SWECO

Energy & Sustainability Strategy

The Courtyard Building

Planning Application

October 2024

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Revisions & Author Details

Revision no.	Date	Author	Checked/Approved By	Date Approved
FOR ISSUE	25/10/2024	Matthew Mapp / Monika Potomska	Matthew Mapp	25/10/2024

1. Executive Summary

1.1 Energy & Sustainability Summary

This Energy & Sustainability Strategy has been prepared on behalf of Knighton Estates Limited (the 'Applicant') by Sweco UK for the refurbishment and extension of The Courtyard Building, 1 Alfred Place, WC1E 7EB (the Proposed Development) in the London Borough of Camden (LBC). The development is described as follows:

"Refurbishment and extension of the building to provide commercial, business and service use (Class E) including infill extension, roof extension and replacement facades to Alfred Place, reconfiguration of entrances and servicing arrangements, rooftop plant equipment, PV panels, new landscaping, provision of cycle parking and other ancillary works."

The Proposed Development will need to conform to the requirements set out in Approved Document **Part L Volume 2 (Conservation of Fuel, and Power) of the Building Regulations 2021**, and thus submit an energy assessment for the purposes of the planning application. 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).

Following the energy and carbon evaluation, it is proposed that practical energy efficiency measures along with low, and zero carbon (LZC) applications are incorporated into the design for the Proposed Development. These measures are undertaken in the context of the need to retain the heritage value of the existing building, particularly the street-facing facades, balanced against an intent to improve operational energy performance. The Sustainability Statement in Section 11 provides details of the overall sustainability strategy for the Proposed Development and the key features to support LBC policy requirements. The overall Energy & Sustainability Strategy achieves or aspires to achieve the following:

Currently Achieved (Application Stage)

- Building Regulations Part L 2021 site-wide carbon emissions reductions of **29%** at 'Be Green' stage of the Energy Hierarchy.
- Building Regulations Part L 2021 site-wide carbon emissions reductions of **22%** at 'Be Lean' stage of the Energy Hierarchy.
- **73%** (by volume) of existing structure retained, and **69%** of façade retained (by façade surface area) or 60.4% by mass.
- A baseline upfront embodied carbon of **619 kgCO_2e/m² GIA A1-A5** (split as 536 kgCO_2e/m² GIA A1-A5 for base build and 83 kgCO_2e/m² GIA A1-A5 for Cat A installations), with reported values including early-stage contingency of +62 kgCO_2e/m² GIA A1-A5 (reported within stated value).
- **967 m² of blue roof**, with combined areas of blue and green roof systems, achieving a reduction in the total surface runoff rate from the existing site of **92.4%**.
- **100% electric HVAC** building services solution with **all refrigerant GWP <700** and **utilising PV installation** at roof level.
- Base-build operational Energy Use Intensity (EUI) of **68.9 kWh/m²/year (NIA)** and whole-building EUI of 151.2 kWh/m²/year (NIA).
- Extensive and intensive green roof systems resulting in a Biodiversity Net Gain (BNG) expected to be **well in excess of 10%.** Please refer to Section 11.4 of the DAS for the Urban Greening Factor (UGF result).
- Target of **BREEAM Excellent** with a current target score of **79.97%.**
- **Greywater harvesting systems** included within the design.
- **Significant improvements to sustainable transport facilities** with cycle spaces and showers meeting current policy.

Aspirational Targets (to be verified by future information)

- Aspirational Upfront Embodied Carbon target at Practical Completion of >475 kgCO_2e/m² GIA A1-A5.
- Target 98% diversion from landfill for demolition and construction waste.
- Target 20% of new materials with high recycled content.
- Deploy and maintain targets and methodology within Construction Management Plan.
- Explore opportunities for reuse of demolition materials.
- Review opportunities to improve operational Energy Use Intensity (EUI)

The energy assessment has been carried out using the adopted methodology outlined in the "Energy Planning: Greater London Authority (GLA) guidance on preparing energy assessments" June 2022 and "The London Plan (2021)". 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 concept of applying the Energy Hierarchy in relation to Part L 2021 of the Building Regulations is demonstrated in this report. The combination of contextual and practical passive design measures (informed by survey, investigation and consultation), energy-efficient plant selection, and the heat-pump-led design result in an overall annual carbon reduction of **29%** relative to the current 2021 Part L2 target emission rate (TER) for the building, based on the overall site-wide calculation.

The results align with the GLA's released cover note (15th June 2022) regarding the recent update to Part L, in which they have acknowledged the increased difficulty with achieving the improvement targets.

"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."

GLA expects the performance against Part L 2021 to improve over time to enable developments achieve the energy efficiency targets and the minimum 35% on-site improvement with continuously improving technology and as costs come down. It was also positioned that these benchmarks may be updated in the future, but designers should continue to maximise on-site carbon reductions as far as possible.

LBC policy has been referenced throughout, with particular attention to the Camden Local Plan (2017) and the Energy Efficiency & Adaptability CPG (2021); Section 3.5 provides guidance on how the relevant sections of this document comply with policy.

1.2 Non-Domestic Operational CO_2 Emissions

The following tables demonstrate compliance with the energy hierarchy, and the carbon targets proposed by the GLA. The commercial areas within the Proposed Development, namely office, retail, back of the house, 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 below are matching the BRUKL outputs enclosed in **Appendix A.**

In accordance with the Energy Efficiency & Adaptability CPG (2021), chapter 6: the retained areas and extension areas were assessed separately. Appendix 2 of the CPG states that developments that combine refurbished existing spaces with new construction, including extensions, should adhere to the guidelines outlined in the GLAs Guide to Preparing Energy Assessments.

Therefore, the retained areas were evaluated based on the notional specifications outlined in Appendix 3 as detailed in the GLA's Energy Assessment Guidance for existing buildings. On the other hand, the extension areas were assessed using the notional modelling guidance for new built spaces under Part L 2021. The combined results are then presented as site-wide.

Part L2 2021 (SAP 10.2) – Site Wide

Table 1.2.1: reported CO_2 emissions for the Proposed Development after each stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Site Wide	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)		
	Regulated Energy	Total CO_2 Reductions	Regulated Energy % Reduction
Building Regulations 2021 Part L Compliant Development	61.0	-	-
LEAN - After energy demand reduction	47.3	13.7	22%
CLEAN – After Clean Technology	47.3	0.0	0%
GREEN - After Renewable Energy	43.4	3.9	6%

Table 1.2.2: regulated CO_2 emissions savings for the Proposed Development from each stage of the Energy Hierarchy for Non-Domestic Buildings.

Non-domestic areas (Part L 2021) – Site Wide	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	(%)
Savings from reduced energy demand	13.7	22%
Savings from Clean Technology	0.0	0%
Savings from renewable energy	3.9	6%
Total Cumulative Savings	17.6	29%
Total Target Savings - GLA's Target	61.0	100%

Part L2 2021 (SAP 10.2) – Existing/Retained

Table 1.2.3: reported CO_2 emissions for the Proposed Development after each stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Existing/Retained	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)		
	Regulated Energy	Total CO_2 Reductions	Regulated Energy % Reduction
Building Regulations 2021 Part L Compliant Development	58.6	-	-
LEAN - After energy demand reduction	45.1	13.5	23%
CLEAN – After Clean Technology	45.1	0.0	0%
GREEN - After Renewable Energy	41.3	3.8	6%

Table 1.2.4: regulated CO_2 emissions savings for the Proposed Development from each stage of the Energy Hierarchy for Non-Domestic Buildings.

Non-domestic areas (Part L 2021) – Existing/Retained	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	(%)
Savings from reduced energy demand	13.5	23%
Savings from Clean Technology	0.0	0%
Savings from renewable energy	3.8	6%
Total Cumulative Savings	17.3	29%
Total Target Savings - GLA's Target	58.6	100%

Part L2 2021 (SAP 10.2) – Extension (new-built)

Table 1.2.5: reported CO_2 emissions for the Proposed Development after each stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Extension (new-built)	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)		
	Regulated Energy	Total CO_2 Reductions	Regulated Energy % Reduction
Building Regulations 2021 Part L Compliant Development	2.4	-	-
LEAN - After energy demand reduction	2.2	0.10	6%
CLEAN – After Clean Technology	2.2	0.00	0%
GREEN - After Renewable Energy	2.1	0.10	5%

Table 1.2.6: regulated CO_2 emissions savings for the Proposed Development from each stage of the Energy Hierarchy for Non-Domestic Buildings.

Non-domestic areas (Part L 2021) – Extension (new-built)	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	(%)
Savings from reduced energy demand	0.1	6%
Savings from Clean Technology	0.0	0%
Savings from renewable energy	0.1	5%
Total Cumulative Savings	0.3	11%
Total Target Savings - GLA's Target	2.4	100%

1.3 Carbon Offsetting

Along with the Part L 2021 release, an updated GLA Energy Assessment Guidance was issued in June 2022. This requires results to be reported using the SAP10.2 carbon factors, which considers further decarbonisation of the grid from the SAP10 factors previously used in conjunction with Part L 2013. Thus, SAP10.2 provides a more realistic carbon emissions estimation.

The carbon offset payment of the shortfall in regulated carbon emissions is outlined in this section as per SAP 10.2 Carbon factors for:

Non-domestic areas to achieve net zero for regulated carbon emissions.

Table 1.3.1 Shortfall in regulated Carbon dioxide savings - SAP 10.2 (Cash in-lieu contribution)

	Annual Shortfall Tonnes CO2 (Regulated)	Off-set Payment per tonnes for 30 years CO2 Emissions	Total Offset payment for Tonnes CO2 Emissions (Regulated)
Shortfall	43.40	£2,850	£123,690

The carbon charge has been calculated as per The London Plan (2021) as well as LBC's CPG (Chapter 7) which aligns the price per tonne with the GLA's pricing strategy: rate of £95 per tonne of CO2 per year (or £2,850 over a period of 30 years (95 x 30 years)).

For more details, refer to the GLA spreadsheet summary in Appendix B.

2. Introduction

2.1. Purpose Statement

This report describes the various options for energy, and carbon reduction, and contains a sustainability strategy for The Courtyard Building, 1 Alfred Place, WC1E 7EB (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 at the time of application. 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

The description of the development is provided as follows:

Refurbishment and extension of the building to provide commercial, business and service use (Class E) including infill extension, roof extension and replacement facades to Alfred Place, reconfiguration of entrances and servicing arrangements, rooftop plant equipment, PV panels, new landscaping, provision of cycle parking and other ancillary works.

The Applicant' design brief aims to view the site holistically, preserving, repairing, and renewing the elements of the site with heritage significance to ensure their future. The design aims to enhance the character of the local area. Sustainable design interventions, as set out within this document, are key to creating an office space suitable for the 21st century that is attractive, resilient, and cares for the wellbeing of its occupants. These design aims will provide a modern, commercial building that takes advantage of the site's proximity to key transport interchanges, to deliver floorspace that is flexible, sustainable and futureproof.

The key scheme proposals are to:

- Join the two buildings on the site in a more sensitive manner than the existing glass extension installed in 1999. The infill section will form a more engaging entrance to the office that will enhance the character of the area.
- Resolve a number of access issues by rebuilding the slab in one section of 3-7 Alfred Place to simplify the levels.
- Retain and repair the existing building fabric, sensitively improving the existing façade where possible to manage the balance between retained heritage and improved energy performance.
- Improve street frontage to better engage with the surrounding context and contribute to the area.
- Provide new End of Journey that supports workers in cycling/running to work.
- Place more emphasis on the existing heritage value of the cupola by raising it to be visible at street level.
- Rebuild areas of the roof in poor condition, providing opportunities for amenities, urban greening, and consolidation of plant to improve street views.
- Create additional roof massing surrounding the cupola to draw attention to it and to reflect diversity in form and material at this level.
- Sustainable Design and Biodiversity improvements of enhancement to building and amenity offer.

For the purposes of this report, and for understanding the complexities of the site, its interventions and the sustainability & energy performance achieved and proposed, it is important to understand the extent of demolition, retention and intervention/new installations within the Proposed Development. The headline of this are:

- 73% (by volume) of the existing structure is retained insitu and reused.
- 69% of the existing facades (by façade surface area) are retained and sensitively upgraded where possible within constraints of existing structure.

The Condition & Feasibility Study includes further detail on the existing building and the reasoning for specific interventions, and is included in Appendix D.

The following tables summarise the demolition, retention and interventions to create the Proposed Development, and need to be considered throughout this report when appraising the energy and sustainability performance and targets.

Table 2.2.1: table to describe, floor-by-floor, the extent of demolition and retention of the existing building to facilitate the Proposed Development (refer also to the EMRYS demolition drawing pack included in the wider application documentation).

Building Level	Demolition & Retention Extent
Basement	Minor slab demolition to support slab lowering and lift pit for revised lift locations. Demolition of stairs and lift walls to facilitate layout changes & core changes within the new building. Block and partition walls demolished to facilitate new basement layout and spatial arrangement. Majority of existing basement slab, boundary walls and foundations retained insitu.
Ground Floor	1999 glass extension along Alfred Place demolished (all structure and associated facades, walls, etc.) Cores, stairs and lift shafts demolished. Internal blockwork and partition walls demolished. Existing external windows and doors removed.

