1	24.6	0	7.8	0.58	0	0.65	0
	Notional	3.1	226.1	1	0	5.7	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

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	B1F - Plant Room_W_5
Floor	0.2	0.12	B1F - Plant Room_S_3
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	2.2	0F - Restaurant_G_10
Personnel doors	1.5	0.7	0F - Restaurant_D_9
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
m³/(h.m²) at 50 Pa	5	25

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Old Section fully improved- PLANNING USE UNLY

As designed

Date: Fri Jan 20 10:56:30 2017

Administrative information

Building Details

Address: 212-214 High Holborn, London, WC1V 7BF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.7.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Russell Pridgeon

Telephone number: 0161 337 4353

Address: The Warehouse, Denton, M43 3DS

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	39
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	39
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	37.9
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	1.53	1.7	0F - Restaurant_W_8
Floor	0.25	0.12	0.12	B1F - Plant Room_S_3
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	2.2	2.2	0F - Restaurant_G_10
Personnel doors	2.2	0.7	0.7	0F - Restaurant_D_9
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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	25

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- VRF mixed mode

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	4.5	-	-	-
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- Instantaneous Elec HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	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
B1F - Plant Room	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Restaurant	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Reception Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Offices Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			General lighting [W]
	Luminaire	Lamp	Display lamp	
Standard value	60	60	22	
B1F - Plant Room	100	-	-	81

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
0F - Restaurant	-	100	100	398
0F - Reception Old	-	100	100	108
0F Mezz - Circulation Old	-	100	-	64
1F - Office Old	100	-	-	816
1F - Circulation Old	-	100	-	41
2F - Office Old	100	-	-	785
2F - Circulation Old	-	100	-	35
3F - Offices Old	100	-	-	777
3F - Circulation Old	-	100	-	33

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?
B1F - Plant Room	N/A	N/A
0F - Restaurant	NO (-80.1%)	NO
0F - Reception Old	N/A	N/A
0F Mezz - Circulation Old	N/A	N/A
1F - Office Old	N/A	N/A
1F - Circulation Old	N/A	N/A
2F - Office Old	N/A	N/A
2F - Circulation Old	N/A	N/A
3F - Offices Old	NO (-86.6%)	NO
3F - Circulation Old	N/A	N/A

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	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]	698.7	698.7
External area [m²]	321.1	321.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	471.79	221.56
Average U-value [W/m²K]	1.47	0.69
Alpha value* [%]	5.41	18.87

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
55	**A1/A2 Retail/Financial and Professional services**
25	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
21	**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	3.2	1.04
Cooling	9.92	18.66
Auxiliary	5.04	4.38
Lighting	24.32	30.03
Hot water	32.42	37.5
Equipment*	62.57	62.57
TOTAL**	**74.9**	**91.62**

* 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]	162.45	184.47
Primary energy* [kWh/m²]	224.03	201.39
Total emissions [kg/m²]	37.9	39

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	48.3	114.1	3.2	9.9	5	4.19	3.2	4.5	4.5
	Notional	3.1	181.4	1	18.7	4.4	0.82	2.7	----	----

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	B1F - Plant Room_W_5
Floor	0.2	0.12	B1F - Plant Room_S_3
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	2.2	0F - Restaurant_G_10
Personnel doors	1.5	0.7	0F - Restaurant_D_9
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
m³/(h.m²) at 50 Pa	5	25

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

Old Section PV calculation- PLANNING USE UNLY

As designed

Date: Fri Jan 20 12:10:10 2017

Administrative information

Building Details

Address: 212-214 High Holborn, London, WC1V 7BF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.7.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Russell Pridgeon

Telephone number: 0161 337 4353

Address: The Warehouse, Denton, M43 3DS

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	39
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	39
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	30
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	1.53	1.7	0F - Restaurant_W_8
Floor	0.25	0.12	0.12	B1F - Plant Room_S_3
Roof	0.25	-	-	"No heat loss roofs"
Windows***, roof windows, and rooflights	2.2	2.2	2.2	0F - Restaurant_G_10
Personnel doors	2.2	0.7	0.7	0F - Restaurant_D_9
Vehicle access & similar large doors	1.5	-	-	"No external vehicle access doors"
High usage entrance doors	3.5	-	-	"No external high usage entrance doors"

$U_{a\text{-}Limit}$ = 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
$m^3/(h.m^2)$ at 50 Pa	10	25

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- VRF mixed mode

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

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	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
B1F - Plant Room	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Restaurant	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Reception Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Office Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Offices Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Circulation Old	-	-	-	0.8	-	-	-	-	-	0.7	0.5

