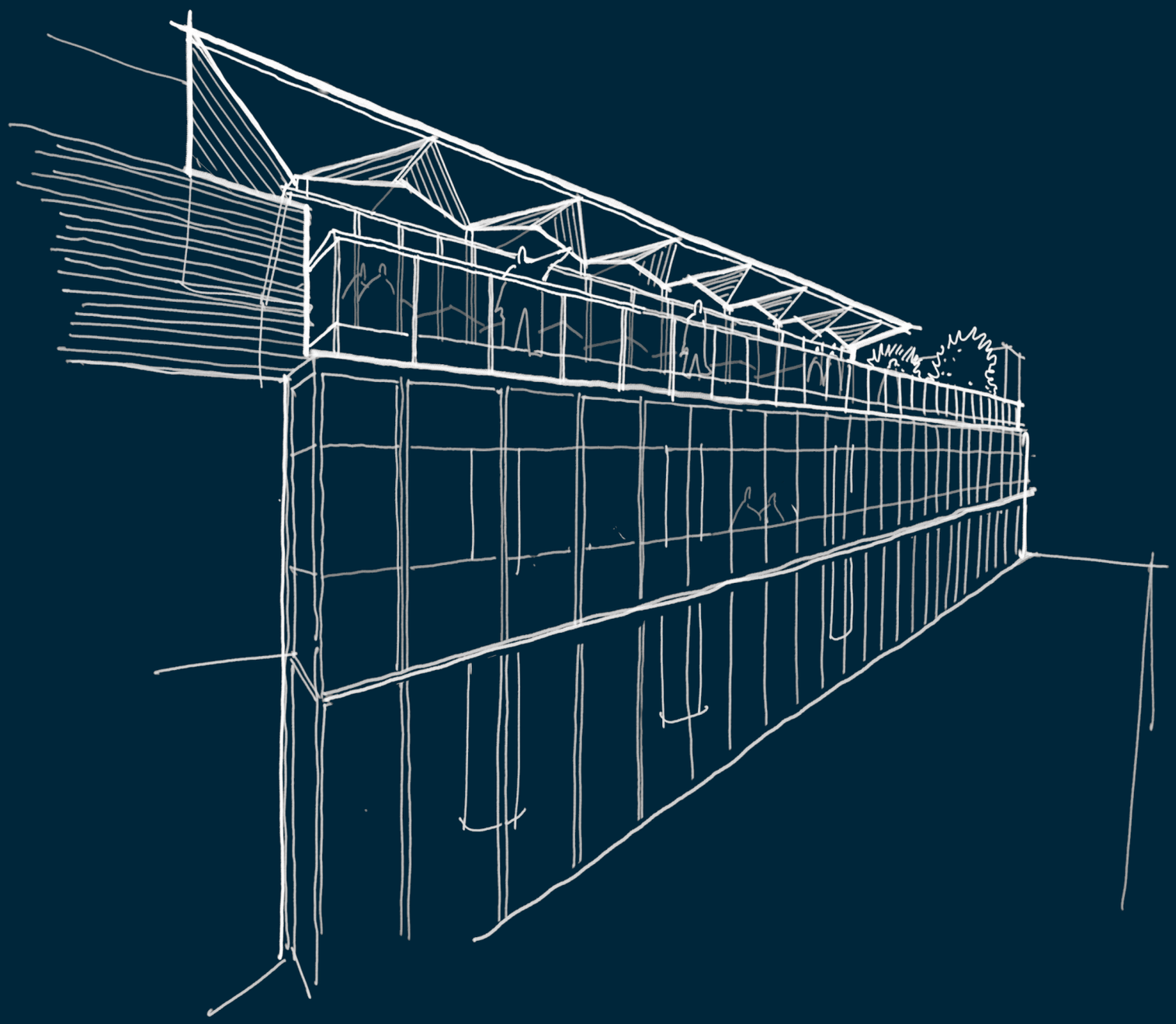
200 Gray’s Inn Road

Energy and Sustainability Statement
Sweco
February 2023



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Energy and Sustainability Statement

200 Gray’s Inn Road

SWECO

Change list

Ver:	Date:	Description of the change	Prepared		Reviewed		Approved	
00	08.01.23	Draft for comments	MP	18.01.23	MG	19.01.23	KA	20.01.23
01	30.01.23	Final Issue draft	MP	31.01.23	MG	31.01.23	KA	31.01.23
02	22.02.23	Final Issue	MP	22.02.23	NG	23.02.23	KA	23.02.23

Project Name: 200 Gray's Inn Road
Project Number: 65208078
Client: Great Ropemaker Partnership (G.P) Limited
Ver: Rev 02
Date: 23.02.2023
Author: Monika Potomska

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Appendices:

1 Executive Summary

This report has been prepared on behalf of Great Ropemaker Partnership (G.P) Ltd (the "Applicant") to support a full planning application of **200 Grays Inn Road** (the "Proposed Development"), a pavilion on the existing roof that provides multifunctional spaces for the occupants, within London Borough of Camden ('LBC'). The Proposed Development of the site consists of 0.39 ha.

The proposed scheme will follow the London Plan 2021, Approved Document Part L Volume 2 (Conservation of Fuel, and Power) of the Building Regulations 2021, and the latest guidelines set out by Camden Council. The methodology of carrying out, and reporting predicted energy consumption, and associated carbon emissions are outlined in the Mayor's Energy Hierarchy as detailed in the Energy Assessment Guidance (June - 2022), section 6.15 to 6.25 for Major Refurbishment. **Although Sweco acknowledges that the proposed scheme is not GLA referrable, GLA's methodology is being followed as means of best practice.**

Following the energy and carbon evaluation, it is proposed that extensive energy efficiency measures along with low, and zero carbon (LZC) strategies are incorporated into the design for the Proposed Development. As demonstrated in detail in this assessment, energy, and carbon emissions calculations have confirmed that the proposed energy efficiency design, and LZC applications will achieve:

- **Regulated carbon dioxide savings of 10% relative to a New-Build Part L 2021 at Be Green stage;**
- **All-electrical development by removing the gas-fired boilers and CHP onsite to eliminate the NOx emissions and improve the air quality, which aims towards the development being true net zero carbon;**

The energy assessment has been carried out using "The London Plan (2021)" energy hierarchy. The London Plan energy hierarchy is as follows:

1. Be Lean: Use less energy;
2. Be Clean: Supply energy efficiently;
3. Be Green: Use renewable energy;
4. Be Seen: Energy monitoring.

The GLA has released a cover note (15th June 2022 with a November 2022 update) regarding the recent update to Part L, in which they have acknowledged the increased difficulty with achieving the improvement targets. Due to this, they will continue to monitor the progress and update benchmarks if required.

"Initially, non-residential developments may find it more challenging to achieve significant on-site carbon reductions beyond Part L 2021 to meet both the energy efficiency target and the minimum 35% improvement. This is because the new Part L baseline now includes low carbon heating for non-residential developments but not for residential developments."

1.1 Non-domestic Operational Carbon Dioxide Emissions

The following tables demonstrate compliance with the energy hierarchy, and the carbon targets proposed by the GLA. The pavilion areas within the Proposed Development are classified as 'non-domestic areas' as per Building Regulations terminology and will be referred as such throughout the report. The carbon dioxide emissions savings shown in the tables above are matching the BRUKL outputs enclosed in **Appendix A.**

1.1.1 Part L 2021 (SAP 10.2)

Table 1-1 Carbon Dioxide Emissions After Each Stage of The Energy Hierarchy for Non-Domestic Buildings

Energy Planning – Greater London Authority guidance on preparing energy assessment	Carbon Dioxide Emissions (Tonnes CO2 per Annum)				
	Regulated Energy	Unregulated Energy	Total CO2 Reductions	Regulated Energy % Reduction	Unregulated Energy % Reduction
Building Regulations 2021 Part L Compliant Development	1.5	1.4	-	-	-
Overall carbon emission reduction - After Renewable Energy (inclusive of heat pumps)	1.3	1.1	0.1	**10%**	-

Table 1-2 Regulated Carbon Dioxide Savings from Each Stage of The Energy Hierarchy for Non-Domestic Buildings

Non-domestic areas	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	(%)
Total Target Savings - GLA's Target	0.1	**10%**

2 Introduction

2.1 Purpose of the Report

This report describes the various options for energy, and carbon reduction, and contains a sustainability strategy for the Proposed Development. As part of this document the energy and carbon performance of the Proposed Development is assessed against local and national planning policy requirements as described in Section 3 of this report.

The energy and carbon figures presented in this report are calculated for the purpose of initial estimates only, using the preliminary information currently available. Hence whilst they can be used to gain an understanding of the benefits of each technology, they must not be taken out of context; establishing the best economic, and energy-efficient operation will require more complex analysis of building projected load profiles when these are developed.