	Majority of slab retained insitu. Solid elements of external façade system retained and upgraded.
Level 1	1999 glass extension along Alfred Place demolished (all structure and associated facades, walls, etc.) Demolition of small section of slab adjacent to party wall (c.30 m2) North core & stairs demolished. Walls & windows to courtyard demolished. Majority of existing slab retained. External walls & windows retained.
Level 2	As per L01, except Walls & windows to courtyard retained.
Level 3	As per L02
Level 4	As per L01, except only the building along Alfred Place remains at L04 in the existing building.
Roof	Full demolition of roof, except for building along Alfred Place.

Table 2.2.2: table to describe the elemental interventions for the Proposed Development (see also the WLCA report in Appendix E).

Building Element	Key Interventions & Information
Structure	73% (by volume) of the existing floor slabs are retained. New steel frame and composite metal deck infills where the 1999 extension is removed to connect the buildings. New steel frame & composite metal deck construction to extensions & roof. New cores & circulation.
Roof	New roof to majority of building. Stepped terraces with blue/green roof systems to L04, high thermal performance and accessibility for building occupants and maintenance. New roof at L05 for plant equipment with plant screening.
Stairs	The existing late 20th-century lift/stair is to be removed. The proposal includes improved vertical circulation to ensure a more accessible environment.
Facades & External Doors	**Street-level shopfronts:** upgraded façade with new glazing. **Levels 01-03 (generally):** retained historic facades with internal calcium silicate insulation and existing glazing retention. Additional secondary glazing at L01 due to extent of glazing at these levels. **Internal courtyard:** some glazing replacement at L01, other elevations and levels solid and glazed elements retained. **Level 04:** new façade systems for extension elements, high-performance systems, except for retained façade along Alfred Place in north corner which is as per L01-03 generally). **1-3 Alfred Place:** new façade from GF-L03 where existing 1999 glass box extension is being demolished and infilled.
	Roof level: new plant screens at roof level and cupola along Tottenham Court Road elevation.
Internal Walls & Doors	New internal walls throughout. New doors throughout.
Finishes & FF&E	Strip out of all finishes and fittings. 100% new finishes and fittings, the extent of this is still to be determined.
Building Services	New building services systems throughout. 100% electric HVAC systems employed.
External Works	Limited works to public realm within the site boundary.

The key summary areas for existing building and Proposed Development are set out below in Table 2.2.3.

Table 2.2.3: areas for the existing building and Proposed Development.

	Existing	Proposed	Change
Gross Internal Area (m^2)	7,336	8,324	+988

The total uplift in GIA is 988 m^2 GIA. It is important to note that these area uplifts are not just made up of extension at L04, but also from infills (particularly to areas where the 1999 glass extension have been demolished). Even at L04, only part of the building is extension, with the existing building along Alfred Place in the north corner retained (structure & façade). It is important not to see the Proposed Development extensions as a simple '1 full additional floor on top', but as a more complex 'cut and carve', with areas of extension and infill creating a significant proportion of the additional area uplift demonstrated above.

2.3. Site & Application Boundary

The site fronts Tottenham Court Road, Store Street and Alfred Place. It is located within the Bloomsbury Ward within the London Borough of Camden. The site is also located within the Central London Area, Bloomsbury Conservation Area and Camden's Knowledge Quarter.

Both buildings on the site were built around 1908 during a redevelopment of the adjoining block designed by architects Read & MacDonald. The 3 and 4 storey structures were both designed to have the collaborative function of retail and manufacturing. The gap between them in elevation on Alfred Place is currently used as an access courtyard spanned by the 90s extension that connects the two.

The Site has an excellent Public Transport Accessibility Level ('PTAL') with the highest rating of PTAL 6b. There are multiple underground stations within walking distance. Goodge Street, Tottenham Court Road, Warren Street and Euston Square give the site access to the rest of London on the Northern Line, Central Line, Elizabeth Line, Victoria Line, Metropolitan, Hammersmith & City Line and Circle Line.

Tottenham Court Road provides a vital transport link between the West End and the City of London. Several major bus routes are within walking distance and a number of cycle hire docks exist within 500m of the site.

The overall size of the application plot is 1,770 m^2, and the red line boundary is shown below in Figure 2.3.1. The existing building is not listed but is considered to be a positive contributor to the Bloomsbury Conservation Area, which has informed the decision-making around the existing facades in particular.

Figure 2.3.1: planning application red line boundary for the Proposed Development.

2.4. Methodology

Sweco UK uses Integrated Environmental Systems' (IES) VE Compliance software to demonstrate Part L2A 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 CIBSE TM33: 'Tests for software accreditation and verification' and ISO 52000-1:2017: 'Energy performance of buildings – Overarching EPB assessment – Part 1: General Framework and procedures'. 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 NCM modelling Guide 2021 (released April 2022).
- The software calculates an Emissions Rate for the Notional building, which is the Target Emission Rate (TER) for the actual building.

2.5. 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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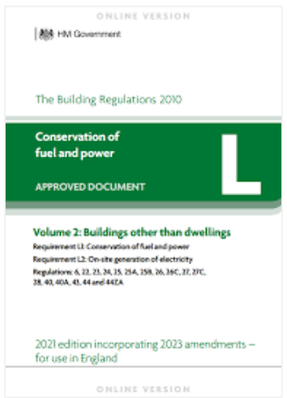
3. Legislation & Planning Policies

3.1. Legislation & Policy Map

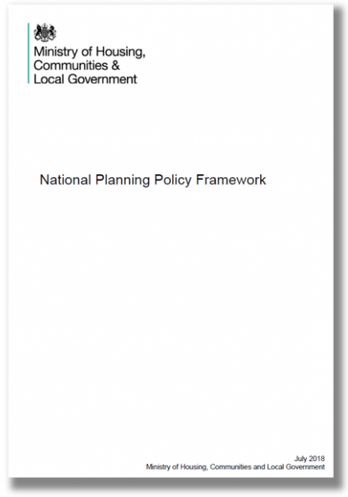
National Legislation

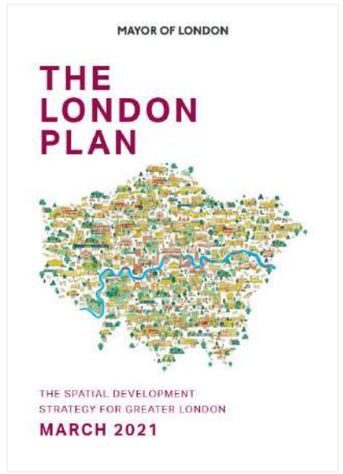
Climate Change Act 2008

Energy Act 2011

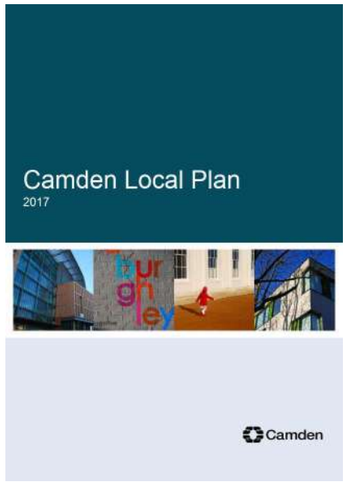


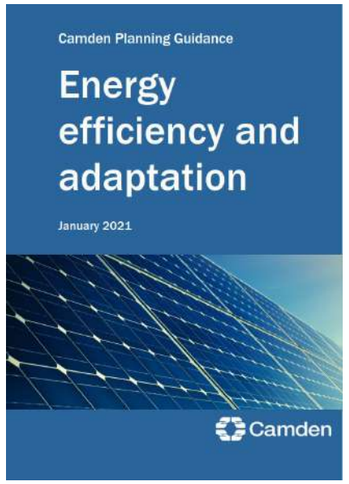
National & Regional Policy





Local Policy





3.2. Legislation

3.2.1. 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.

3.2.2. 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'

3.2.3. Building Regulations Part L

The Proposed Development will be assessed under:

Part L2A 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, as shown Section 4.1 Baseline Carbon Emissions (TER).

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 Table 3.2.3.1.

Grid electricity has significantly decarbonised since the issue of Part L2A 2013, hence SAP10.2 carbon factors have been released with PartL2A 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 3.2.3.1: Fuel Factors 2013 Part L (SAP10) and Part L 2021 (SAP 10.2)

System	Fuel Source	Emission Factor ($KgCO_2/kWh$)	
		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

3.3. National Planning Policy Framework (NPPF)

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:

- 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

- 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:

- 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);

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

- 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:

- 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

- 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:

- 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

- 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.

3.4. Regional Policy

3.4.1. 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 Mayor of London has declared a climate emergency and has set an ambition for London to be net zero-carbon. This means all new buildings must be net zero carbon. The Mayor’s London Plan sets the targets and policies required to achieve this. It includes:

- A net zero-carbon target for all major developments, which has applied to major residential developments since 2016.

- A requirement for all major development to ‘be seen’ i.e., to monitor and report its energy performance post-construction to ensure that the actual carbon performance of the development is aligned with the Mayor’s net zero carbon target.

- A requirement for all referable planning applications to calculate and reduce whole life-cycle carbon emissions to fully capture a development’s carbon impact.

Therefore, the target reduction on CO_2 emissions of the development according to the GLA’s requirements is:

- Zero Carbon for Domestic Areas as compared to a Part L1A Compliant Build.

- Zero Carbon for Non-Domestic Areas as compared to a Part L2A Compliant Build

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 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:

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

As Per London Plan Policy SI 3, developments in Heat Network Priority Areas (HNPAs) (i.e., areas in London where the heat density is sufficient for heat networks to provide a competitive solution for supplying heat to buildings and consumers) should have a communal low-temperature heating system and should select a heat source in accordance with the following heating hierarchy:

1. Connect to local existing or planned heat networks;
2. Use zero-emission or local secondary heat sources (in conjunction with heat pump, if required);
3. Use low-emission combined heat and power (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network;
4. Use ultra-low NOx gas boilers.

The table below outlines compliance with the London Plan (2021).

Table 3.4.1.1: Compliance with the London Plan 2021.

London Plan (2021)	Applied measure at the Proposed Development
Policy SI1 Improving Air Quality	Fossil-fuel free development with all-electric energy strategy with a decentralised multiple VRF systems. Refer to Section 10 and Section 11.8.
Policy SI2 Minimising greenhouse gas emissions	**29%** carbon reduction via passive, and energy-efficient design, and use of the decentralised nature of multiple VRF systems which makes the building more efficient in part load operating conditions through more precise load control. Refer to Sections 1.2, 10 and 11.3.
Policy SI3 Energy Infrastructure	Potential to refurbish the services in the future and connect to district energy network Refer to Section 7.2.
Policy S14 Managing Heat Risk	Measures adopted to reduce building cooling demand (improved façade performance where possible) and maximise potential for adequate thermal comfort where possible. The development team is looking to maximise the urban greening where possible. Refer to Sections 6, and 11.10.
Policy SI5 Water Infrastructure	Extensive water-saving measures to exceed BREEAM targets such as inclusion of blue roofs to reduce the peak flow of the surface runoff, discharge surface water to an existing sewer network and provision of green roofs to reduce the volume of rainfall discharge. Refer to Section 11.5 and accompanying BREEAM pre-assessment (Appendix C).
Policy SI7 Reducing waste, and supporting the circular economy	Relevant BREEAM credits targeted, life cycle assessment, and early considerations of applying the waste hierarchy through the design through maximising façade retention. 73% (by volume) of the existing structure and 69% of the existing facades (by façade surface area) have been retained. Refer to Sections 5.2.4, 11.7 and accompanying BREEAM pre-assessment (Appendix C) and Whole Life Carbon Analysis (Appendix E).
Policy SI8 Waste capacity, and net waste self-sufficiency	Relevant BREEAM credits targeted. Refer to Section 11.7 and accompanying appendices with BREEAM pre-assessment in Appendix C.

London Plan (2021)	Applied measure at the Proposed Development
Policy SI10 Aggregates	Relevant BREEAM credits targeted, life cycle assessment, and early considerations of applying the waste hierarchy through the design. Refer to Section 11.7, and accompanying BREEAM pre-assessment (Appendix C).
Policy SI12 Flood risk management	Risk of flooding from all sourced considered to be low, site sits within Flood Zone 1. Refer to Section 11.5 and accompanying appendix with BREEAM pre-assessment (Appendix C).

3.4.2. 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.

As summarised in Section 11 of this report, the Proposed Development will positively contribute to achieving the objectives set out by the London Environment Strategy.