General lighting and display lighting

Zone name	Luminous efficacy [lm/W]			
	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
B1F - Plant Room	100	-	-	81

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
0F - Restaurant	-	100	100	398
0F - Reception Old	-	100	100	108
0F Mezz - Circulation Old	-	100	-	64
1F - Office Old	100	-	-	816
1F - Circulation Old	-	100	-	41
2F - Office Old	100	-	-	785
2F - Circulation Old	-	100	-	35
3F - Offices Old	100	-	-	777
3F - Circulation Old	-	100	-	33

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?
B1F - Plant Room	N/A	N/A
0F - Restaurant	NO (-80.1%)	NO
0F - Reception Old	N/A	N/A
0F Mezz - Circulation Old	N/A	N/A
1F - Office Old	N/A	N/A
1F - Circulation Old	N/A	N/A
2F - Office Old	N/A	N/A
2F - Circulation Old	N/A	N/A
3F - Offices Old	NO (-86.6%)	NO
3F - Circulation Old	N/A	N/A

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

Separate submission

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

Separate submission

EPBD (Recast): Consideration of alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	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]	698.7	698.7
External area [m²]	321.1	321.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	471.79	221.56
Average U-value [W/m²K]	1.47	0.69
Alpha value* [%]	5.41	18.87

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
55	**A1/A2 Retail/Financial and Professional services**
25	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
21	**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	3.6	1.04
Cooling	11.16	18.66
Auxiliary	5.04	4.38
Lighting	24.32	30.03
Hot water	32.42	37.5
Equipment*	62.57	62.57
TOTAL**	**76.54**	**91.62**

* 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	16.7	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]	162.45	184.47
Primary energy* [kWh/m²]	228.32	201.39
Total emissions [kg/m²]	30	39

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	48.3	114.1	3.6	11.2	5	3.73	2.84	4	4
	Notional	3.1	181.4	1	18.7	4.4	0.82	2.7	----	----

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	B1F - Plant Room_W_5
Floor	0.2	0.12	B1F - Plant Room_S_3
Roof	0.15	-	"No heat loss roofs"
Windows, roof windows, and rooflights	1.5	2.2	0F - Restaurant_G_10
Personnel doors	1.5	0.7	0F - Restaurant_D_9
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
m³/(h.m²) at 50 Pa	5	25

11. EXTENSION BUILDING SBEM DATA

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

New Section improvements - PLANNING USE UNLY

As designed

Date: Fri Jan 20 11:28:47 2017

Administrative information

Building Details

Address: 212-214 High Holborn, London, WC1V 7BF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.7.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Russell Pridgeon

Telephone number: 0161 337 4353

Address: The Warehouse, Denton, M43 3DS

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	24.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	24.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	23.5
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	0.22	0.22	B1F - Toilets_W_6
Floor	0.25	0.07	0.1	B1F - Cycle Store_S_3
Roof	0.25	0.18	0.18	2F - Office_R_5
Windows***, roof windows, and rooflights	2.2	2.2	2.2	0F Mezz - Office_G_8
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"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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	4

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- Improved VRF mixed Mode

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	4.5	-	-	-
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- Instantaneous Elec HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	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
B1F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
B1F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
B1F - Cycle Store	-	-	-	0.8	-	-	-	-	-	0.7	0.5
B1F - Gym	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Offices	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Reception	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Cafe	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Circulation 1	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5

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
2F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Offices 1	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Circulation 1	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
4F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
4F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
4F - Offices	-	-	-	0.8	-	-	-	-	-	0.7	0.5
6F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
6F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
6F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
5F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
5F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
5F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
B1F - Toilets	-	100	-	123
B1F - Circulation	-	100	-	123
B1F - Cycle Store	100	-	-	27
B1F - Gym	-	100	-	152
0F - Circulation	-	100	-	44
0F - Offices	100	-	-	149
0F - Reception	-	100	100	148
0F - Cafe	-	100	100	163
0F - Toilets	-	100	-	62
0F Mezz - Office	100	-	-	798
0F Mezz - Circulation 1	-	100	-	42
1F - Office	100	-	-	842
1F - Circulation	-	100	-	56
1F - Toilets	-	100	-	92
2F - Office	100	-	-	815
2F - Toilets	-	100	-	73
2F - Circulation	-	100	-	47
3F - Offices 1	100	-	-	722
3F - Circulation 1	-	100	-	45
3F - Toilets	-	100	-	69
4F - Toilets	-	100	-	69
4F - Circulation	-	100	-	45
4F - Offices	100	-	-	1482
6F - Office	100	-	-	746
6F - Circulation	-	100	-	57