2.2 Development Description

Foster + Partners designed the existing building and completed it in June 1990. The Site comprises a 10-storey building with a basement level, the commercial building provides approximately 282,000 square feet of office space, arranged around a full-height atrium. The building is currently in use as an office (Class E) with a number of tenants.

ITN's headquarters in central London occupy the building, and which now has additional commercial tenants. In the immediate surrounding area, existing building heights range from 4 to 15 storeys. The Site is located in an area of varied character in central London. Among the surrounding buildings are Victorian and Georgian terraces as well as newer commercial and residential developments.

The project brief is to create a multifunctional pavilion on the existing roof, to provide space for staff members. In addition to creating an opportunity for interaction among the staff, the proposed development will also provide access to outdoor space and biodiversity, making use of the outstanding views and providing opportunities for staff interaction. Taking advantage of the roof's potential, rationalizing the plant and satellite dishes and relocating some to the east of the roof, will provide an exciting additional space for the staff and provide outdoor amenities.

Table 2-1 Proposed Land Uses / Floor Areas

Use	Use Class	Proposed (NIA sqm)	Proposed (GIA sqm)	Proposed (GEA sqm)
Office	Class E	131	340	360
Total	-	131	340	360

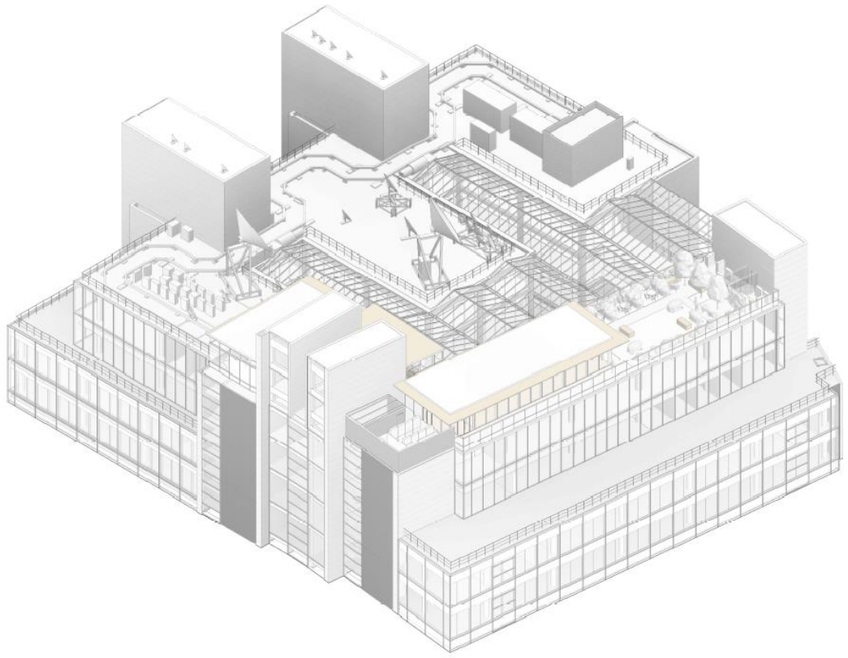

Figure 2-1 The Proposed Development's view (Bennetts Associates)

2.3 Planning Application Boundary

Located in Camden, the Site is bound by Coley Street to the north, Grays Inn Road to the west, Gough Street to the east and the Elm Yard to the south.

The Proposed Development does not fall within a Conservation Area, but it does border the Hatton Garden Conservation Area to the south, and the Bloomsbury Conservation Area is located to the west. In addition to the Proposed Development, there are several other listed buildings (mostly Grade II) nearby.

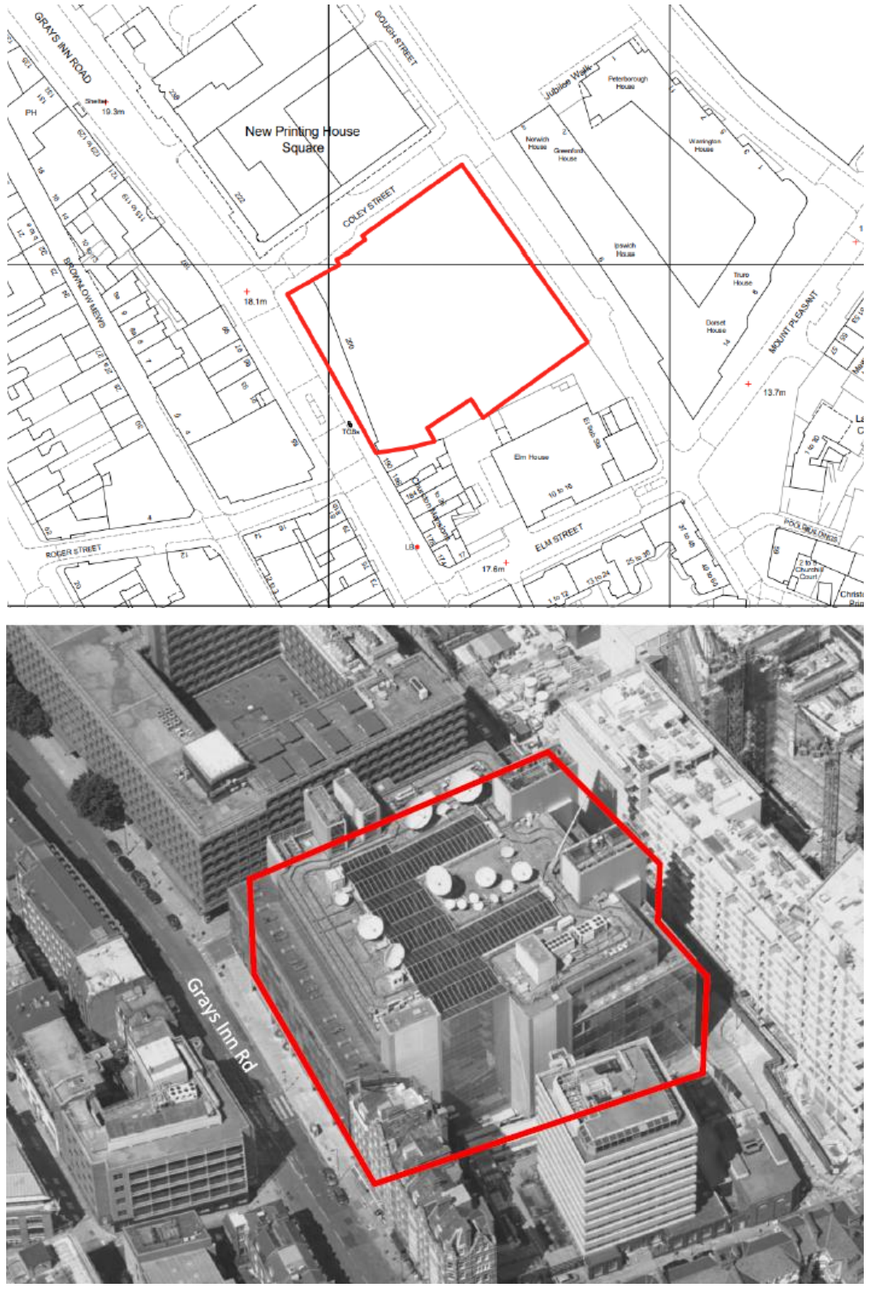

Figure 2-2 Indicative development red line boundary (Bennetts Associates)

2.4 Methodology

Sweco UK uses Integrated Environmental Systems' (IES) VE Compliance software to demonstrate Part L compliance for the non-domestic areas.

The IES VE Compliance software has been approved by The Department for Levelling Up, Housing and Communities (DLUHC) for use as a Dynamic Simulation Model (DSM) software package. As part of its approval process, the IES software had to demonstrate that it satisfies all the tests, and other requirements defined in accordance with ISO 90003:2004 – 'Guidelines for the application of ISO 9001:2000 to computer software.

The methodology used by the IES accredited software is summarised below:

- A three-dimensional software model of the proposed non-domestic areas of the building is generated using the software's Model IT component. This model is based on the architectural drawings and is an accurate geometric representation of the building.
- The building usage is defined for the building in line with the National Calculation Method's (NCM) various definitions for building uses.
- The building systems are defined and allocated to each of the rooms within the building.
- The software calculates a Building Emissions Rate (BER) based on the geometry of the building, its use, and the efficiency of the building systems defined.
- The software automatically generates a notional building using the geometry for the proposed building, but allocating glazing coverage, U-values, and plant efficiency in accordance with the Elemental Method as defined in DRAFT NCM modelling guide 2021.
- The software calculates an Emissions Rate for the Notional building, which is the Target Emission Rate (TER) for the actual building.

2.5 Architectural Information

The energy model of the building uses the architectural design drawings issued by ***Bennetts Associates*** dated 18th January 2023.

Any subsequent changes made to the drawings within the analysis period have been reviewed by the team and no significant deviations were found that would affect the results.