3.5. Local Policies - Camden

The London Borough of Camden (LBC) take a strong stance on sustainability and have had a number of forward-thinking policies related to this subject in place for a number of years. The are two key adopted planning policy documents from LBC that have been referred to for sustainability requirements throughout the Energy & Sustainability Strategy. These are:

- Camden Local Plan (2017)
- Energy Efficiency & Adaptation CPG (January 2021), which supports compliance with policies CC1 and CC2 of the Camden Local Plan (2017)

These documents form the basis of the content of the Energy & Sustainability Strategy and are referred to directly in various sections of the report. A summary of the policy headlines and requirements from each document can be found in Tables 3.5.1 and 3.5.2 below.

Table 3.5.1: summary of the key energy & sustainability policies found within the Camden Local Plan (2017) and where evidence of compliance with these policies can be found within this report.

Policy Reference	Policy Intent/Requirements	Where compliance can be found in this report
CC1	Promote Zero-Carbon development Energy hierarchy Sustainable transport Energy improvements for existing buildings Optimise resource efficiency Review Whole Life Carbon Decentralised energy networks	Refer to Sections 1.1, 5.2, 7.2, 10 and Section 11.8.
CC2	Green spaces & infrastructure Managing surface water runoff (SuDS) Green & blue roof systems Managing overheating & cooling Requirement for a Sustainability Statement Future Adaptation BREEAM 'Excellent'	Refer to Sections 6, 11.10, 11.5 and the accompanying BREEAM pre-assessment tracker.
CC3	Water efficiency measures Flood risk & flood resilience measures Drainage & SuDS	Refer to Section 11.5 and the accompanying BREEAM pre-assessment tracker.
CC4	Air Quality Assessments (AQA) Construction Management Plan (CMP)	Refer to Section 11.8 and the accompanying BREEAM pre-assessment tracker.
CC5	Reducing waste Operational waste facilities Circular economy principles & recycling	Refer to Section 11.7 and the accompanying BREEAM pre-assessment tracker.
A3	Improve site biodiversity and urban greening Protect existing trees & vegetation of value	Refer to Section 11.10 and the accompanying BREEAM pre-assessment tracker.
D1	High quality design Sustainable in design & construction	Refer to Sections 6, 10, 11.7, 11.9 and 11.10.

	Sustainable & durable construction High quality materials Promotes health Opportunities for greening & biodiversity enhancements Incorporates outdoor amenity space Carefully integrates building services	

Table 3.5.2: summary of the key energy & sustainability guidance found within the Camden Energy Efficiency & Adaptability CPG (EEA CPG) and where evidence of compliance with these policies can be found within this report.

CPG Chapter Reference	Policy Intent/Requirements	Where compliance can be found in this report
2	**Energy Hierarchy** Submit an energy statement Follow the Mayor's Energy Hierarchy	Refer to Sections 1.1 and 1.2.
3	**'Be Lean' stage of Energy Hierarchy** Passive Design measures Daylight & sunlight Overheating Natural ventilation opportunities Thermal performance HVAC systems efficiency	Refer to Section 5.
4	**Decentralised energy** Review of opportunities to connect to district heat networks and identifying heat network priority areas	Refer to Sections 7.2 and 10.
5	**Renewable energy technologies** Consider feasibility of on-site energy generation Target a 20% reduction in CO_2 emissions from on-site renewable energy generation Specific requirements for PV panels Specific requirements for ASHPs	Refer to Sections 8.2 and 8.3.
6	**Energy Statements** Requirements for how to produce and report within Energy Statements/Strategies	Refer to Sections 1.1 and 4.1.
7	**Energy Reduction** New Build and deep refurbishments to achieve London Plan targets (35% reduction against extant Part L version) Refurbishment to achieve 'greatest possible reduction' against Part L2B Carbon offsetting	Refer to Section 1.1 – 1.3.
8	**Energy Efficiency in Existing Buildings** Demonstrate how sustainable design principles have been implemented Sensitive improvements to be made Application of renewables	Refer to Sections 5.3 and 8.2.
9	**Reuse & Resource Efficiency** Condition & Feasibility Studies Development options for reuse Whole life carbon assessments Circular economy & waste	Refer to Sections 11.6, 11.7 and the Condition & Feasibility Study, which is issued within the wider application documentation.
10	**Sustainable Design & Construction** Provide a sustainability statement Overheating & Cooling Hierarchy Passive design review Review of paragraph 10.30 measures	Refer to Sections 5.2, 6, 11 – Sustainability Statement.
11	**Sustainable Assessment Tools** Achieve BREEAM 'Excellent' Achieve 60% of energy and water credits Achieve 40% of materials credits	Targeting Excellent with a score of 79.97% for the Office **Energy:** 66.6% of the credits are targeted for the Office **Water:** 77.7% of the credits are targeted for the Office **Materials:** 84.6% of the credits are targeted for the Office

The EEA CPG includes a number of tables and guidance proformas for reporting within Energy and Sustainability Statements. Where relevant, these formats have been applied within this document to ensure consistency of review and data provision.

In addition to the adopted policy documents, the Applicant is also aware that a Regulation 18 Draft (Consultation Version) of the New Camden Local Plan (January 2024) has been published and is available for review from Camden's website. The draft forms up some of the key policy positions and commitments from the 2017 Local Plan and EEA CPG, with a clear message of intent on sustainability. While re recognise that this is a consultation draft at the time of submission and thus carries limited weight, we have still reviewed draft policy to explore how the proposals may align with the intent of this document. Key policies include:

- Specific advice on demolition and expectation of any approach to justify (CC1, CC2)
- Policy introduction specific to circular economy (CC3)
- Introduction of minimum expectation for upfront embodied carbon (CC4)
- Clear and detailed expectation for operational energy reduction for refurbished and new buildings, shifting focus to EUI targets (CC5 & 6)
- Specific policy for overheating (CC8)
- Specific policies related to urban greening and biodiversity (NE1 & 2)

4. Baseline Carbon Emissions

4.1. Baseline Target Emissions Rate (TER)

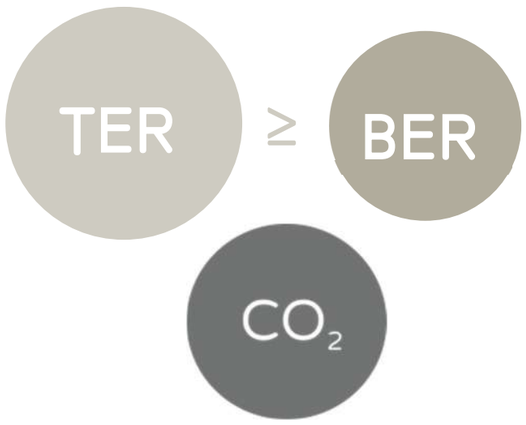
The 'baseline' building represents a development which just meets the minimum standards of CO_2 emissions reduction (i.e., for new-built buildings (including extensions) the Building Emissions Rate (BER) is equal to or lower than the Target Emissions Rate (TER), as defined by Part L of the Building Regulations 2021).

The Energy Efficiency & Adaptability CPG (2021), Appendix 2 requires for refurbishments to follow GLA Energy Assessment Guidance for establishing modelling methodology. It defines the methodology for calculating regulated CO_2 baseline emissions for refurbishments. The CO2 baseline emissions are generated by assuming the notional specification for existing buildings (based on Approved Document L2). The BER of the baseline model is then compared against the BER of the proposed development for comparison.

Allowances for energy consumption not included under Part L have been made by reference to published material or by calculation. These include small power (energy use for electrical appliances). The energy breakdown, and carbon dioxide emissions by end-use, and area are shown in Section 1.

As part of the study for the commercial areas of the building, a thermal model of the building was developed, and analysed using the approved IES Virtual Environment (VE) Software (Version 2024 4.0.0). This software models the carbon dioxide emission rates produced by a building in accordance with Part L2 of the Building Regulations (2021).

Unregulated energy use, and the associated carbon dioxide emissions for the non-domestic buildings has been calculated using the BRUKL document (typical output document), and Chartered Institution of Building Services Engineers' (CIBSE) publications for guidance, as well as evidence established through previous development work.



5. Be Lean (Reduce Energy Demand)

5.1. Introduction

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, with optimised glazing ratio for daylighting, and solar gains management during summer, and winter.
- 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; and
- Setting an ambitious energy use intensity target (EUI) for operational energy.

5.2. Passive Design Features – Regulated Energy

5.2.1. Introduction

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, use of natural ventilation and designing out unwanted gains through glazing ratio optimisation, including greenery for stabilising temperature conditions, wherever possible.

5.2.2. Site Location & Microclimate

Higher temperatures can be experienced due to urban heat island impact within a densely populated environment. Potential issues of sunlight availability at ground level during winter months can arise as well as excess solar gain protection is necessary for upper levels for the summer period. The design positively responds to the local environmental conditions by:

- Developing a massing (for the new extension) that optimises the site potential, whilst striving to safeguard daylight, and sunlight to existing nearby residential properties.
- Locating delivery, and servicing routes away from heavily pedestrianised areas, and cyclist routes.
- Locating intakes of air supply as far as possible from pollution sources.
- Improving local air quality by prioritising district heating connection for heating rather than fossil fuel-based heating systems.

The surrounding buildings' stature contributes to reducing direct solar radiation by offering suitable shading, a factor that has been acknowledged and incorporated into the energy model. The Proposed Development depends on the shading provided by neighbouring structures. The buildings factored into the energy model are all existing.

Additionally, the design team has examined the potential consequences of any delays in the construction of these buildings. The design team has taken steps to ensure that any resulting increase in thermal loads remains within the permissible threshold, as detailed in the subsequent section.

5.2.3. Building Orientation, Layout & Form

The retained section features a recessed façade, which helps minimize solar gains and reduces cooling loads. The new roof extension increases usable floor space while rebuilding parts of the existing roof creates opportunities for amenities and urban greening.

At ground floor, Class E space is adaptable for multiple uses. The open floor layout offers the potential for flexible office space, and the new atrium roof enhances natural daylight across the office floor plates.

5.2.4. Façade Optimisation

The treatment of facades is an important aspect of low-energy design. The ‘Fabric First’ approach should be pursued wherever possible to reduce operational energy and emissions in the first instance. Improvements to existing facades for refurbishment projects should be carefully considered, as highlighted in Chapter 8 of the EEA CPG, and new facades will be required to meet the latest performance standards set out under Building Regulations Part L.

As noted at the start of this report, the existing building is considered to be a positive contributor to the Bloomsbury Conservation Area, and the primary reason for this is the heritage value of its historic façade, which is (mostly) retained from the original 1908 construction, with some minor upgrades over the years. The support of scheme that retains as much of this façade as possible during any refurbishment or redevelopment of the site has been made evident to the Applicant during the pre-application process and is a foundational principle of the Proposed Development set out within this application submission. Embodied carbon is also saved by retaining existing façade systems, which are often high-impact elements and retention in part of as a whole can therefore contribute positively to successful whole life carbon assessment outcomes. However, this has the potential to negatively impact operational performance, especially when comparing to modern design standards and expectation for façade systems, so this balance needs to be considered in intervention decision-

making. Further detail on this façade and its particulars is provided within the Condition & Feasibility Study, which is issued within the wider application documentation. This document also covers the particulars set out in EEA CPG Chapter 8 paragraph 8.22 in terms of detail/considerations.

Chapter 8 of the EEA CPG states that:

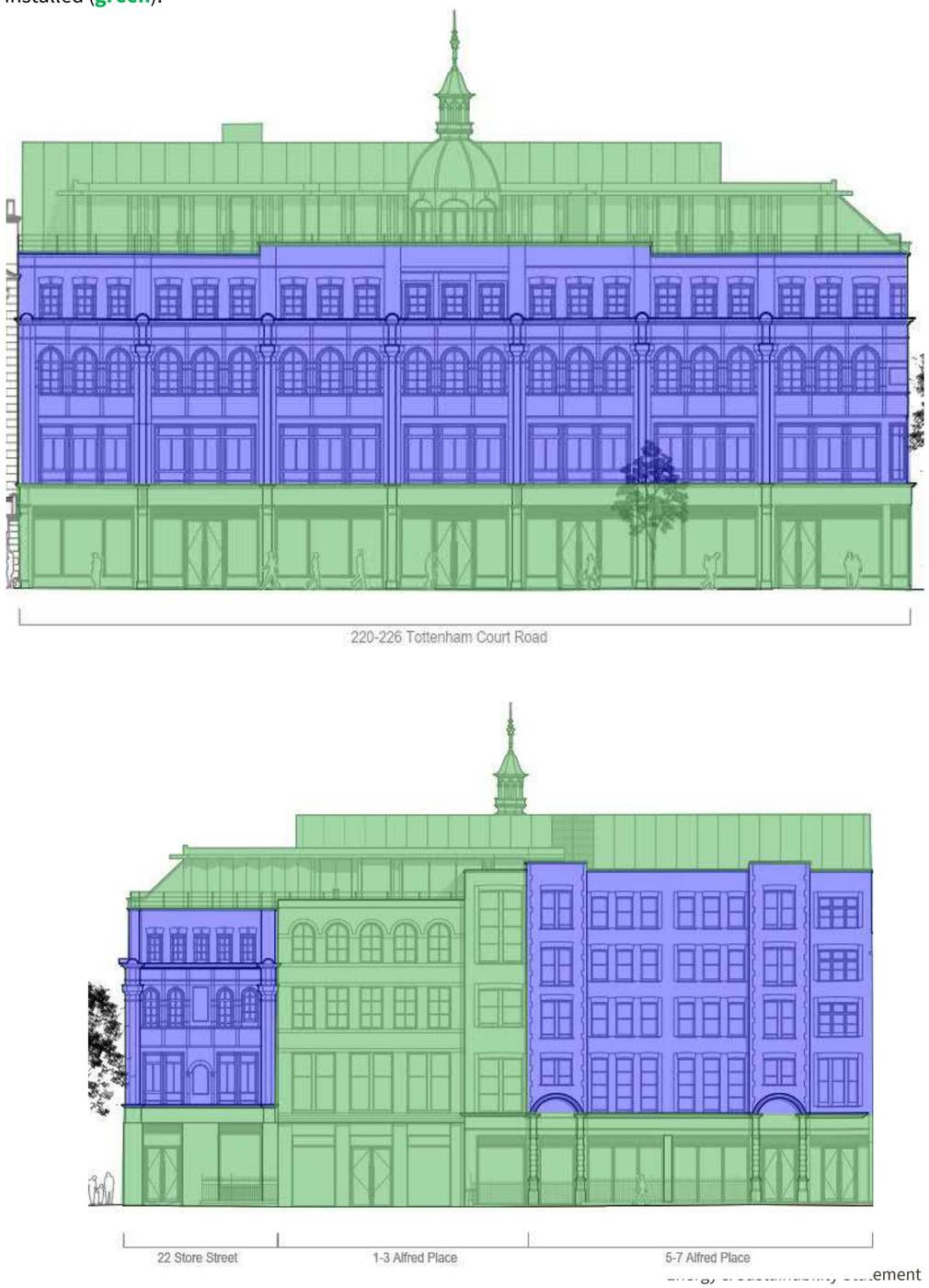
- The Council expects proportionate measures to be taken to improve the energy performance and sustainability of existing buildings.
- All buildings being refurbished are expected to reduce their carbon emissions by making improvements to the existing buildings, including work involving an extension.
- When dealing with historic buildings, a sensitive approach needs to be taken.
- Making sensitive changes should also help preserve historic character where applicable.
- The council will aim to balance the conservation of fuel and power against the need to conserve the fabric of the building.

There are various interventions proposed to the facades at the Proposed Development. In some cases, where parts of the existing structure and facades are demolished (i.e. the existing 'glass box' 1999 extension along 1-3 Alfred Place), new facades are installed. Much of the existing historic facade is retained and sensitively upgraded, where technical considerations and interfaces with the retained structure allow for this to be reasonably implemented (see also the Condition & Feasibility Study). A broad summary of the systems and interventions to the facades is as follows:

- **Street-level shopfronts:** upgraded façade with new glazing.
- **Levels 01-03 (generally):** retained historic facades with internal calcium silicate insulation and existing glazing retention. Additional secondary glazing at L01 due to extent of glazing at these levels.
- **Internal courtyard:** some glazing replacement at L01, other elevations and levels solid and glazed elements retained.
- **Level 04:** new façade systems for extension elements, high-performance systems, except for retained façade along Alfred Place in north corner which is as per L01-03 generally).
- **1-3 Alfred Place:** new façade from GF-L03 where existing 1999 glass box extension is being demolished and infilled.
- **Roof level:** new plant screens at roof level and cupola along Tottenham Court Road elevation.

Sweco have provided some high-level elevation summary mark-ups below to approximately demonstrate where facades are retained and/or upgraded, and where they are newly installed. It should be noted that while the shopfront glazing is highlighted in green, the solid/opaque elements of these systems are typically retained and upgraded.

Figure 5.2.4.1: elevation drawings for the Proposed Development marked up to demonstrate areas where facades are retained and/or upgraded (**blue**) and where new façade systems or new glazing are installed (**green**).



The retained façade systems are kept because of the need to maintain the heritage value of the existing building within the Conservation Area. In total, 69% of the existing façade is retained. Where facades are retained and upgraded, there is only so much that can be done to improve operational performance. For example:

- Glazing ratios are fixed and cannot be modified in a significant way to impact overheating and perimeter solar gains, which typically has a significant impact on overheating mitigation in commercial offices.
- Replacement of glass within bespoke and intricate framing systems is complex and very expensive given need to create bespoke moulds for glass and then fitting into historic frames.
- Opportunities for deploying additional external shading elements to facades is limited by the need to maintain visual appearance.
- Opportunities for newer facades at these levels are also limited by the need to maintain consistency of design with the existing systems (i.e. not build another out-of-context glass box like the 1999 extension).

The Condition & feasibility Study also details how the interfaces with the existing structure (in this case embedded steel structure, which will also be retained, within the existing façade) causes additional complications in terms of condensation risk and dew points, which have been carefully considered to arrive at what the Applicant believes is the right solution in the context of this development.

The newer façade systems, particularly at L04, will need to achieve optimal performance to ensure that the performance issues with the retained facades are mitigated to generate an improved energy performance outcome for the site.

5.2.5. Building Envelope

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

The outlined U-values in the table below are critical to reducing operational carbon emissions, and coordination on the practice of achieving these U-values has been discussed with the appointed façade consultant, and architectural team, the next stages of technical design will provide more detailed calculations to confirm those. A second table is provided for the proposed performance of the retained and/or upgraded systems, based on detailed analysis and input from the appointed façade consultant on this development. The performance of these elements is limited by the factors set out in Section 5.2.4.

Table 5.2.5.1: Building fabric thermal performance inputs for the Level 4 extension (new elements).

Parameter – Level 4 (New Elements)		Part L2A Limiting Value	Part L2A Notional Building Parameters	Proposed Values
Building Airtightness (@ 50Pa)		8 $m^3/h/m^2$	3 $m^3/h/m^2$	3 $m^3/h/m^2$
U-values	Wall	0.26 W/m^2K	0.18 W/m^2K	0.15 W/m^2K
	Roof	0.18 W/m^2K	0.15 W/m^2K	0.18 W/m^2K
	Floor	0.18 W/m^2K	0.15 W/m^2K	0.18 W/m^2K
	Curtain wall (retail)	1.6 W/m^2K	1.4 W/m^2K	1.0 W/m^2K (Overall: glazing & frame)
Glazing U-value		1.6 W/m^2K	1.4 W/m^2K	1.0 W/m^2K (including frame)
Glazing g-value (BS EN 410)		Office Elevations		0.28
Glazing Visible Light Transmittance		-	71%	50-65%
Thermal Mass		N/A		Low - Medium

Percentage of Glazing (floor average)	1m high window across each elevation	50%

Notes:

1. *The "Proposed 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 repeating cold thermal 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.*
3. *Glazing g-value to vary based upon exposure to sunlight, to balance daylighting against the cooling loads.*
4. *The g-value specified to shopfronts or active frontages of the building considers that façade set-backs or additional shading is proposed. The design must be able to manage the solar gains entering the space to allow for a transparent façade whilst considering passive solar gain control measures.*

Table 5.2.5.2: Building fabric thermal performance inputs for the retained/existing areas, as identified by the Facade Consultant through surveys and investigations.

Parameter – Retained/Existing areas		**Appendix 3 of the GLA's Energy Assessment Guidance: Notional Specification for existing buildings**	**Proposed Values**
Building Airtightness (@ 50Pa)		50 $m^3/h/m^2$	25 $m^3/h/m^2$
U-values	Wall	0.55 W/m^2K	0.39 W/m^2K
	Roof	0.18 W/m^2K	0.18 W/m^2K
	Floor	0.25 W/m^2K	0.22 W/m^2K
	Curtain wall (retail)	1.40 W/m^2K	1.0 W/m^2K (Overall: glazing & frame)
Glazing U-value		1.40 W/m^2K	Replacement Glass: 2.5 W/m^2K (including frame)
			Existing Glass: 4.6 W/m^2K (including frame)
Glazing g-value (BS EN 410)		0.40	0.40 (Replacement Glass)
			0.80 (Existing Glass)
Glazing Visible Light Transmittance		N/A	50-65%
Thermal Mass		N/A	Low - Medium
Percentage of Glazing (floor average)			50%

Notes:

1. *For instances where the existing condition of the building is of a higher performance, the actual energy performance of the building element should be used rather than the Notional Specification for Existing Buildings.*
2. *If meeting such a standard would reduce the internal floor area of the room bounded by the wall by more than 5%, a lesser standard may be appropriate.*
3. *The U-value of the floor of an extension may be calculated using the exposed perimeter and floor area of either the whole enlarged building or the extension alone.*
4. *If meeting such a standard would create significant problems in relation to adjoining floor levels, a lesser standard may be appropriate.*

5.2.6. Cooling & Overheating

Policy SI 4 of the London Plan (2021) requires that major development proposals should reduce the potential of overheating and the reliance on air conditioning systems.

Camden's Local Plan policy CC2: Adapting to Climate Change as well as Chapter 10 of the CPG mandates that developments implement strategies to mitigate the effects of urban and residential overheating by following the cooling hierarchy. This hierarchy is in accordance with the London Plan's cooling hierarchy, which emphasizes that active cooling should only be utilized after all passive measures have been applied.

It established that access to natural ventilation can be beneficial for occupant wellbeing, but the success of its implementation is subjective, and may vary depending on individual tenants' preferences and circumstances. It is assumed that the noise levels and pollution levels in the near future are unlikely to be permissible for opening windows. Operational energy savings from natural ventilation are subjective to combination of tenant(s) adaptations and favourable outside temperature conditions during spring (including lean summer days) and autumn outside the actual building operation's control.

5.2.7. Daylighting Strategy

As previously described, façade performance for the extension is being optimised to enhance daylighting provision. This considers solar performance of glass, window-to-wall ratios, 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 is

taken to ensure that the specified g-value did not negate the ability of the glass to provide good visual light transmittance. These considerations form a key part of the project approach and will be reflected in specification.

5.2.8. Low Water Consumption

Reduced water usage using low flow water outlets and appliances can also lead to a reduction in the energy required to heat domestic hot water. The development sets very high targets for reducing potable water consumption and integrating water reuse technologies. More details can be found in Section 11.4.

5.3. Active Design Features – Regulated Energy

5.3.1. Introduction

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

5.3.2. Heating, Cooling & ventilation Strategy

The project incorporates a Variable Refrigerant Flow (VRF) system for both heating and cooling, designed with an optimized selection of refrigerants to significantly reduce life cycle embodied carbon. This system includes fan coil units located on each floor with condensers at roof level for each tenanted area, which enhances flexibility for future modifications and adaptations to the building's HVAC needs.

Additionally, the heating and cooling baseline is efficiently delivered to the floor plates through heat recovery AHUs that feature integrated heat pumps. Air is supplied directly through the floor, ensuring an even distribution of tempered air throughout the space. In Building B and C, ceiling-mounted FCUs are utilized, effectively managing air circulation and providing a comfortable indoor environment. In Building A, wall mounted FCUs provide the same functionality and work within the existing constrained head heights here. This combination of technologies not only improves energy efficiency but also supports a sustainable approach to building management, aligning with modern environmental standards.

5.3.3. Building Management System & Metering

The development will be provided with a microprocessor-based digital Building Management System (BMS). The BMS will automate the building services systems, helping building managers understand how the building is operating, and allow them to control, and adjust systems to optimise performance, in a simple, efficient manner.

BMS control of landlord plant and equipment will be designed with energy efficiency as the key driver. Some examples of the energy-efficient controls include:

- Demand led control strategies - The BMS shall use demand-led strategies where appropriate, demands for heating, and cooling shall be monitored by the BMS, evaluated, and processed, prior to commanding systems operational.
- Time program control - The BMS shall provide time schedules that can be programmed to define when an operation signal is to be sent to the controlled plant. The time schedules shall allow different on/off times for building/plant control strategies to be defined throughout the year.
- Optimisation Control - The BMS shall provide individual optimisation programmes for the time schedules associated with temperature control of space/zone, to enable the operation of the related heating and/or cooling systems prior to normal operating periods, to bring the zones within comfortable temperatures at the start of normal occupancy times. The optimisation programme shall be self-adaptive using an iterative process after each period of operation to improve its performance.
- Seasonal Operation - Plant controls shall be pre-programmed for seasonal operation, allowing plant start-up routines, and temperature control set points to be determined and automatically adjusted based on the season of operation.

5.3.4. Energy Metering & Billing

All landlord meters shall be connected and interfaced with the building management system (BMS) to enable energy consumption data to be collated, analysed, and distributed as required by the metering, and billing strategy (possible for up to 4 tenancies as designed).

Metering of energy usage on all floors, per tenancy will allow building owners / occupiers to view and interrogate where potential energy savings can be made throughout their buildings.

The energy metering, and sub metering strategy will be in line with best practice as outlined in CIBSE TM31, 39, and 46 to ensure compliance with current legislation, together with Part L2 of the Building Regulations and BREEAM Ene-02.