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
6F - Toilets	-	100	-	69
5F - Toilets	-	100	-	69
5F - Circulation	-	100	-	57
5F - Office	100	-	-	746

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?
B1F - Toilets	N/A	N/A
B1F - Circulation	N/A	N/A
B1F - Cycle Store	N/A	N/A
B1F - Gym	N/A	N/A
0F - Circulation	N/A	N/A
0F - Offices	N/A	N/A
0F - Reception	N/A	N/A
0F - Cafe	N/A	N/A
0F - Toilets	N/A	N/A
0F Mezz - Office	NO (-60.2%)	NO
0F Mezz - Circulation 1	N/A	N/A
1F - Office	NO (-21.3%)	NO
1F - Circulation	N/A	N/A
1F - Toilets	N/A	N/A
2F - Office	NO (-21.3%)	NO
2F - Toilets	N/A	N/A
2F - Circulation	N/A	N/A
3F - Offices 1	NO (-26.1%)	NO
3F - Circulation 1	N/A	N/A
3F - Toilets	N/A	N/A
4F - Toilets	N/A	N/A
4F - Circulation	N/A	N/A
4F - Offices	NO (-79.4%)	NO
6F - Office	NO (-65.5%)	NO
6F - Circulation	N/A	N/A
6F - Toilets	N/A	N/A
5F - Toilets	N/A	N/A
5F - Circulation	N/A	N/A
5F - Office	NO (-52.2%)	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?	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]	1686.3	1686.3
External area [m²]	1502.7	1502.7
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	4	3
Average conductance [W/K]	633.45	798.54
Average U-value [W/m²K]	0.42	0.53
Alpha value* [%]	15.17	16.45

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
61	**A1/A2 Retail/Financial and Professional services**
4	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
34	**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	0.96	6.27
Cooling	12.28	14.57
Auxiliary	4.13	3.98
Lighting	20.35	21.17
Hot water	8.09	9.36
Equipment*	39.15	39.15
TOTAL**	**45.82**	**55.35**

* 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]	155.85	160.06
Primary energy* [kWh/m²]	138.9	136.82
Total emissions [kg/m²]	23.5	24.4

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	14.6	141.3	1	12.3	4.1	4.19	3.2	4.5	4.5
	Notional	18.5	141.6	6.3	14.6	4	0.82	2.7	----	----

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	0.22	B1F - Toilets_W_6
Floor	0.2	0.06	B1F - Circulation_S_3
Roof	0.15	0.18	2F - Office_R_5
Windows, roof windows, and rooflights	1.5	2.2	0F Mezz - Office_G_8
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
m³/(h.m²) at 50 Pa	5	4

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2013

Project name

New Section PV calculation - PLANNING USE UNLY

As designed

Date: Fri Jan 20 12:48:25 2017

Administrative information

Building Details

Address: 212-214 High Holborn, London, WC1V 7BF

Certification tool

Calculation engine: SBEM

Calculation engine version: v5.2.g.3

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v4.7.0

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

Owner Details

Name:

Telephone number:

Address: , ,

Certifier details

Name: Russell Pridgeon

Telephone number: 0161 337 4353

Address: The Warehouse, Denton, M43 3DS

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

CO_2 emission rate from the notional building, $kgCO_2/m^2.annum$	24.4
Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	24.4
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	15.1
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	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	Surface where the maximum value occurs*
Wall**	0.35	0.22	0.22	B1F - Toilets_W_6
Floor	0.25	0.07	0.1	B1F - Cycle Store_S_3
Roof	0.25	0.18	0.18	2F - Office_R_5
Windows***, roof windows, and rooflights	2.2	2.2	2.2	0F Mezz - Office_G_8
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"

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$]
$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]
$U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

* 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	4

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- Improved VRF mixed Mode

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.5	4.5	-	-	-
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- Instantaneous Elec HWS

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	1	-
Standard value	1	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
B1F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
B1F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
B1F - Cycle Store	-	-	-	0.8	-	-	-	-	-	0.7	0.5
B1F - Gym	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Offices	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Reception	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Cafe	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Circulation 1	-	-	-	0.8	-	-	-	-	-	0.7	0.5
0F Mezz - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
1F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5