2.6 Energy Assessors

The energy assessment has been carried out and approved by CIBSE Energy Registered Low Carbon Energy Assessors based at Sweco UK – 1 Bath Road, Maidenhead, SL6 4AQ.

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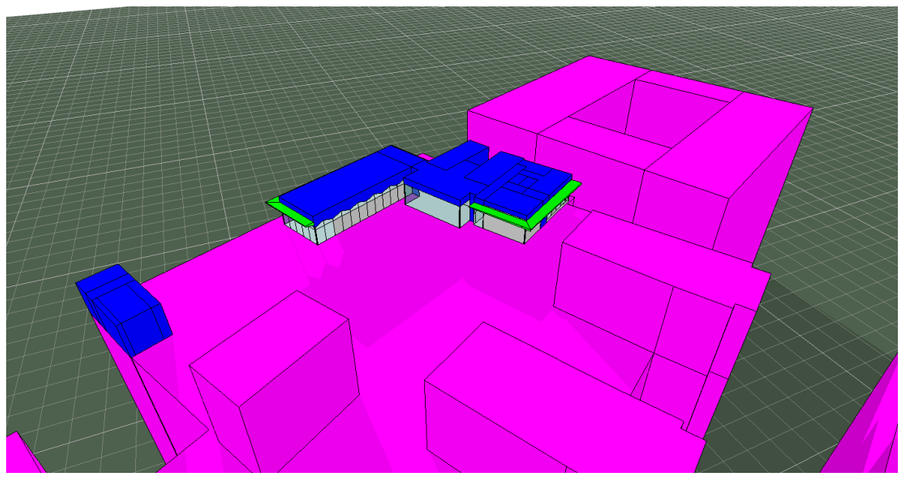


Figure 2-3 3D view of the Proposed Development extracted from IES-VE, note that not all shading elements were modelled physically due to software limitation therefore might not be visualised in the image above.

3 Legislation, and Planning Policies

3.1 Legislation

3.1.1 Climate Change Act 2008 (2050 Target Amendment)

The Climate Change Act sets legally binding greenhouse gas emission reductions targets of 100% by 2050 (with an interim target of 26% by 2020) against a 1990 baseline, which are to be achieved through action taken in the UK, and abroad. It contains provisions to enable the Government to require public bodies, and statutory undertakers to carry out their own risk assessment and make plans to address the risk of climate change.

In May 2019, the Climate Change Committee recommended a new emissions target for the UK: net-zero greenhouse gases by 2050 to respond to the Paris Agreement commitments. The recommendation has been adopted by the government, and the targets were amended accordingly in June 2019.

3.1.2 Energy Act 2011

The Act includes provisions for the establishment of the Green Deal, which is a new financing framework to fund improvements to the energy efficiency of domestic, and non-domestic properties. This will be paid back through a charge on the energy bill so that there is no upfront cost for consumers. The scheme was cancelled in July 2015.

The Act provided powers to ensure that from April 2018, it became unlawful to rent out a residential or business property that does not reach a minimum energy efficiency standard, currently set at EPC rating 'E'.

3.1.3 Building Regulations Part L 2021

Approved Documents are issued by the Secretary of State to provide guidance on compliance with specific aspects of building regulations in some of the more common building situations. They set out what, in ordinary circumstances, may be accepted as a reasonable provision for compliance with the relevant requirement(s) of the Building Regulations to which they refer.

Approved Document Part L of the Building Regulations covers the carbon emissions that are attributable to buildings in use, resulting from lighting, heating, cooling, and ventilation, excluding small power.

At the time of writing this report, the new Part L has been issued (December 2021) and proposes further options to increase the energy efficiency requirements.

In January 2021 the government has clarified the implementation of the new Part L. The timescale is as below:

- For transitional arrangements to apply to an individual building, developers will need to both:
    - Submit a building / initial notice or deposited plans by June 2022;
    - and commence work on each individual building by June 2023.
- Where notices or plans are submitted after June 2022, transitional arrangements will not apply, and homes must be built in line with 2021 Part L standards.
- Where notices or plans are submitted before June 2022 but work on any individual building does not commence by June 2023; the non-commenced buildings must build in line with 2021 Part L standards.
- No individual building will need to change once building work has commenced, in line with the definition on commencement below, if work commences within the reasonable period. However, developers will need to plan their sites appropriately, and if work on a building commences outside of the reasonable period, they will need to ensure that it is compliant with new standards.
- For the purposes of transition, commencement will not change from the existing 2013 definitions:
    - Excavation for strip or trench foundations or for pad footings.
    - Digging out and preparation of ground for raft foundations.
    - Vibrofloatation (stone columns) piling, boring for piles or pile driving.
    - Drainage work specific to the building(s) concerned.

Part L 2021 takes a fabric first approach, which is closely followed by low carbon heating systems. Emphasis has especially been placed on the inclusion of photovoltaic panels and heat pumps to provide space conditioning.

The Proposed Development will need to conform to the requirements set out in Approved Document L of the Building Regulations 2021. In summary:

- Non-domestic developments come under Part L, Volume 2 of the Building Regulations 2021 for new buildings.
- A rigid calculation methodology is set out to show compliance. This is the National Calculation Method (NCM) for non-domestic buildings.
- The required maximum carbon dioxide emissions can be achieved by any mixture of passive design features (i.e., reducing energy demand), and energy efficiency measures, but minimum standards of thermal performance apply.

In all cases, the carbon dioxide emissions achieved are calculated by comparing the proposed design against a target which complies with Building Regulations values.

3.1.4 Building Regulations Part L 2021 application to the Proposed Development

The Proposed Development will be assessed under:

- Part L 2021 for the new non-domestic buildings.

It is a requirement that such buildings meet the minimum building regulations in terms of the maximum façade U-values, minimum values for energy efficiencies, and minimum values for CO_2 reductions as listed within the Part L requirements.

Fuel CO2 emission factors are based on SAP 2021, and the NCM document for Part L 2021 compliance, considered within the energy model to calculate the CO2 emissions that will be produced because of the running of the systems, as outlined within the report. Fuel CO2 emission factors in terms of SAP 10.2 carbon factors are used to calculate the equivalent carbon dioxide emissions associated with different fuels. For example, 1 kWh of power from grid electricity will have a different environmental impact than 1 kWh of power from natural gas as presented in the Table 3-1.

Grid electricity has significantly decarbonised since the issue of Part L2A 2013, hence SAP 10.2 carbon factors have been released with Part L 2021.

This will ensure that the assessment of new developments better reflects the actual carbon emissions associated with their expected operation. The impact of these new emission factors is significant in that technology generating on-site electricity (such as gas-engine CHP) will not achieve the carbon savings they have to date.

Table 3-1 Fuel Factors 2013 Part L (SAP10) and PartL2021 (SAP10.2)

System	Fuel Source	Emission Factor (KgCO2/kWh)	
		SAP 10	SAP 10.2 (new)
LTHW Heating Energy	Natural Gas	0.210	0.210
Chiller Energy	Grid Electricity	0.233	0.136
Lighting Energy	Grid Electricity	0.233	0.136
Pump / Fan Energy	Grid Electricity	0.233	0.136
DHW Energy	Natural Gas	0.210	0.210

3.2 Planning Policies

3.2.1 National Planning Policy Framework (NPPF) England

In July 2021, the Ministry of Housing, Communities, and Local Government revised the issue of National Planning Policy Framework (NPPF), which sets out the Government's planning policies for England, and how development should happen in the country.

Chapter 14: "Meeting the challenge of climate change, flooding, and coastal change" is NPPF's relevant section to this energy, and sustainability statement. That chapter provides a framework for local authorities to address the following issues as regards planning applications: (Key paragraphs extracted)

The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

- New development should be planned for in ways that:

a) Avoid increased vulnerability to the range of impacts arising from climate change. When a new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) Can help to reduce greenhouse gas emissions, such as through its location, orientation, and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

- To help increase the use, and supply of renewable, and low carbon energy, and heat, plans should:

a) Provide a positive strategy for energy from these sources, that maximises the potential for a suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape, and visual impacts);

b) Consider identifying suitable areas for renewable, and low carbon energy sources, and supporting infrastructure, where this would help secure their development;

c) Identify opportunities for development to draw its energy supply from decentralised, renewable, or low carbon energy supply systems, and for co-locating potential heat customers, and suppliers.

Local planning authorities should support community-led initiatives for renewable, and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

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

a) Comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved, and its design, that this is not feasible or viable; and

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

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

a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and

b) approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

3.3 Regional Policies

3.3.1 The London Plan (2021)

The Mayor of London published the current "London Plan" in March 2021. This is the Spatial Development Strategy for Greater London. The Development Plan for each London Borough must ultimately comply with the general requirements of the London Plan (2021).