The strategy will be compliant with The Heat Network (Metering, and Billing) Regulations 2014, and the EU Energy Efficiency Directive. All notifications, and assessments as required by the regulations shall be made by the Contractor.

Details about the metering and billing strategy will be established at RIBA stage 3.

5.3.5. EC/DC Motors for Fan Coil Units

The current Part L Building Regulations set stringent efficiencies for the fans used in all air conditioning and mechanical ventilation systems. Recent advances in fan motor technology have resulted in substantial reductions in energy consumption, and otherwise a significant proportion of building energy use. EC/DC (electronically commutated direct current) motors will be used in place of conventional AC motors.

5.3.6. High Efficiency Variable Speed Drives

By varying the fan, and pump speeds for the water, and air distribution systems to match the building load profiles, fan, and pump energy consumption will be considerably reduced. This functionality will be afforded and managed via the intelligent Building Management System (BMS).

5.3.7. Ventilation Heat Recovery

The energy required to heat or cool the incoming fresh air supply to the buildings 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.

Heat recovery between the return/exhaust air, and outside air shall be provided on all supply, and extract units via a thermal wheel with efficiencies of at least 80%. The efficiencies will conform to the European Directive 2009/125/EC, which required increased efficiencies from 1st January 2018.

5.3.8. 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 public space at the ground floor, and on 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 5.3.8.1: Applied lighting specification for the Proposed Development.

System	Parameter	Applied Value
Lighting Efficiency: Non-domestic Areas	Commercial	Based on 400 Lux Display lighting 80 lm/crit watt
	Office Areas	5.5 W/m² Based on 400 Lux & 110 lm/W
	Reception Areas	300 Lux & 95 lm/W Display lighting - 80 lm/W
	Storage Areas	150 Lux & 95 lm/W
	Toilet Areas	300 Lux & 95 lm/W
	Shower Areas	150 Lux & 95 lm/W
	Circulation Areas	150 Lux & 95 lm/W
	Plant Areas	300 Lux & 95 lm/W
	Cycle Store	200 Lux & 95 lm/W
	Lift Lobby Areas	150 Lux & 95 lm/W
	Stairs	150 Lux & 95 lm/W
Lighting Controls	Transient Spaces	Occupancy Sensing On
	Occupied Spaces	Occupancy Sensing On Daylight Dimming Control

Note: 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. Commercial (retail) to be fitted out by tenant.

5.3.9. Automatic Monitoring & Targeting

The Building Regulations Approved Document L2A identifies that the provision of automatic monitoring and targeting with alarms for out-of-range values, can provide significant savings in energy consumption of the building services systems. A saving in energy consumption of 5% is awarded for complete installations that measures, records, transmits, analyses, reports, and communicates meaningful energy management information to enable the operator to interrogate and manage the energy it uses.

5.3.10. Power Factor Correction

The Building Regulations Approved Document L identifies that the provision of power factor correction to the building's electrical supply can provide significant savings in electrical consumption. A saving in electrical energy consumption of 1% is awarded for power factor correction to 0.9, and a saving of 2.5% awarded for power factor correction to 0.95 power factor. This Proposed Development intends to have a power factor correction of 0.95 as a minimum.

5.3.11. Efficient HVAC Parameters

The following design parameters were assigned to the base building heating, ventilation, and air conditioning (HVAC) systems to establish its annual CO_2 emission rate.

Table 5.3.11.1: Applied HVAC Parameters for Main Central Plant, Non-Domestic Areas

System	Parameter	Applied Value
Cooling System Office	Seasonal Efficiency (SEER)	12.44
	Nominal Efficiency (EER)	4.02
Cooling System Reception/Retail [2]	Seasonal Efficiency (SEER)	12.44
	Nominal Efficiency (EER)	4.02
Heating System Office	Seasonal Efficiency (SCOP) [1]	7.8
Heating System Reception/Retail [2]	Seasonal Efficiency (SCOP) [1]	7.8
Heating System Shower (Direct Electric)	Seasonal Efficiency (SCOP) [1]	1.0
Air Handling units (AHUs) – Office Space	SFP	1.37 W/l/sec (average value)
	Ventilation Heat Recovery Efficiency	94% (thermal wheel)
	Demand Control Ventilation	Yes
Air Handling units (AHUs) –Showers	SFP	1.47 W/l/sec (average value)
	Ventilation Heat Recovery Efficiency	94% (thermal wheel)
	Demand Control Ventilation	No
Electric Water Heater - DHW Toilets	Delivery Efficiency	100%
Pumps	Pump Type	Variable Speed with multiple pressure sensors
	DHW Controls	Timed Control
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

Note 1: The lean building, as per GLA assessment guidance, will provide space heating and DHW with the same system types as the actual building.

Note 2: Retail to be fitted out by tenant.

5.4. Active Design Features – Unregulated Energy

5.4.1. Introduction

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. 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. 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.

5.4.2. 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 with lift-trimming strategy.

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.

5.4.3. 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 – F& G ratings already banned.
- Freezers – F& G ratings already banned.
- Fridge-Freezers – F& G ratings already banned.
- Washing Machines – F& G ratings already banned.
- Washer Dryers – F& G ratings already banned.
- Dishwashers – F& G ratings already banned.

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

5.4.4. High-Efficiency Vertical Transportation

The vertical transportation systems will be specified with energy-saving features intended to reduce energy use, both while lifts are moving and when in standby mode. Such measures can be particularly beneficial when applied to passenger lifts in large workplaces which commonly deal with high numbers of people moving in, out, and around the building. These measures typically include:

- Specification of modern VVVF drive systems.
- Quantity, size, and speed of passenger lifts optimised to meet agreed performance benchmarks and thereby minimise base energy load.
- Real-time monitoring of prevailing passenger demand and switching lifts in and out of service to minimise the energy consumption while maintaining specified performance benchmarks.
- Provision of energy-efficient lighting.
- Car lighting automatically switched off when cars are not occupied.
- Optimised dispatcher and drive control.
- In association with the Vertical Transportation specification features indicated above, other measures may be considered, such as:
- Promote the use of stairs for single or two-floor travel to reduce lift use (which can be overridden for those unable or less willing to use the stairs).
- Implementing novel technologies, such as providing landing call stations with a “green” button, for an energy-efficient trip using energy optimisation algorithms, and a “black” button, for a lift-performance call, with lifts being allocated according to waiting time or time to destination optimisation algorithms.

5.5. Be Lean – Carbon Emissions Reduction

Based on the above design parameters, a summary of the energy consumption, and CO2 emissions rate for the ‘Lean’ building can be seen in the tables below and summarised in Section 1. The ‘Lean’ energy efficiency measures described here are calculated to reduce regulated carbon dioxide emissions of the Proposed Development (Side Wide) by **22%**, compared to Part L2 2021. A summary of the energy consumption, and CO_2 emissions rate for the Lean non-domestic buildings are based on the BRUKL reports within Appendix A.-

Table 5.5.1: reported CO_2 emissions for the Proposed Development after the ‘Be Lean’ stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Site Wide	**Carbon Dioxide Emissions (Tonnes CO_2 per Annum)**		
	Regulated Energy	**Total CO_2 Reductions**	**Regulated Energy % Reduction**
Building Regulations 2021 Part L Compliant Development	61.0	-	-
LEAN - After energy demand reduction	47.3	13.7	22%

Table 5.5.2: reported CO_2 emissions for the Proposed Development after the ‘Be Lean’ stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Existing/Retained	**Carbon Dioxide Emissions (Tonnes CO_2 per Annum)**		
	Regulated Energy	**Total CO_2 Reductions**	**Regulated Energy % Reduction**
Building Regulations 2021 Part L Compliant Development	58.6	-	-
LEAN - After energy demand reduction	45.1	13.50	23.0%

Table 5.5.3: reported CO_2 emissions for the Proposed Development after the 'Be Lean' stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Extension (new-built)	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)		
	Regulated Energy	Total CO_2 Reductions	Regulated Energy % Reduction
Building Regulations 2021 Part L Compliant Development	2.4	-	-
LEAN - After energy demand reduction	2.2	0.1	6%

5.6. Camden EEA CPG Section 10 Review

This section has set out the energy demand reduction measures for the Proposed Development that have resulted in the stated performance at this stage of the Energy Hierarchy. As set out in Chapter 10 of the EEA CPG (paragraph 10.30), applicants are expected to demonstrate how sustainable design and construction principles have been incorporated. The areas in Table 5.6.1 (passive) and Table 5.6.2 (active) below are relevant to this section, and the location of compliance with these considerations is set out for clarity.

Table 5.6.1: Camden EEA CPG passive energy demand reduction considerations and where these items are addressed within this section, alongside a summary of outcomes.

Energy Demand Reduction Consideration	Compliance within this section
Layout of uses	Refer to the Design and Access Statement.
Design of windows and openings	Refer to the Design and Access Statement.
Floorplate size and depths and floor to ceiling heights	Refer to the Design and Access Statement.
Reducing internal heat gains	Refer to Section 5.3.
Reducing the need for artificial lighting	Refer to Section 5.2.7 and the Design and Access Statement.
Limiting excessive solar gain	Refer to Sections 5.2 and 6.
Optimising natural ventilation	Refer to Section 5.2.6.
Passive cooling	Refer to Sections 5.2.6 and 6.
Green infrastructure	Refer to Section 11.10.
Best practice levels of insulation	Refer to Section 5.2.4.
Draught-proofing & air tightness	Refer to Section 5.2.
Thermal mass	Refer to Section 5.2.
Thermal buffers	Refer to Section 10.
Renewable energy technology	Refer to Section 8 33m^2 of PV panels included within the Proposed Development design.

Table 5.6.2: Camden EEA CPG active energy demand reduction considerations and where these items are addressed within this section, alongside a summary of outcomes.

Energy Demand Reduction Consideration	Compliance within this section
Efficient ventilation	Section 5.3 and 10.
Efficient cooling	Section 5.3 and 10.
Efficient heating	Section 5.3 and 10.
Efficient lighting	Section 5.3 and 10.
Zoning, controls and sensors	Section 5.3 and 10.
Efficient appliances and equipment	Section 5.4.2.
Energy monitoring & building management systems	Section 5.3.4 and 9.1.
Metering	Section 5.3.4 and 9.1.

6. Cooling & Overheating

6.1. Cooling Hierarchy

Policy SI 4 of The London Plan (2021) states that major development proposals should reduce potential overheating, and reliance on air-conditioning systems, and demonstrate this in accordance with the following cooling hierarchy:

Table 6.1.1: London Plan 2021 Cooling Hierarchy, and Proposed Development strategy.

Cooling Hierarchy	Proposed Strategy
Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation, and green roofs, and walls.	For the extension, the glazing ratio has been derived by data-driven design by setting out an ambitious solar gains target, and managing daylight levels, and respond to the solar exposure, and façade orientation. The g-value has been reduced in places of the existing areas where glazing replacement has taken place. Urban greening strategies inform roof layout which will contribute to creating a microclimate which will contribute to reducing the urban heat island effect.
Minimise internal heat generation through energy-efficient design.	LED lighting is proposed to reduce internal heat gains.
Manage the heat within the building through exposed internal thermal mass, and high ceilings	Maximising the floor to ceiling height proposed to the office areas.
Passive ventilation	Refer to section 5.2.6. Natural ventilation not feasible for the main ventilation strategy for this building but maximised for occupant wellbeing.
Mechanical ventilation	Highly efficient mechanical ventilation with efficient heat recovery and potential for 'free cooling' is proposed for fresh air supply all year round.
Active cooling systems	Energy-efficient design through the use of the decentralised nature of multiple VRF systems.

6.2. Overheating Analysis

A thermal comfort assessment is indicative of the building design and services strategy and wherever the comfort cooling can deliver thermal comfort levels in occupied spaces in accordance with the criteria set out in CIBSE Guide A Environmental Design Table 1.5 by using Design Summer Year (DSY) weather file London DSY1, DSY2 and DSY3.

In a refurbishment scheme, effectively addressing overheating can significantly enhance occupant comfort and energy efficiency. When overheating is not managed, it can lead to challenges such as discomfort for users, increased energy consumption, and potential damage to the building materials.

The following measures have been applied within the scheme to proactively reduce the overheating risk such as improved insulation, strategic ventilation, and the use of lower g-values on the upper levels. The project can create a healthier and more pleasant indoor environment. This not only enhances the building's sustainability but also contributes to the overall success of the refurbishment by ensuring that it meets modern standards and user expectations.

A free-running building relying solely on natural ventilation scenario would not be able to reach adequate levels of thermal comfort due to the deep floor plan of the building which reduces the ventilation effectiveness.

6.3. Active Cooling Demand

The GLA's Energy Assessment Guidance requires that developments report the active cooling demand predicted by the energy modelling compliance tool.

Cooling loads taken from compliance tools should only be referred to satisfy GLA's requirement of data collection for monitoring purposes, and it is not indicative of the designed cooling demand of the building. Those tools are used for compliance, with a rigid methodology, and the mechanical design will better inform the cooling demand within the occupied areas of the development.