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
2F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
2F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Offices 1	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Circulation 1	-	-	-	0.8	-	-	-	-	-	0.7	0.5
3F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
4F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
4F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
4F - Offices	-	-	-	0.8	-	-	-	-	-	0.7	0.5
6F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5
6F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
6F - Toilets	-	-	-	0.8	-	-	-	-	-	0.7	0.5
5F - Circulation	-	-	-	0.8	-	-	-	-	-	0.7	0.5
5F - Office	-	-	-	0.8	-	-	-	-	-	0.7	0.5

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	Luminaire	Lamp	Display lamp	General lighting [W]
Standard value	60	60	22	
B1F - Toilets	-	100	-	123
B1F - Circulation	-	100	-	123
B1F - Cycle Store	100	-	-	27
B1F - Gym	-	100	-	152
0F - Circulation	-	100	-	44
0F - Offices	100	-	-	149
0F - Reception	-	100	100	148
0F - Cafe	-	100	100	163
0F - Toilets	-	100	-	62
0F Mezz - Office	100	-	-	798
0F Mezz - Circulation 1	-	100	-	42
0F Mezz - Toilets	-	100	-	62
1F - Office	100	-	-	842
1F - Circulation	-	100	-	56
1F - Toilets	-	100	-	92
2F - Office	100	-	-	815
2F - Toilets	-	100	-	73
2F - Circulation	-	100	-	47
3F - Offices 1	100	-	-	722
3F - Circulation 1	-	100	-	45
3F - Toilets	-	100	-	69
4F - Toilets	-	100	-	69
4F - Circulation	-	100	-	45
4F - Offices	100	-	-	1482
6F - Office	100	-	-	746

General lighting and display lighting	Luminous efficacy [lm/W]			
Zone name	**Luminaire**	**Lamp**	**Display lamp**	**General lighting [W]**
Standard value	60	60	22	
6F - Circulation	-	100	-	57
6F - Toilets	-	100	-	69
5F - Circulation	-	100	-	57
5F - Office	100	-	-	746

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?
B1F - Toilets	N/A	N/A
B1F - Circulation	N/A	N/A
B1F - Cycle Store	N/A	N/A
B1F - Gym	N/A	N/A
0F - Circulation	N/A	N/A
0F - Offices	N/A	N/A
0F - Reception	N/A	N/A
0F - Cafe	N/A	N/A
0F - Toilets	N/A	N/A
0F Mezz - Office	NO (-60.2%)	NO
0F Mezz - Circulation 1	N/A	N/A
0F Mezz - Toilets	N/A	N/A
1F - Office	NO (-21.3%)	NO
1F - Circulation	N/A	N/A
1F - Toilets	N/A	N/A
2F - Office	NO (-21.3%)	NO
2F - Toilets	N/A	N/A
2F - Circulation	N/A	N/A
3F - Offices 1	NO (-26.1%)	NO
3F - Circulation 1	N/A	N/A
3F - Toilets	N/A	N/A
4F - Toilets	N/A	N/A
4F - Circulation	N/A	N/A
4F - Offices	NO (-79.4%)	NO
6F - Office	NO (-65.5%)	NO
6F - Circulation	N/A	N/A
6F - Toilets	N/A	N/A
5F - Circulation	N/A	N/A
5F - Office	NO (-52.2%)	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?	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]	1686.3	1686.3
External area [m²]	1502.7	1502.7
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	4	3
Average conductance [W/K]	633.45	798.54
Average U-value [W/m²K]	0.42	0.53
Alpha value* [%]	15.17	16.45

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
61	**A1/A2 Retail/Financial and Professional services**
4	**A3/A4/A5 Restaurants and Cafes/Drinking Est./Takeaways**
34	**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	0.96	6.27
Cooling	12.28	14.57
Auxiliary	4.13	3.98
Lighting	20.35	21.17
Hot water	8.09	9.36
Equipment*	39.15	39.15
TOTAL**	**45.83**	**55.35**

* 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	16.15	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]	155.85	160.06
Primary energy* [kWh/m²]	138.9	136.82
Total emissions [kg/m²]	15.1	24.4

* 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] Split or multi-split system, [HS] LTHW boiler, [HFT] Natural Gas, [CFT] Electricity										
	Actual	14.6	141.3	1	12.3	4.1	4.19	3.2	4.5	4.5
	Notional	18.5	141.6	6.3	14.6	4	0.82	2.7	----	----

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	0.22	B1F - Toilets_W_6
Floor	0.2	0.06	B1F - Circulation_S_3
Roof	0.15	0.18	2F - Office_R_5
Windows, roof windows, and rooflights	1.5	2.2	0F Mezz - Office_G_8
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
m³/(h.m²) at 50 Pa	5	4