To support borough planners, the Mayor has previously published the following guidance documents through London Renewables: "Integrating Renewable Energy into New Developments: A Toolkit for Planners, Developers and Consultants", and more recently the Supplementary Planning Guidance, "Sustainable Design and Construction", 2014.

The London Plan includes planning policies both for reducing energy consumption within buildings and, more significantly, for promoting the use of decentralised electricity generation and renewable energy technologies. These policies cover the requirements of each borough with respect to Energy strategies and planning applications.

The Energy Planning – 'GLA Guidance on preparing energy assessments as part of planning applications' (June 2022) states the requirements and guidance for energy strategies to ultimately reduce carbon dioxide emissions.

These emissions should include those covered by the Building Regulations and those that are not covered by the Building Regulations.

The London Plan recognises that energy efficiency should come before energy supply considerations and has suggested a simple strategy known as the Energy Hierarchy (Policy SI 2). The process follows good practice in the design of low carbon buildings and comprises four distinct stages and order of application:

1. Use Less Energy (Be Lean).
2. Supply Energy Efficiently (Be Clean).
3. Use Renewable Energy (Be Green).
4. Monitor, verify and report on energy performance (Be Seen).

This strategy puts energy efficiency/conservation measures first to reduce the demand for energy, 'Be Lean'. Following this, consideration must be given to supplying the resultant reduced energy demand as efficiently as possible, including to exploit local energy resources (such as secondary heat) and supply energy efficiently, 'Be Clean'. Sources of low or zero carbon and renewable energy technologies should then be examined for incorporation, 'Be Green'. Lastly, it is a requirement for major developments to monitor and report energy performance post-construction to ensure that the actual carbon performance of the development is aligned with the Mayor's net zero carbon target, 'Be Seen'.

London Plan (2021) requires a minimum on-site reduction of:

- at least 35 per cent beyond Building Regulations: residential development should achieve 10 per cent, and non-residential development should achieve 15 per cent through energy efficiency measures. Where it is clearly demonstrated that the zero-carbon target cannot be fully achieved on-site, any shortfall should be provided, in agreement with the borough, either:

1. through a cash in lieu contribution to the borough's carbon offset fund, or
2. off-site provided that an alternative proposal is identified, and delivery is certain

The proposed development is not considered a major refurbishment therfore the carbon offset payment and energy targets are not applicable. However, GLA's energy hierarchy is a recognised industry standard for achieving enrgy efficiency therfore the numbers in this report are reported in line with it as means of best practice.

3.3.2 London Environment Strategy – May 2018

The Mayor of London published the London Environment Strategy setting out London's plans to tackle environmental challenges by 2050. The aims are:

- For London to have the best air quality of any major world city by 2050, going beyond the legal requirements to protect human health, and minimise inequalities.
- For London to be the world's first National Park City, where more than half of its area is green, where the natural environment is protected, and where the network of green infrastructure is managed to benefit all Londoners.
- For London to be a zero-carbon city by 2050, with energy-efficient buildings, clean transport, and clean energy.
- To make London a zero-waste city. By 2026, no biodegradable or recyclable waste will be sent to landfill, and by 2030, 65 per cent of London's municipal waste will be recycled.
- For London, and Londoners to be resilient to severe weather, and longer-term climate change impacts. This will include flooding, heat risk, and drought.
- For Londoners' quality of life to be improved by reducing the number of people adversely affected by noise, and promoting quieter, and tranquil spaces.
- For London to transition to a low carbon circular economy.

3.4 Local Policies – Camden Council

The Camden Local Plan (adopted in 2017) sets out the Council's planning policies and replaces the Core Strategy and Development Policies planning documents (adopted in 2010). The Local Plan covers the period from 2016-2031.

The Council has prepared a number of other documents that provide advice and guidance on how their planning policies will be applied for certain topics, areas or sites known as Supplementary Planning Guidance (SPG). These documents do not have the same weight in decision making as Camden development plan documents, but they are important supporting documents. One of these documents which is of importance for this report is CPG3: Sustainability.

There are five key strategic Policies which Camden aims to implement to address sustainability within built environment:

- Policy CC1: Climate change mitigation
- Policy CC2: Adapting to climate change
- Policy CC3: Water and flooding
- Policy CC4: Air quality
- Policy CC5: Waste

Detailed information of these Policies is illustrated below.

3.4.1 Sustainability and climate change

The Council aims to tackle the causes of climate change in the borough by ensuring developments use less energy and assess the feasibility of decentralised energy and renewable energy technologies.

Climate change adaptation involves changing our behaviours and processes to prepare for the potential effects of climate change. It needs to be clear that buildings and people can adapt to changes already evident within the climatic system.

Improving local air quality, mitigating the impact of development on air quality and reducing exposure to poor air quality in the borough is vital in safeguarding public health and the environment. The focus of Policy CC4 is to mitigate the impact of development on air quality and to ensure exposure to poor air quality is reduced in the borough.

4 ‘Be Lean’ – Reducing Energy Demand

This section of the report details the applied measures at the Proposed Development to reduce energy demand as part of the 'Be Lean' stage of the Energy Hierarchy, and is based on the following strategies:

- "Fabric First approach" – designing of a high thermal performing building envelope (for new elements), with optimised glazing ratio in the new south-facing facade for daylighting, and solar gains management during summer, and winter.
- Central ventilation strategy for the offices' areas flexibility, and lower energy use due to improved energy efficiency of mechanical ventilation equipment.
- Promoting energy savings and wellness initiatives through robust metering, and control strategy.
- Energy-efficient equipment will be used throughout the development to reduce energy consumption.

4.1 Passive Design Features: Regulated Energy Use and response to Climate Resiliance

The chapter identifies the Proposed Development strategies and their effectiveness at adaptability and building resilience to climate variability and change.

Passive features take advantage of the climate, location, and site context to reduce energy demand for regulated energy uses (e.g., heating, cooling, ventilation, lighting, and pump energy). Examples of design features include maximising the use of natural resources, such as passive solar heating, daylighting, and designing out unwanted gains through glazing ratio optimisation, including greenery for stabilising temperature conditions, wherever possible.

4.1.1 Site location, and microclimate

The Proposed Development is in the London Borough of Camden, a highly urban area. Camden’s microclimate is fundamentally different from other parts of London where higher temperatures can be experienced due to urban heat island impact, and within a densely urban environment with potential issues of sunlight availability at ground level during winter months. The design positively responds to the local environmental conditions by:

- Developing a massing for the new built areas that optimises the site potential, whilst striving to safeguard daylight, and sunlight to existing nearby properties.
- Proposing light coloured materials to new and most exposed elevations to contribute to reducing urban heat island effect.
- Locating intakes of air supply as far as possible from pollution sources.
- Improving local air quality by prioritising electricity-based rather than fossil fuel-based heating systems such as AHUs or HVRF systems.
- Where fossil fuels will only be used for life safety, and backup electrical supply rather than day-to-day use; and
- Providing more greenery to terraces across several floors with a green wall and roof.

The height of the neighbouring buildings can aid in mitigating direct solar radiation by providing an appropriate amount of shading which has been recognised and accounted for in the energy model.

4.1.2 Building orientation, layout, and form

The pavilion’s footprint responds to the existing building’s geometry, maximising the available floor space and creating additional space for the staff and providing outdoor terraces. At the same time the depth of the floors plates is considered with maximising the potential for cross ventilation where possible.

Being the top floor, the pavilion is more exposed to excess solar gains than the remainder of the existing buildings meaning it won’t benefit as much from the shade of the surrounding buildings. This is considered within form by introducing deep overhangs to mitigate unwanted heat gains.

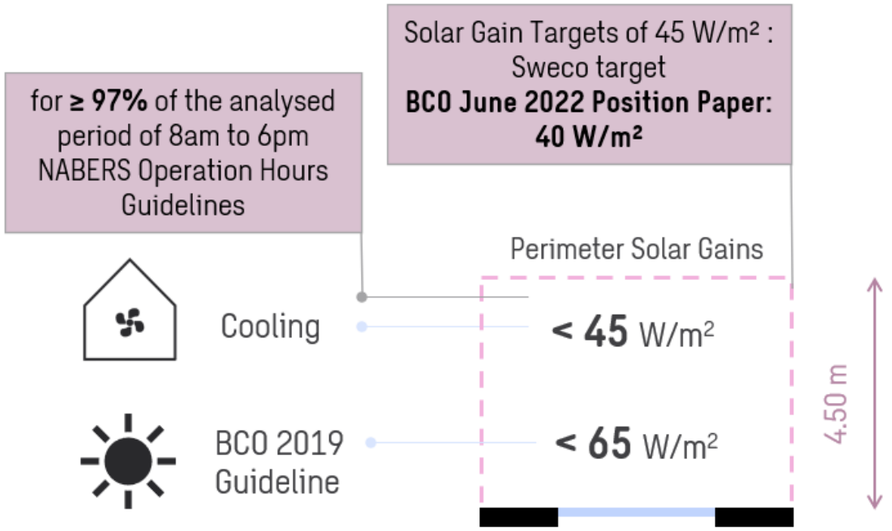
4.1.3 Façade Optimisation – Cooling and Overheating: Mitigation of excess solar gains

For the new façade elements, solid areas are going to be derived from detailed thermal modelling analysis during the design process to optimise solar heat gains through the glazing with daylighting, and thus ensure good levels of natural daylight penetration whilst limiting unwanted solar gain, and heat loss.