The following measures have therefore been applied to reduce the cooling loads from outset:

- Optimised glazing ratio to significantly reduce solar gains and achieve adequate daylighting.
- External shading elements dimensioned to reduce solar heat gains to the building perimeter, and in particular the office accommodation.
- Consideration of surrounding buildings to cast shadows on the lower levels.

The active cooling demand for the Proposed Development as per 'Lean' BRUKL report (HVAC Systems Performance) is summarized in the table below:

Table 6.3.1: Active Cooling Demand – Proposed Development 'Lean' building – Part L 2021

Building	Area weighted average building Cooling and Heating Demand	Area weighted average building Cooling and Heating Demand
	(MJ/m²)	(MJ/year)
Actual	67.7	574,266
Notional	103.8	880,412

The results show circa **35%** reduction in the cooling demands of office space, and retail areas, respectively, compared to the notional building values. This can be attributed to the passive design measures such as optimised glazing ratio, shading elements, and to the high performing cooling systems integrated to the building, and for office spaces.

For detailed results – see **Section 1.1.**

7. Be Clean – Heating Infrastructure

7.1. Introduction

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

After careful selection of appropriate servicing strategies, and plant selection, the design team agreed to meet the energy demand and constraints of The Courtyard Building using multiple VRF systems and to not connect to the DHN.

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

7.2. District Heating & Cooling Networks

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

The image on the right is an extract from the London Heat Map website; all existing district heating (DH) network are in red, the proposed are in purple.

Figure 7.2.1 – DH network in proximity of the Proposed Development

There is a new UCL network in proximity to the site, which was added to the London Heat Map in late August 2024. No evidence of its potential distribution was available before that date. UCL supplies space heating and DHW to connected buildings on its Bloomsbury campus via a primary hot water network, fed from four energy centres (as well as several contaminated gas-fired boilers, e.g. stand-alone boilers at BSUs). The system uses 2 no. combined heat and power (CHP) engines as a low-carbon heat source. CHP engines generate heat and power simultaneously, off-setting the use of grid electricity. Heat from the engines is supplemented directly by gas and oil boilers, as well as indirectly by steam. The Applicant has reached out to UCL for further advice on whether this network is planned to be extended to within the vicinity of the site as soon as the implementation of this network was made clear to us via the London Heat Map, and whether future potential connection is a viable prospect. We are yet to receive a response on this item. When further details are provided by UCL, this may be reviewed against the content of this section.

The carbon factors for electricity have been revised (Table 3.2.3.1) with the introduction of the Part L 2021 to reflect the decarbonization of the electricity grid. This means that the carbon intensity associated with electric energy use is now lower than before, encouraging the use of electric systems. There is a strong likelihood that connection to this system, with the use of fossil fuels and the consequent carbon factors associated with its use, will result in a poorer performance against Building Regulations Part L, not an improved one. The proposed heating and cooling strategy for The Courtyard Building makes use of multiple VRF systems.

These systems are highly effective for a refurbishment development like this. They are capable of achieving higher heating and cooling efficiencies than similar systems interfacing to networks via central heat pumps. Furthermore, the decentralised nature of multiple VRF systems makes the building much more efficient in part load operating conditions, specific to its intended use. This is through more precise load control and allowing plant for large areas of unoccupied tenancies to be fully isolated. These points result in lowered energy consumption, in both calculated and actual performance.

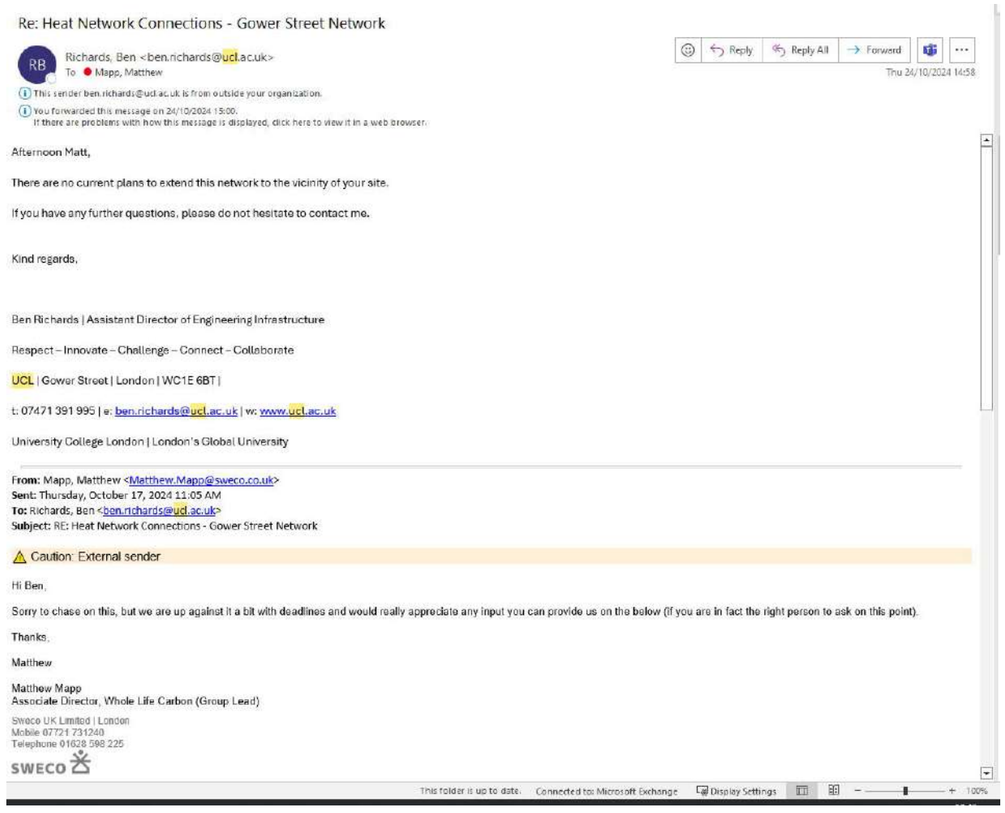
Compared with water-based heating and cooling a VRF system also requires less structural intervention to integrate into existing buildings. Modern low temperature water-based systems require larger riser openings to be made to allow for piped distribution networks. On floor they require large openings to be created in secondary structural elements. In plant areas sizable pieces of equipment are required to run water-based systems, such as multiple pump circuits and thermal storage vessels, the structure required to support these would require more demolition and replacement works to upgrade the basement slabs. These increase the embodied carbon of the whole building through increased materials in the services construction and in structural elements required. This is an important point to consider, as it would lessen the ability to retain as much of the existing structure as has been possible for this proposal.

The above points make electrically driven VRF systems a more suitable solution for the proposed development in operational and whole life carbon terms. These same reasons also mean a district

heat network connection to The Courtyard Building is less appropriate than an improved system from day one of building operation. However, as the lifetime of VRF systems is typically 15 years there would be an opportunity in the future when large scale plant replacement works take place to modify the system to make use of any new heat networks in the vicinity of the site. This is likely to incur additional demolition of the structure however, so this needs to be considered for any future connectivity.

Further to the above, feedback on possibility of future network expansion and connection has also been provided by Gower Street Network operator UCL, as shown below in Figure 7.2.2.

Figure 7.2.2: email response from UCL Gower Street network operator confirming no plans to extend network in future to the vicinity of the Site.



Re: Heat Network Connections - Gower Street Network

RB Richards, Ben <ben.richards@ucl.ac.uk>
To Mapp, Matthew

Reply | Reply All | Forward
Thu 24/10/2024 14:58

This sender ben.richards@ucl.ac.uk is from outside your organization.
You forwarded this message on 24/10/2024 15:00.
If there are problems with how this message is displayed, click here to view it in a web browser.

Afternoon Matt,

There are no current plans to extend this network to the vicinity of your site.

If you have any further questions, please do not hesitate to contact me.

Kind regards,

Ben Richards | Assistant Director of Engineering Infrastructure

Respect – Innovate – Challenge – Connect – Collaborate

UCL | Gower Street | London | WC1E 6BT |

t: 07471 391 995 | e: ben.richards@ucl.ac.uk | w: www.ucl.ac.uk

University College London | London's Global University

From: Mapp, Matthew <Matthew.Mapp@sweco.co.uk>
Sent: Thursday, October 17, 2024 11:05 AM
To: Richards, Ben <ben.richards@ucl.ac.uk>
Subject: RE: Heat Network Connections - Gower Street Network

⚠ Caution: External sender

Hi Ben,

Sorry to chase on this, but we are up against it a bit with deadlines and would really appreciate any input you can provide us on the below (if you are in fact the right person to ask on this point).

Thanks,

Matthew

Matthew Mapp
Associate Director, Whole Life Carbon (Group Lead)

Sweco UK Limited | London
Mobile 07721 731240
Telephone 01628 598 225

SWECO

This folder is up to date. Connected to Microsoft Exchange Display Settings 100%

The response confirms that there is no intention to extend this network to within the vicinity of the site, which also accords with our research that shows this network is specific to the UCL campus area. Should this network decide to extend in the future (albeit no plans to date), it is likely that the timeframes for delivery of this infrastructure would align better with the first replacement of the building services (c.15 years' time) and therefore connection could feasibly be reappraised at that time, subject to whether any further extension is actually intended by UCL to the current extent of the network, and whether the systems in the network would be upgraded to a solution that facilities low-carbon and net zero achievement for its outside of the existing campus network.

7.3. Be Clean – Carbon Emissions Reduction

The clean emissions are equal to the lean stage figures, for Part L 2021 methodology applies the same systems and carbon factors associated with the Be Lean Stage (i.e. heat pump systems fall within the 'Be Green' part of the Mayor's Energy Hierarchy).

8. Be Green – Renewable Energy

8.1. Introduction

Further energy, and carbon dioxide emissions savings could, in principle, be made through the adoption of renewable and low & zero carbon (LZC) 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.

8.2. Considerations for LZC Technologies

8.2.1. Photovoltaics (PV)

Photovoltaic panels convert solar energy into electricity and are best placed in an unobstructed location, generally south-facing at 30° inclination, ideally. When located vertically, the output can be reduced by about 15%. PV panels provide a visible green label for the building and make use of space at the top of the buildings.

To achieve carbon reductions, photovoltaic panels will be installed at roof level to serve the landlord within the building, as follows:

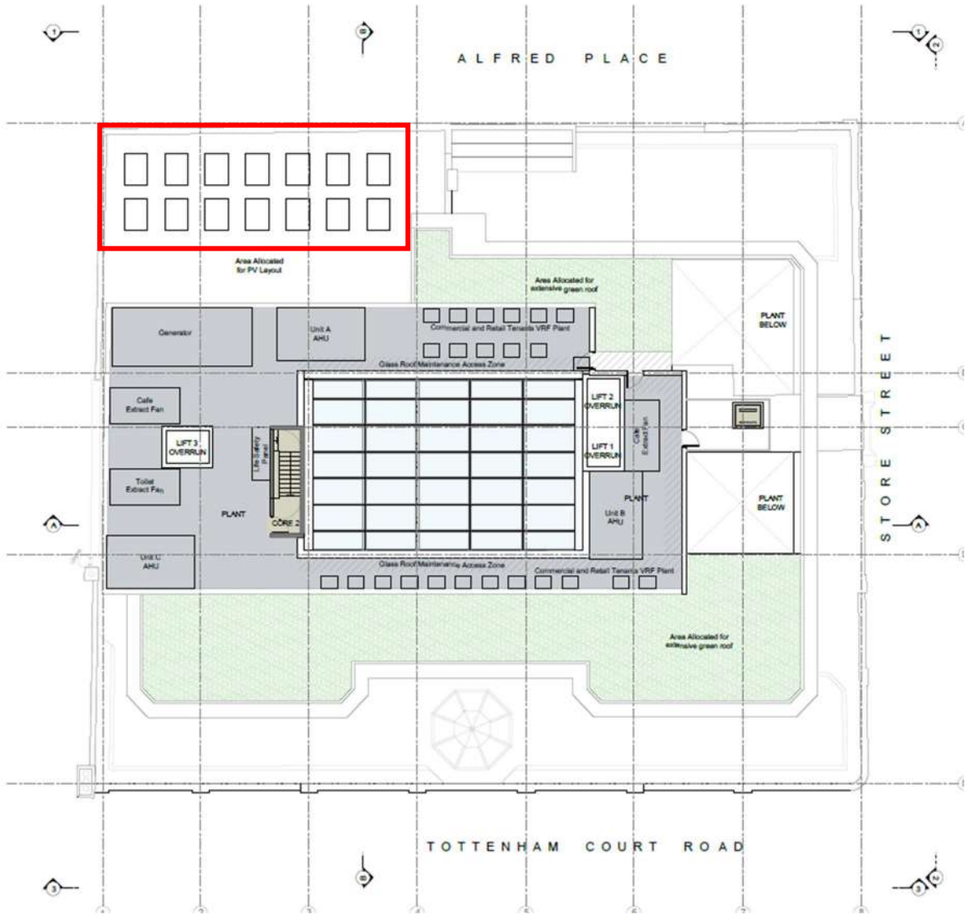
- 14 panels of 2.34m^2 (33 sqm total area)

The electricity produced by PV panels will be fed to the building and used to meet part of the landlord energy demand.