Sweco undertook a detail exercise to ensure a low g-value and appropriate shading measures are executed, this included testing various glazing options and coatings.

The aim is to drive down the solar gains within the perimeter aimed at achieving solar gains of less than 45W/m^2 for not more than 3% of the percentage hours in occupancy period (NABERS occupancy profile: 8:00 to 18:00) following Sweco’s best practice. BCO guidance of no more than 65W/m^2 is to be considered for the corner zones and where the retained structure results in design constraint, however, if possible, the target is improved to be at least in the range from 45 to 65W/m^2. The target was set based on a two-fold ambition:

- Energy demand reduction: Improve the energy performance
- Health and well-being: Improve thermal comfort



This methodology allows to design (and upgrade) facades to control excess gains in the summer but at the same time benefit from the solar presence in winter and maximise daylighting where possible. Sweco worked with Bennett Associates to ensure passive design strategies are being considered to reach ambitious solar gain targets, this includes:

- Low g-value of 0.28 on all facades
- Optimised glazing ratios and external shading strategy on all facades to control solar gain
- Enhanced biodiversity for outdoor terrace space
- Glazing to solid ratio revised to control solar gain (in new elements)
- Surrounding context providing shading

4.1.3.1 Soffit detailing - overhang

The Proposed Development benefits from a deep overhang present over its most glazed facades which allows occupants to experience the views out as well as achieve good levels of daylighting whilst mitigating the excess solar gains. The Site is located within Central London Area / Central Activities Zone where risk of overheating is higher than in other parts of London due to its climate driven by urban heat island effect. It is vital for additional shading strategies such as external overhangs to be implemented to avoid risk of inadequate levels of thermal comfort.

The 1.325m overhang sits directly above the glazing and not only improves occupant comfort but also further reduces the pressure on the cooling loads and improves the overall energy efficiency of the buildings.

The Part L analysis is inclusive of Criterion 3 check that checks if spaces have appropriate passive control measures to limit the effects of solar gains. Figure 4-1 defined occupied wherever occupied spaces are compliant with this criterion. The multi-function room is capable to mitigating those heat gains due to the present overhang without any need for further mitigation strategies such as internal blinds – which can further be introduced in case of more extreme weather scenarios as a future proofing strategy.

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
200GI_P_MULTI FUNCTION ROOM	NO (-10.1%)	NO
200GI_P_LOBBY	NO (-7.8%)	NO

Figure 4-1 Part L 2021 Criterion 3 Results

For detailed results please refer to Appendix A.

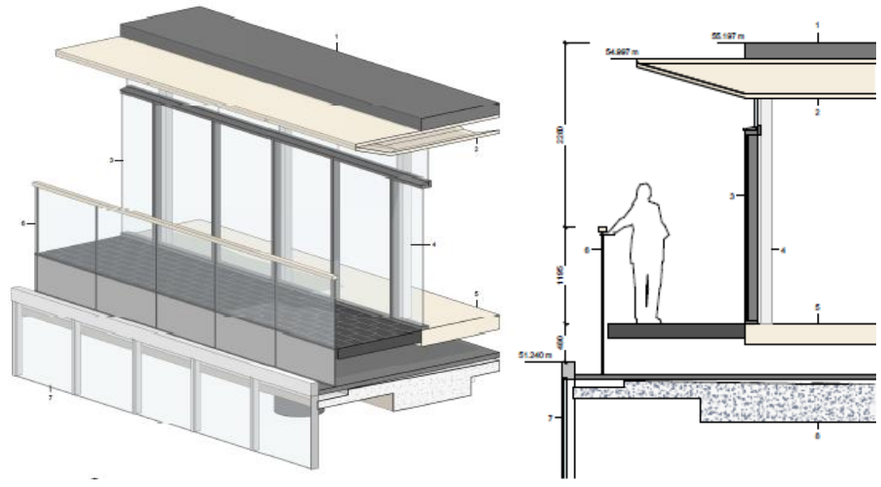


Figure 4-2 Soffit/overhang details - Bennet Associates

4.1.4 Building Envelope

The external envelope of a building acts as an important climatic modifier, with a well-designed façade significantly reducing the buildings energy demand and contributing to a comfortable internal environment by minimising cold draughts, and excessive solar heat gains in summer.

For these very reasons, Sweco recommends a “Fabric First” approach as a first step to a high performing building. The following table details improvements made to the proposed building’s construction elements as a “Fabric First” approach to reduce heating and cooling loads and increase comfort level within the spaces by even heat distribution within the occupied spaces at the Proposed Development.

The outlined U-values in Table 4-1 are critical to reducing carbon emissions, and coordination on the practice of achieving these U-values has been discussed with the architectural team, the next stages of design will provide more detailed calculations to confirm those.

The following values are indicative of the design stage and are subject to confirmation and further analysis.

Table 4-1 Building Fabric Thermal Performance Non-Domestic Areas New Elements

Parameter		Part L2A 2013 Limiting Value	Part L 2021 Limiting Value	Sweco Target Values
Building Airtightness (@ 50Pa)		10 m³/h/m²	8 m³/h/m²	3 m³/h/m²
U-values	New Wall	0.35 W/m²K	0.26 W/m²K	0.18 W/m²K
	Roof	0.25 W/m²K	0.18 W/m²K	0.15 W/m²K
	Floor	0.25 W/m²K	0.18 W/m²K	0.15 W/m²K
Glazing U-value		2.2 W/m²K	1.6 W/m²K	1.2 W/m²K
Glazing g-value (BS EN 410)		Glazing		0.28
Glazing Visible Light Transmittance		-		50-55%

Notes:

1. The “Target Values” are the construction parameters applied to the Actual Building simulation model and should be reflective of the average of the actual building element U-value.
2. The U-values include for repeating thermal cold bridges. A margin of 10% of the U-value has been added to the target U-values to make provision for non-repeating thermal bridging. The thermal bridging coefficient should not exceed 10% of the target U-values listed above. The curtain walling U-value includes linear thermal bridging (y-value).
3. Glazing g-value can vary based upon exposure to sunlight, to balance daylighting against the cooling loads. G-values will be confirmed after load calculations and Part L Crit. 3 check.
4. Thermal mass parameter is not specified in Part L, but it would be good to incorporate a degree of thermal mass to commercial areas and couple it with night-time ventilation for purging heat.
5. These values are a starting point of best practice thermal performance and will be confirmed after checking performance against the new carbon factors set out by SAP 10.

4.1.5 Daylighting Strategy

Daylighting takes two approaches: the impact of the building on the daylight receipt of surrounding buildings and enhancing the daylight provision of the Proposed Development. Both have been considered here.

As previously described, façade performance has been optimised to enhance daylighting provision to the commercial spaces at the Proposed Development. This considered solar performance of glass, window-to-wall ratios in new elements, the existing building context, and passive solar shading measures/window reveal depths to ensure that daylight provision to the spaces was not provided at the expense of another key performance indicator. For example, a balanced approach was taken to ensure that the specified g-value did not negate the ability of the glass to provide good visual light transmittance. These considerations for a key part of the project approach and will be reflected in specification.

4.2 Active Design Features: Regulated Energy Use

Active features include the power-driven systems used to operate the building accounting for energy efficiency considerations as presented in this section.

4.2.1 Heating, Cooling, and Ventilation Strategy

Will be primarily served by a Hybrid Variable Refrigerant Flow (HVRF) system. From the HBC unit heating or cooling will be then provided to fan coil units located at high level within the office space via a water system (LTHW or CHW), serving the internal and perimeter zones.

Ventilation fresh air is provided by underfloor air handling units each equipped with plate heat exchangers to maximise heat recovery and thus minimise the energy requirements associated with tempering the air.

4.2.2 Ventilation Heat Recovery

The energy required to heat or cool the incoming fresh air supply to the building will be significantly reduced by using an efficient heat recovery system. The heat recovery systems will utilise the thermal properties of the return air to transfer 'free' heat/cooling to the incoming fresh air supply. These will be controlled to minimise the demand for any heating, and cooling of the fresh air supply.

4.2.3 Low Energy Lighting

A full lighting installation will be provided throughout the landlord, and common areas of the buildings, generally comprising LED luminaires, with functional lighting. All luminaires will be provided with dimmable control gear (addressable) to suit its type and application. All landlord lighting will be controlled through the addressable lighting control system.

Lighting will be provided to the external areas, including main entrance and its passage on the ground floor and the external terraces. External luminaires will generally comprise suitably IP-rated LED luminaires to suit the architectural design. Luminaires will be provided with DALI-addressable dimmable control gear. Where proposed, external lighting will be controlled through the building lighting control, and management system, and minimised wherever possible to avoid light pollution. Lighting levels are listed in the next table.

Table 4-2 Applied Lighting Specifications

System	Parameter	Applied Value
Lighting Efficiency: Non-domestic Areas	Multifunction Space	4.5 W/m² Display lighting 35 lm/crit watt
	Storage Areas	100 lux @ 5 W/m2
	Toilet Areas	200 lux @ 5 W/m2
	Circulation Areas	100 lux @ 5/m2
	Plant Areas	200 lux @ 5 W/m2
	Stairs	100 lux @ 5 W/m2

System	Parameter	Applied Value
Lighting Controls	Transient Spaces	Presence Detection On/Off
	Occupied Spaces	Presence Detection On/Off Daylight Dimming Control (Reception local manual switching)

Note 1: All installed Lighting will be LED, and all-day lighting areas to have daylight dimming controls with local sensors with presence detectors. All transient areas will have presence detectors.

4.2.4 Efficient HVAC Parameters

The following design parameters were assigned to the base building heating, ventilation, and air conditioning (HVAC) systems to establish its annual CO2 emission rate.

Table 4-3 Applied HVAC Parameters for Main Central Plant, Non-Domestic Areas

System	Parameter	Applied Value
Cooling System Multi-function Space – ASHP	Seasonal Efficiency (SEER)	4.63
	Nominal Efficiency (EER)	3.07
Heating System Multi-function Space/WC– ASHP	Seasonal Efficiency (SCOP)	4.0
Air Handling units (AHUs)	SFP	1.25 W/l/sec (average value)
	Ventilation Heat Recovery Efficiency	87% (Plate heat exchanger)
	Demand Control Ventilation	Yes
Heat recovery unit (HRU) WC	SFP	1.40 W/l/sec (average value)
	Ventilation Heat Recovery Efficiency	87% (Plate heat exchanger)
	Demand Control Ventilation	No
Electric Water Heater - DHW Toilets	Delivery Efficiency	100%
Pumps	Pump Type	Variable Speed with multiple pressure sensors
Electrical / Metering	Power Factor	Greater Than 0.95
	Lighting systems have provision for metering	Yes
	Automatic Monitoring of energy Data?	Yes
	Controls	Central Start & Stop Optimum Start & Stop
		Local time & temperature Control Weather Compensation Control

4.3 Active Design Features: Unregulated Energy Use

Unregulated energy refers to ‘plug loads’ such as:

- Lifts, escalators.
- Refrigeration systems.
- Computers, laptops, printers, photocopiers, audio-visual equipment.
- Server rooms, and other electrical loads.

Unregulated energy use can account for a large portion of the total energy consumption within office buildings according to CIBSE TM54 – prediction of operational energy use (Figure 4-3). Therefore, to bridge the performance gap of design performance versus actual measured performance during operation of the building, it is important to address unregulated energy use as it is not considered under Approved Document Part L of the Building Regulations.

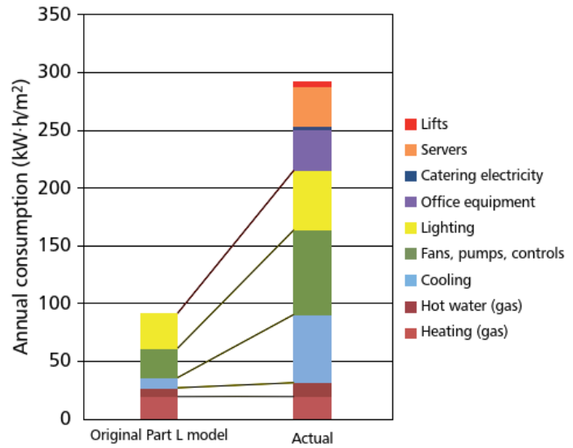


Figure 4.3 Comparison of Building Regulations Approved Document L2A (HM Government, 2010) calculations and monitored energy use after five years of operation, for an example office building

Figure 4-3 Comparison of operational energy use: Part L versus actual measured energy use (extracted from CIBSE TM54:2022)

This section summarizes how the Proposed Development will control unregulated energy use and achieve an ambitious target of energy use intensity (EUI) target, which accounts for both regulated, and unregulated energy use.

4.3.1 Low Energy Culture

Providing building users, and operators with practical guidance on the importance and methods of energy efficiency can lead to effective, cost-free reductions in energy usage, and carbon emissions. Savings can be expected in, for example:

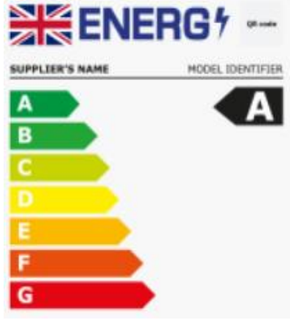
- Operating comfort cooling systems efficiently.
- Lighting Energy: a culture of ‘turn-it-off’, providing task lighting wherever possible.
- Small Power: prefer electrical equipment with energy labelling, and avoiding monitors, and PCs etc. in standby mode.
- Cooling/Heating Energy: widening ‘acceptable’ temperature range.
- Vertical transportation: promote the use of stairs.

Training of operators and facility managers is particularly important to provide them with the skills and knowledge to implement and continue to improve an energy management programme.

The amount of energy that can be saved will be dependent upon the motivation of the occupants, and the effectiveness of the awareness programmes. The development will actively encourage a low energy culture as part of its building operation, and commercial leasing strategy.

4.3.2 Low Energy White Goods

White goods are to be provided with a certified energy label. These are rated from A to G, with G being the least efficient.



Wherever white goods are provided within the development, including washing machines, dryers, dishwashers, and fridge/freezers, they will achieve:

- Fridges – G ratings already banned. F ratings banned from March 2024.
- Freezers – G ratings already banned. F ratings banned from March 2024.
- Fridge-Freezers – G ratings already banned. F ratings banned from March 2024.
- Washing Machines – F & G ratings banned from March 2024.
- Washer Dryers – F & G ratings banned from March 2024.
- Dishwashers – F & G ratings banned from March 2024.

Information on the EU Energy Efficiency Labelling Scheme of efficient white goods will be provided to the white goods supplied by the developer.

5 ‘Be Clean’ – Heating Infrastructure

This section outlines the feasibility of clean energy supply to the Proposed Development as required by the ‘Be Clean’ stage of the Energy Hierarchy.

This section provides justification to why relevant technologies, and systems have been excluded, and summarises the feasibly study carried out by the design team.

5.1 District Heating, and Cooling Networks

The feasibility of connecting the Proposed Development to a district heating (DH) network has been assessed, referring to the London Heat Map (refer to www.londonheatmap.org.uk).

The following image is an extract from the London Heat Map website. The development site is outlined in black; all potential heat supply sites are marked as follows: proposed heat networks in orange.

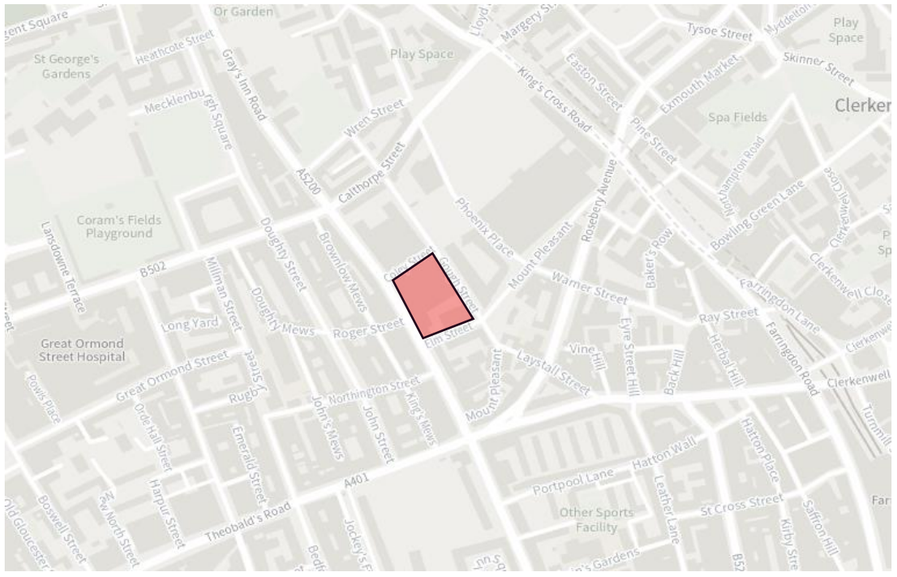


Figure 5-1 Potential heat supply sites at the Proposed Development

Following the research, there are no existing or proposed heat networks for the Proposed Development to connect to in the present or future. The closest is a proposed heat network, however the distance between the network and the Proposed Development is too great.