Based on the current design, the PVs generation profiles would be likely compatible with the building electric load, and the share of electricity produced on-site is relatively small, energy storage by means of batteries is not considered for this development. This will eliminate the environmental costs related to battery manufacturing, and end of life disposal, for the benefit of building's sustainability.

The extent of PV installation is limited by a number of factors, including the need for access and maintenance of the panels over their life cycle, plant space at roof (as demonstrated by the grey areas in Figure 8.2.1.1) and the inclusion of blue/green roofs, planting and accessible terrace space, all of which are key parts of the Sustainability Strategy for this development. By modifying the roof and adding partial extension to L04 more space is created, but the use of this space must be balanced between different requirements and sustainability/occupant aspirations. Increasing height further is not possible in the current content (nor is it viable given the intent to retain the existing structure and thus structural loadings), and therefore creating of further stepped massing and terraces for better distribution of requirements is not possible in this context. Application of PVs to the green roof/blue roof combined area (as seen in the green highlighted areas in Figure 8.2.1.1) was considered but due to the long-term maintenance and health of these systems PV panels were not employed here. Sweco have not seen any evidence over the longer-term from our recent projects that a green roof in combination with PV panels, while possible to apply, yields beneficial long-terms results, with the quality and health of the green roof systems often suffering.

Figure 8.2.1.1: PV Indicative layout



8.2.2. Wind Turbines

Wind turbines produce electricity directly from the energy in the wind. This is then fed into the buildings electrical system via a control gear. Two types of wind turbines are available: horizontal axis, and vertical axis. The former tends to be noisy and produce vibration. The latter are quieter in operation, and more suited to installation on buildings but are generally less efficient, and more expensive.

Although wind turbines are a highly visible form of renewable energy, they can normally provide only a very small contribution to the total electrical consumption of buildings in the city and urban locations. Probably visually unacceptable in planning terms, there are also concerns that such a turbine would create unacceptable noise levels during the day, and night. Furthermore, at this stage, the flexibility in façade design is limited.

Wind turbines are not considered to be viable for this development.

8.2.3. Solar Hot Water

Solar hot water panels must be in a generally south facing position, ideally at about 30° to the horizontal. If located vertically, the output is reduced by about 15%.

The scheme investigated is based on installing a nominal active area of high efficiency (evacuated tube) solar hot water panels, accommodated on the roof of the building. Such systems are relatively low maintenance, are a proven technology, and are a visible indication of the development's green aspirations. Although efficient, and cost-effective in implementation, solar hot water systems can only offset a fraction of the domestic hot water demand for the site.

8.2.4. Ground-Source Heat Pumps

The proposed building is a commercial office space, designed to balance heating, and cooling demand. The annual overall cooling load is unbalanced with the annual heating load due to the massing, and commercial use of the building. Therefore, there is no requirement to store energy, and hence a GSHP will not be suitable application as part of the energy strategy.

Ground source heat pumps are therefore not considered suitable for this development.

8.2.5. Aquifer Heat Pumps

The use of the London aquifer to reject heat to (in cooling mode), and to draw heat from (in heating mode) can reduce emissions from a development, depending on the number of boreholes, and the potential yield. In an open-loop aquifer-based heat pump system, boreholes are sunk into the chalk strata. Aquifer water is pumped up to the surface and stored temporarily in a tank. This water is usually at 12-14°C year-round. The water is passed through a heat exchanger where it heats or cools the condenser water circuit serving the heat pumps. The water is then pumped back into the aquifer. Boreholes are normally sunk in pairs, one abstraction, and one discharge. A licence from the Environment Agency is required to extract aquifer water. The difficulties of achieving acceptable separation on-site, the central London location of the development, and the distance from water sources would severely restrict the effectiveness of an aquifer system. Also given the relatively small contribution to the site compared with the benefits of the community energy system, it is not proposed to pursue this option for the Proposed Development.

Aquifer source heat pumps are therefore not considered suitable for this development.

8.2.6. 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.

Although the main heating and cooling plant for the development is VRF based, the central air handling units make use of integrated low GWP ASHPs to meet the baseline ventilation heating and cooling loads. As these integrated units operate within the intake and exhaust airstreams of the air handling units and in tandem with thermal wheel heat recovery devices, they see very steady operation profiles and achieve reliable high COPs for heating and cooling performance as summarised in the table below:

Table 8.2.6.1: Summary of as-selected SEER & COPs for integrated ASHP air handling units.

R454b integrated reversible ASHP	Cooling factor SEER	Heating COP Including Thermal Wheel	Heating COP Excluding Thermal Wheel	Thermal Wheel Heat Exchange Efficiency
Unit 1	5.61	13.6	9.2	94%
Unit 2	5.38	14.0	9.6	94%

Unit 3	5.54	13.7	9.3	94%
Unit 4	5.54	13.7	9.3	94%

8.2.7. Gas-Powered Fuel Cells

Fuel Cells are highly efficient electrochemical energy conversion devices. A fuel cell consists of stack combined with sub-systems to form a functional energy solution. Fuel cells, when running on Hydrogen, combine Hydrogen, and Oxygen to produce pure water plus high-grade electric energy with no associated carbon emissions. Therefore, they offer the potential to provide a zero-carbon solution when running on hydrogen generated and stored via renewables. Natural gas-powered fuel cells instead, convert the chemical energy from the methane in natural gas into electricity through a chemical reaction with Oxygen.

A fuel-cell principal output is electricity, along with the harvest of waste heat, which can be utilised in building as a combined heat, and power (CHP) plant. The fuel cells main advantage in comparison to internal combustion driven CHP is their high electrical efficiency. Currently, available fuel cells can reach up to 48% with 200 kW size units. (Minimum single module). The cost of the fuel cells is high as they are, despite numerous installations in London, not mass-produced. The application of fuel cells is limited by the following:

- High capital purchase costs (units not mass-produced to be cost-effective) in comparison to internal combustion engine based (IC) CHP
- Minimum unit size approx.200kW per unit
- Significantly larger footprint in compares to internal combustion engine CHP.
- Extensive ancillary support units external to the Fuel Cells.
- Slow response, and start-up

Associated investment costs are higher compared to other technologies. As above, the Proposed Development is under a requirement to connect to the DH network.

Gas powered fuel cells are therefore not considered suitable for this development.

8.3. Be Green – Carbon Emissions Reduction

Based on the above design parameters, a summary of the energy consumption, and CO_2 emissions rate for the 'Green' stage at the Proposed Development are shown in tables below.

The 'Green' measures described reduce the regulated carbon dioxide emissions of the commercial areas by a further **6%** (on top of the Be Lean emissions reductions) against Part L2A 2021, for a total site-wide reduction of **29%**. **Please refer to Section 1.**

Table 8.3.1: reported CO_2 emissions for the Proposed Development (**existing** elements) after each stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Existing/Retained	**Carbon Dioxide Emissions (Tonnes CO_2 per Annum)**		
	Regulated Energy	**Total CO_2 Reductions**	**Regulated Energy % Reduction**
Building Regulations 2021 Part L Compliant Development	58.6	-	-
LEAN - After energy demand reduction	45.1	13.5	23%
CLEAN – After Clean Technology	45.1	0.0	0%
GREEN - After Renewable Energy	41.3	3.80	6%

Table 8.3.2: reported CO_2 emissions for the Proposed Development (**extension** elements) after each stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Extension (new-built)	**Carbon Dioxide Emissions (Tonnes CO_2 per Annum)**		
	Regulated Energy	**Total CO_2 Reductions**	**Regulated Energy % Reduction**
Building Regulations 2021 Part L Compliant Development	2.4	-	-
LEAN - After energy demand reduction	2.2	0.1	6%
CLEAN – After Clean Technology	2.2	0.0	0%
GREEN - After Renewable Energy	2.1	0.1	5%

Table 8.3.3: reported CO_2 emissions for the Proposed Development (**site-wide**) after each stage of the Energy Hierarchy for Non-Domestic Buildings.

Energy Planning – Greater London Authority guidance on preparing energy assessment – Site Wide	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)		
	Regulated Energy	Total CO_2 Reductions	Regulated Energy % Reduction
Building Regulations 2021 Part L Compliant Development	61.0	-	-
LEAN - After energy demand reduction	47.3	13.7	22%
CLEAN – After Clean Technology	47.3	0.0	0%
GREEN - After Renewable Energy	37.4	3.9	6%

Table 8.3.4: regulated CO_2 emissions savings for the Proposed Development (**site-wide**) from each stage of the Energy Hierarchy for Non-Domestic Buildings.

Non-domestic areas (Part L 2021) – Site Wide	Regulated Carbon Dioxide Savings	
	(Tonnes CO_2 per annum)	(%)
Savings from reduced energy demand	13.7	22%
Savings from Clean Technology	0.0	0%
Savings from renewable energy	3.9	6%
Total Cumulative Savings	**17.6**	**29%**
Total Target Savings - GLA's Target	**61.0**	**100%**

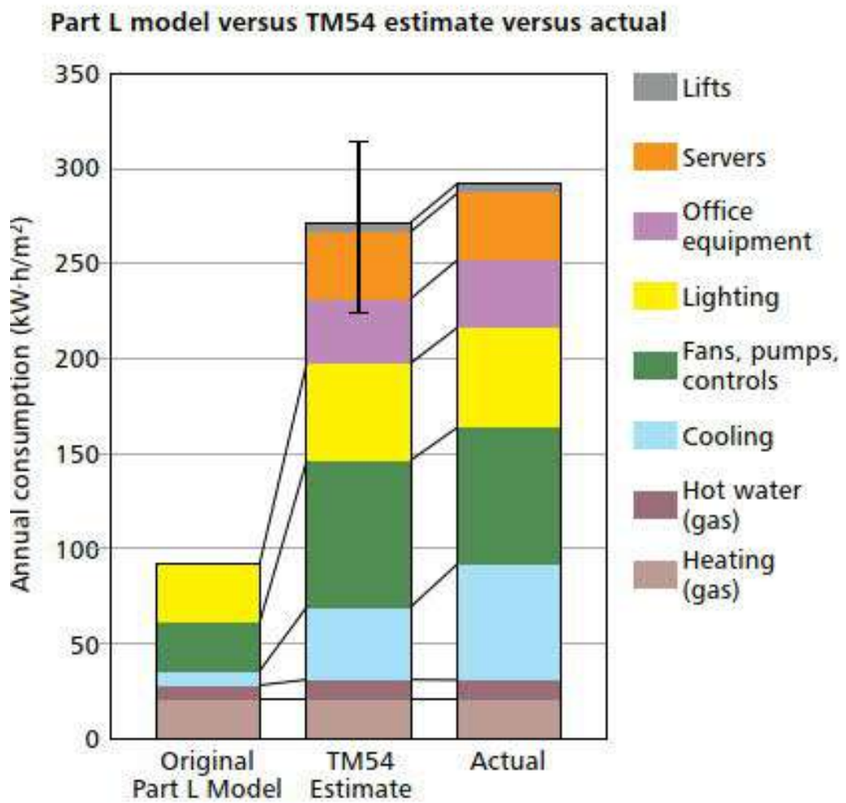
9. Energy Use Intensity (EUI)

9.1. Importance of EUI

The gap between predicted and actual operational energy of new buildings is acknowledged to be significant. Part of the reason for the energy performance gap in the United Kingdom is that buildings are traditionally designed only to show compliance with the Building Regulations, rather than to target actual energy efficiency through a robust and detailed design for performance exercise.

Figure 9.1.1 shows a comparison of the energy breakdown estimated following both the Building Regulations Approved Document Part L2 and CIBSE TM54 methodology, and the actual building metered data.

Figure 9.1.1: example comparison of Approved Document Part L2A model and calculations of operational performance for a case study building (CIBSE TM54).



One of the main reasons behind the difference between AD L2 calculation and the monitored data is that compliance calculations are subject to standardisations created for simplification and comparability purposes. For instance, Part L2 calculation uses standard inputs for operational and occupational hours, as well as weather tapes based on old historic data that will be different from the external conditions in which the building will operate. Secondly, the compliance calculation excludes a large set of energy uses such as small power, lifts and escalators, catering, external lighting etc.