5.2 Combined Heat, and Power (CHP)

CHP units consume gas in an internal combustion engine or other prime movers (e.g., fuel cell or sterling engine) to provide heat, and electricity. A total of 45% to 55% of the energy value of gas is converted into heat, mainly in the form of hot water for space, and hot water heating. Between 30 to 35% of the energy value is converted to electricity, with the remaining 10 to 25% lost as flue gases.

In the absence of the ability to connect to a district heating network, onsite high-efficiency CHP units will not be proposed on the site to serve the base space heating, and hot water demand with no backup boiler installed.

In addition, regardless of the DH connection, the following reasons supported the design team decision to exclude the CHP technology

1. The building is with office, and amenity areas with low space heating, and DHW demand, and stable cooling load, which increase the opportunity of waste heat recovery through HVRF system.
2. The decarbonized grid will make the onside generation more carbon-intensive process.
3. The need to reduce the carbon, and NOx emissions from the CHP, and boiler operation in this area.
4. Exporting electricity to the grid will not be an economically viable solution from the Proposed Development

5.3 Be Clean – Reduction on Carbon Emissions

The clean emissions are equal to the lean stage figures for this building due to the arguments discussed above.

6 ‘Be Green’ – Renewable Energy

Further energy, and carbon dioxide emissions savings could, in principle, be made through the adoption of renewable technologies. This section provides an appraisal of the renewable energy technologies suitable for the Proposed Development as part of the ‘Be Green’ stage of the Energy Hierarchy.

The suitability of available technologies is sensitive to several factors, including site constraints, development footprint, surrounding environment, access limitations, and development type.

To this end, the following renewable energy technologies have been investigated to establish their suitability and feasibility.

6.1 Consideration of Low, and Zero Carbon Technologies

Due to the relatively small footprint of the building the following renewable technologies were considered but found unsuitable: Wind Turbines, Solar Hot Water, Ground Source Heat Pumps, Aquifer Heat Pumps, Hybrid Variable Refrigerant Flow (HVRF), Gas Powered Fuel Cells.

There is not enough free space to allow for the installation of photovoltaics, thus the maximum number of possible photovoltaics would be limited. The energy produced by photovoltaics would be minimal, therefore installation of PV panels is not considered for the base build.

6.1.1 Air Source Heat Pumps (ASHP)

Air Source Heat Pumps systems are typically all-electric systems that use heat pumps to provide space heating and cooling to building spaces. They can serve multiple zones in a building, each with different heating, and cooling requirements by simultaneously providing low temperature hot water (LTHW) and chilled water (CHW) to be distributed on demand. When these units are used to provide space heating, air-source heat pumps (ASHP) work similarly to a fridge, but in reverse. It extracts heat from the outside air in the same way that a fridge extracts heat from its inside. The heat they extract from the air is constantly being naturally renewed. According to the GLA Energy Assessment Guide, the space heating provided via ASHP should be considered as a renewable heat source and included in the ‘Green’ carbon emission.

Air Source Heat Pumps are therefore considered suitable for this development for its low carbon properties and renewable heat source.

6.2 Be Green – Reduction on Carbon Emissions

6.2.1 SAP 10.2 – Part L 2021

The ‘Green’ measures combined with the Be Lean approach described reduce the regulated carbon dioxide emissions of the commercial areas by **10%** hence the cumulative savings on

Table 6-1 Site-Wide Regulated Operational Carbon Dioxide Emissions, and Savings

	Total Regulated Emissions (Tonnes CO_2/year)	Percentage Savings (%)	CO_2 Savings (Tonnes CO_2/year)
Part L 2021 baseline	1.5	-	-
Cumulative on-site Savings	1.3	10%	0.1

7 Energy Strategy

A dedicated 4 pipe air source heat pump with circulation pumps included is to be provided to serve underfloor air handling units and the trench heating and cooling along the façade. This strategy allows the multifunction space to operate independently from the rest of the building and allows for this to be an all-electric scheme to make use of future decarbonisation of the national grid.

Occupant controlled natural ventilation is proposed that operates on a traffic light system so occupants are able to understand when these can be opened, and it will be beneficial in order to reduce energy use. Operation of these will automatically shut off the plant that is local to the opening to reduce energy usage.

Air handling units are to be located under the floor within the multifunction space and will provide fresh air via a displacement system. These make use of plate heat exchangers to utilise the thermal properties of the return air to transfer 'free' heat/cooling to the incoming fresh air supply. These will be controlled to minimise the demand for any heating, and cooling of the fresh air supply.

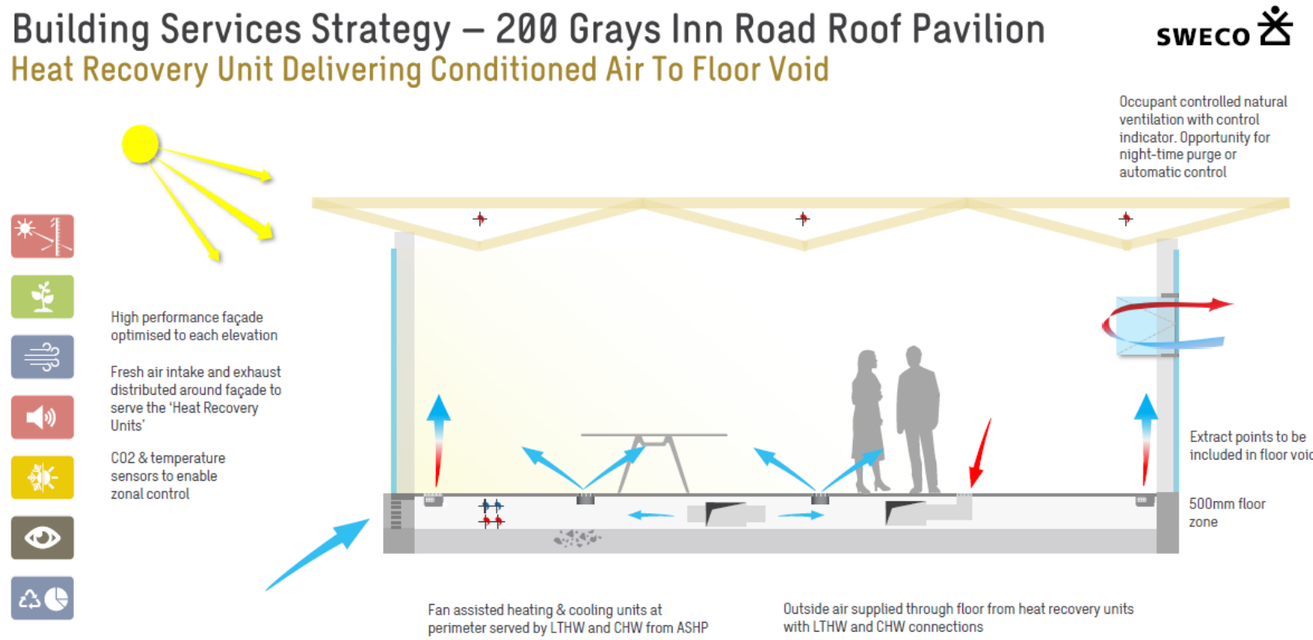


Figure 7-1 Energy Strategy Diagram

8 Conclusions

This report has been prepared on behalf of Great Ropemaker Partnership (G.P) Limited (the "Applicant") to support a planning application for the proposed development at **200 Gray's Inn Road** (the "Proposed Development"). The Proposed Development comprises refurbished building in the London Borough of Camden.

Following the energy and carbon evaluation, it is proposed that extensive energy efficiency measures along with low, and zero carbon (LZC) strategies are incorporated into the design for the Proposed Development. As demonstrated in detail in this assessment, energy, and carbon emissions calculations have confirmed that the proposed energy efficiency design, and LZC applications will achieve:

As demonstrated in detail in this assessment, energy and carbon emissions calculations have confirmed that the proposed energy efficiency design and LZC applications will achieve:

- **Regulated carbon dioxide savings of 10% relative to a New-Build Part L 2021 at Be Green stage;**
- **All-electrical development by removing the gas-fired boilers and CHP onsite to eliminate the NOx emissions and improve the air quality, which aims towards the development being true net zero carbon;**

In support of the above key sustainability metrics and overall project approach, several core sustainability 'themes' have been established for the Proposed Development, around which a set of targets and methodological requirements have been set. These themes are those that are expected to drive sustainable development in Camden.

Appendix A – Part L BRUKL Reports

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

200 Grays Inn Road

As designed

Date: Wed Feb 22 15:08:52 2023

Administrative information

Building Details

Address: London,

Certifier details

Name: Kartik Amrania

Telephone number:

Address: 1 Bath Road, Maidenhead, SL6 4AQ, Maidenhead, SL6 4AQ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.18

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.18

BRUKL compliance module version: v6.1.d.0

Foundation area [m²]: 225.88

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	4.16	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	3.84	
Target primary energy rate (TPER), kWh/m^2.annum	44.38	
Building primary energy rate (BPER), kWh/m^2.annum	41.19	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.18	0.18	20000000:Surf[1]
Floors	0.18	-	-	UNKNOWN
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.15	0.15	20000000:Surf[0]
Windows** and roof windows	1.6	1.21	1.21	20000005:Surf[1]
Rooflights***	2.2	-	-	No roof lights in building
Personnel doors^	1.6	1.2	1.2	20000005:Surf[6]
Vehicle access & similar large doors	1.3	-	-	No vehicle access doors in building
High usage entrance doors	3	-	-	No high usage entrance doors in building

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

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

* 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. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building
$m^3/(h.m^2)$ at 50 Pa	8	3

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	YES
Whole building electric power factor achieved by power factor correction	<0.9

1- 1- Multi Function Room / Lobby AHU-FCU-cooling

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4	4.63	0	1.25	0.87
Standard value	2.5*	N/A	N/A	2^	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

^ Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

2- 2-Extract only_elec rad_WC

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.08	-	0.2	-	0.87
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

"No HWS in project, or hot water is provided by HVAC system"

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
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 balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

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	2.3	2	0.5	0.5	0.4	1	Zone	Standard
200GI_P_MULTI FUNCTION ROOM	-	-	-	-	-	-	-	0.2	-	-	N/A
200GI_P_SUPERLOO	-	-	-	1	-	-	-	-	-	-	N/A
200GI_P_SUPERLOO-1	-	-	-	1	-	-	-	-	-	-	N/A
200GI_P_WC	-	-	-	1	-	-	-	-	-	-	N/A
200GI_P_LOBBY	-	-	-	-	-	-	-	0.2	-	-	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m^2]
Standard value	95	80	0.3
200GI_P_STAIRS	120	-	-

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
200GI_P_CIRC	120	-	-
200GI_P_MULTI FUNCTION ROOM	174	-	-
200GI_P_CIRC-1	120	-	-
200GI_P_SUPERLOO	120	-	-
200GI_P_SUPERLOO-1	120	-	-
200GI_P_PLANT	120	-	-
200GI_P_STORE	120	-	-
200GI_P_WC	120	-	-
200GI_P_LOBBY	106	35	3.857
200GI_P_CIRC-3	120	-	-
200GI_P_CIRC-4	120	-	-
S	120	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
200GI_P_MULTI FUNCTION ROOM	NO (-10.1%)	NO
200GI_P_LOBBY	NO (-7.8%)	NO

Regulation 25A: Consideration of high efficiency 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?	YES

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	354.7	354.7
External area [m²]	1222.1	1222.1
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	655.6	528.91
Average U-value [W/m²K]	0.54	0.43
Alpha value* [%]	3.05	10

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

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
100	**Offices and Workshop Businesses**
	General Industrial and Special Industrial Groups
	Storage or Distribution
	Hotels
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
	Residential Institutions: Universities and Colleges
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	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	9.14	9.41
Cooling	3.38	1.68
Auxiliary	5.78	6.63
Lighting	7.48	10.9
Hot water	1.23	1.11
Equipment*	28.24	28.24
TOTAL**	**27**	**29.72**

* Energy used by equipment does not count towards the total for consumption or 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
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	188.23	122.07
Primary energy [kWh/m²]	41.19	44.38
Total emissions [kg/m²]	3.84	4.16

HVAC Systems Performance

System Type		Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	195.6	97.1	13.6	5.8	9.5	4	4.63	4	4.63
	Notional	132.9	48.2	13.3	2.9	11.2	2.78	4.63	----	----
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	439.4	0	29.9	0	6.7	4.08	0	4.08	0
	Notional	404.7	0	40.5	0	3.6	2.78	0	----	----
[ST] No Heating or Cooling										
	Actual	0	0	0	0	0	0	0	0	0
	Notional	0	0	0	0	0	0	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

Appendix B – GLA Carbon Emission Spreadsheet

Part L 2021 Performance

Residential

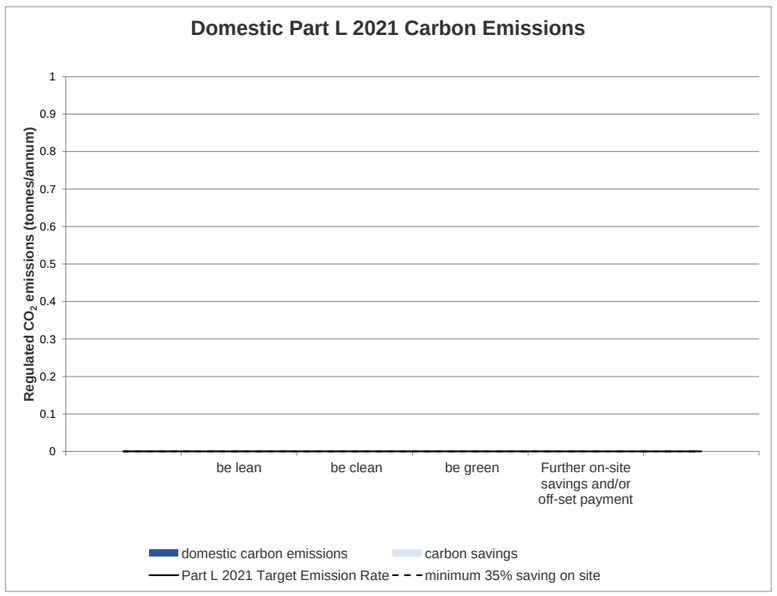
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	Carbon Dioxide Emissions for residential buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	0.0	
After energy demand reduction (be lean)	0.0	
After heat network connection (be clean)	0.0	
After renewable energy (be green)	0.0	

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential buildings

	Regulated residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Cumulative on site savings	**0.0**	**0%**
Annual savings from off-set payment	0.0	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**0**	-
Cash in-lieu contribution (£)	**0**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab



Non-residential

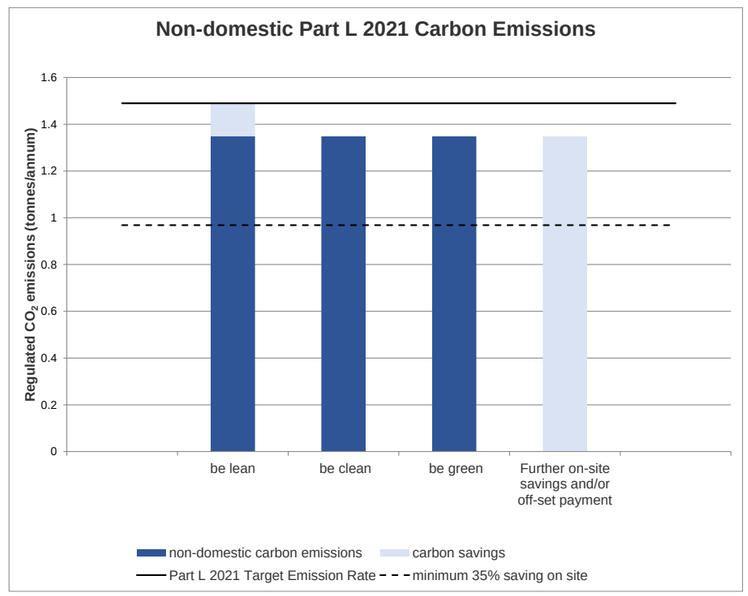
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	1.5	1.4
After energy demand reduction (be lean)	1.3	1.1
After heat network connection (be clean)	1.3	1.1
After renewable energy (be green)	1.3	1.1

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	0.1	10%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Total Cumulative Savings	**0.1**	**10%**
Annual savings from off-set payment	1.3	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**40**	-
Cash in-lieu contribution (£)	**3,841**	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the 'Development Information' tab



SITE-WIDE

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2021 baseline	1.5		
Be lean	1.3	0.1	10%
Be clean	1.3	0.0	0%
Be green	1.3	0.0	0%
Total Savings	-	0.1	10%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**40.4**	-

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	0.00	0.00	

	Area weighted non-residential cooling demand (MJ/m^2)	Total non-residential cooling demand (MJ/year)
Actual		
Notional		

EUI & space heating demand (predicted energy use)

Residential

Building type	EUI (kWh/m^2/year) (excluding renewable energy)	Space heating demand (kWh/m^2/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m^2/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m^2/year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)

Non-residential

Building type	EUI (kWh/m^2/year) (excluding renewable energy)	Space heating demand (kWh/m^2/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m^2/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m^2/year) (excluding renewable energy)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)