9.2. CIBSE Methodology

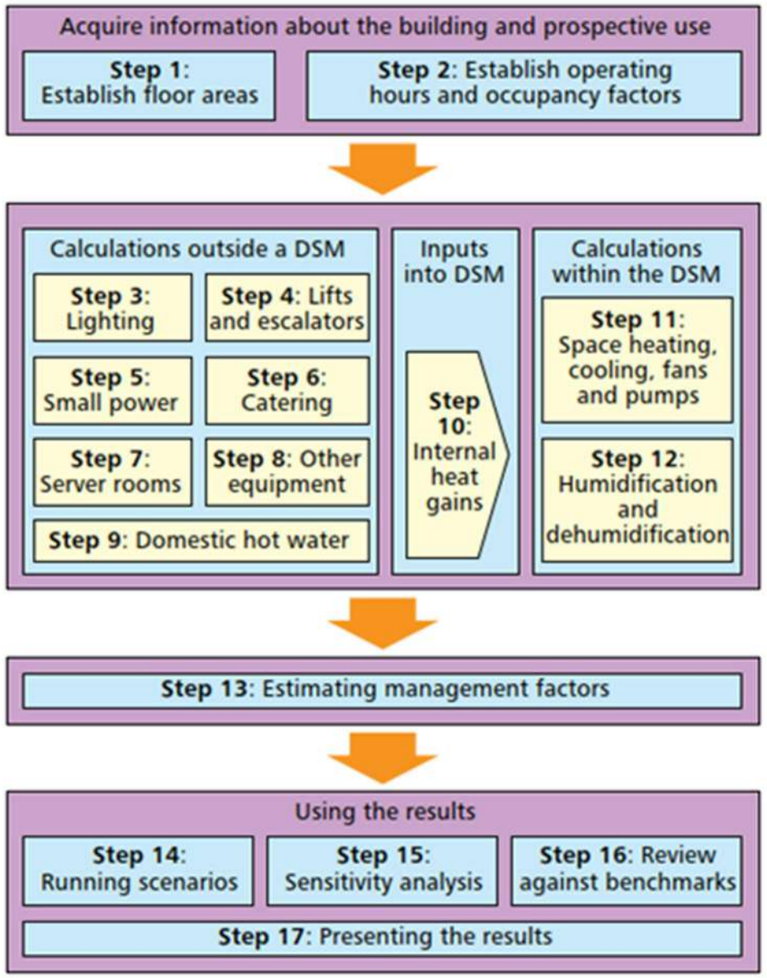
Dynamic energy modelling has been carried out using IES-VE Apache sim, which meets all the requirements in advanced HVAC system and controls capabilities listed in the CIBSE AM 11 Building Performance Modelling. An advanced external calculator, highly integrated with the selected DSM software, has been used to support the calculation.

The building energy will be split into two distinct parts, “Base Building Services” for the landlord energy and “Tenant Services” for the end-user energy consumption, as shown in the figure below:

Figure 9.2.1: Visual representation of the NABERS and BBP proposed building rating system.

Figure 9.2.2 summarises the CIBSE TM54 methodology for the evaluation of building energy uses, including a summary of the required actions at each step.

Figure 9.2.2: CIBSE TM54 Methodology to evaluate operational energy use at the design stage.



The approach used for this project slightly differs from the one outlined in the CIBSE TM54, as lighting energy and the auxiliary energy required by pumps and fans have been calculated outside the DSM software. The adopted external calculation tool, however, follows a dynamic and detailed calculation methodology that complies with or exceed the DSM software capabilities:

- Lighting consumption has been calculated based on design Lux levels, lamp efficiencies and occupancy schedules. Consumption reductions due to daylight dimming and occupancy sensing controls have been considered as well.
- Fresh air heating and cooling loads for the Air Handling Units (AHUs) have been calculated based on hourly external and internal psychrometric conditions for the whole year, considering the efficiency of the unit heat recovery device as well.
- Auxiliary energy demand of the AHUs has been calculated based on the fresh air requirements, the occupancy and systems operation patterns and the units Specific Fan Power (SFP).
- Pump energy has been calculated based on the modelling of primary and secondary chilled water and LTHW loops, pumps power consumption curves (part loads have therefore been considered), and the heating and cooling demands that have been calculated within the DSM software.
- Extract fans energy has been calculated based on the required air changes levels, occupancy, and systems schedules and SFPs of the selected fans.

At this stage of the process, the energy modelling on constitutes a high-level analysis using the principles of CIBSE TM54, covering both base build/landlord and tenant energy.

9.3. Results

The energy unit intensity (EUI) is a measure of the total energy consumed in a building annually. It includes both regulated and unregulated energy but does not include energy use from electrical vehicle charging or any reductions as a result of on-site renewable energy sources.

The results from the high-level CIBSE TM54 analysis can be found in the table below:

Base Build EUI kWh/m²/year (NIA)	Estimated Tenant EUI kWh/m²/year (NIA)	Whole-Building EUI kWh/m²/year (NIA)
68.9	82.3	**151.2**

Whilst we may aspire to target a lower EUI, it is unlikely to be economically viable or reasonably achievable in practice for a refurbishment of this type. Two of the main limiting factors are likely to be the constrained glazing to solid ratio within the retained areas of the development (see also Section 5 of this report).

There are also limitations present to the fabric U-Values being much higher than the ones prescribed for new built buildings. The improvements to the façade have increased overall thermal performance but further improvements would significantly impact the available floor area.

There is no meter read data from the existing building to compare this against to determine how much of an improvement this is against the existing building's current performance (the building was also stripped out prior to the Applicant's ownership of the building). However, the measures set out within this energy strategy are very likely to have resulted in a significant improvement in performance compared to previous operation.

Section 9 – Energy Use Intensity

Whole life carbon encompasses all greenhouse gas emissions associated with a building throughout its entire lifecycle, from material extraction, manufacturing, and transportation, to construction, operation, maintenance, and eventual demolition or recycling. This broader perspective provides a more complete understanding of a building's environmental impact.

For the Whole Life Carbon Assessment in Appendix E, the results of this exercise are also reflected in the B6 module of that exercise (whole-building EUI results), in accordance with the requirement of the London Plan Guidance related to WLCA.

10. Energy Strategy

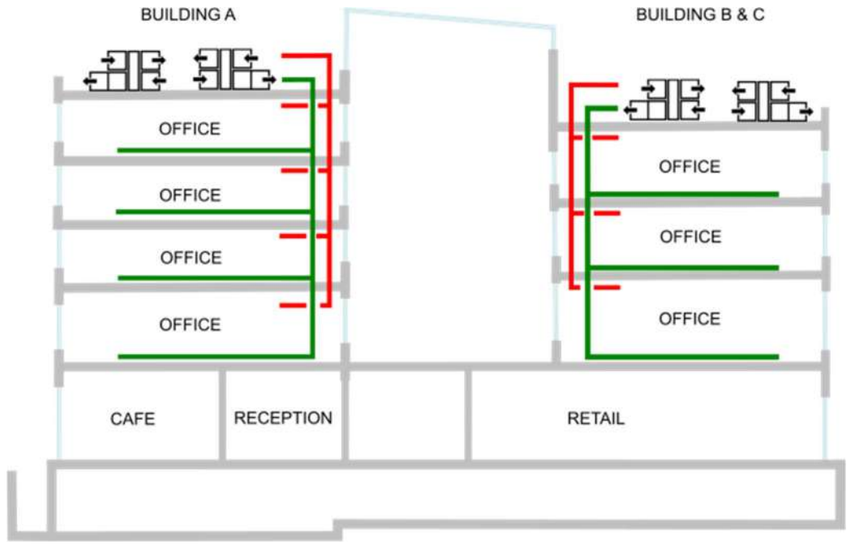
10.1. Proposed Development Energy Strategy

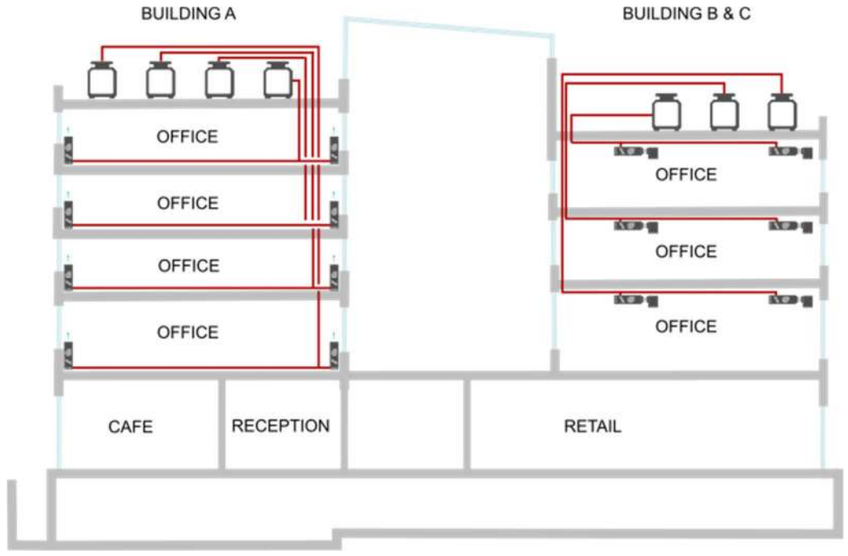
The building will primarily be served by a VRF space conditioning strategy facilitated by a combination of outdoor condensers accommodated on the roof. Central air handling units also on the roof will provide enhanced tempered fresh air to the office spaces.

The base build MEP services have generally been developed to enable three tenancies per office level and facilitate the lettable office accommodation to be fitted out under Category 'B' with an enhanced fresh air solution. Conditioned air will be distributed throughout the floor void and supplied at low velocity into the space via floor grilles. The cooling/heating capacity of each floor is enhanced with VRF fan coil units to respond to peak heating and cooling loads throughout the day.

The VRF system will be specified with low GWP R32 refrigerant to serve the fan coils. Metering will be provided to the outdoor plant serving each tenancy. Four packaged supply and extract Air Handling Units (AHUs) will be provided in the level 04 & 05 plant areas. The AHUs will then distribute the fresh air supply at the desired temperature into the office floor voids.

The following diagrams outline the energy strategy to serve the ventilation, cooling, and heating demand of the building.





11.Sustainability Statement

11.1. Sustainable Development & Context

11.1.1.Introduction

The Sustainability Statement for the Proposed Development is provided to align with the requirements of the Local Plan (2017) and the EEA CPG (2021). Policy CC2 Adapting to Climate Change and Chapter 10 (paragraph 10.29) of the EEA CPG states that:

"Any development involving 5 or more residential units or 500 sqm or more of any additional floorspace is required to demonstrate the [policy requirements of CC2] in a Sustainability Statement".

As the Proposed Development provides +988 m^2 of additional floorspace across the building (accounting for infills as well as extensions), a Sustainability Statement is required.

This section should be read in conjunction with the Energy Strategy as set out in Sections 1-10 of this report, as the key requirements and considerations set out within Paragraph 10.30 (and its concurrent table of considerations and measures) are covered both within this Sustainability Statement and throughout the earlier sections of this report. Section 2 should be read and understood to provide site-specific context for some of the performance and design decisions that have resulted in the sustainability and energy performance stated within this document.

11.1.2. Proposed Development Sustainability Strategy

The Sustainability Strategy for the Proposed Development centres on an intent to retain and reuse as much of the existing building as possible. In total, 73% (by volume) of the existing structure and 69% of the existing facades (by façade surface area) are retained insitu. The demolished structural elements help to facilitate the new proposal, with infills and extensions across the building, delivering a total area uplift of 988 m2 GIA across all floors.

The façade retention is a critical piece of the sustainability puzzle. As described in Section 5.2.4, the existing building is considered to be a positive contributor to the Bloomsbury Conservation Area, and the primary reason for this is the heritage value of its historic façade, which is (mostly) retained from the original 1908 construction, with some minor upgrades over the years. As described in the Condition & Feasibility Study (see Appendix D), the retention and upgrade of this façade system is problematic due to interfaces between structure and existing façade causing potential condensation risk and the historic nature of the windows being difficult to thermally upgrade. Efforts have been made up upgrade these systems where practical, as described in the energy strategy. However, they will not perform as effectively as replacing the façade system in full, and as a result the energy performance and Part L performance of the existing building are reflective of this.

Clear benefits of retention can be observed within the whole life carbon assessment. Proposed Development, without significant intervention at this stage from low-carbon material selection for new materials, performs strongly, achieving 536 $kgCO_2e/m^2$ GIA A1-A5 for the base build element, with a potential addition of 83 $kgCO_2e/m^2$ GIA A1-A5 for the Cat A (noting that this is a serviced office so the development may go straight to Cat B, and therefore Cat A is included only for the purposes of fair comparison with the GLA benchmarks), for a combined total of 619 $kgCO_2e/m^2$ GIA A1-A5. This is some 35% lower than the GLA typical benchmark and only 7% higher than the GLA Aspirational, suggesting that achieving the GLA Aspirational targets are achievable for the Proposed Development. It is recognised that the scale of extension does not trigger the need to formally submit a WLCA, but the Applicant has provided a full accounting of this, including GLA submission, for completeness. This can be found in Appendix E.

In terms of operational energy, alongside the proposed façade upgrades in certain locations and the high-performance new facades (in particular to relevant areas of L04), the energy strategy is moving to a newly installed heat-pump-led 100% electric HVAC solution, with VRF units that allow for the flexible office use to be used efficiently, with a variable occupancy controlled by having modular heat pumps assigned to control specific office areas. The current modelling for planning application stage suggests that the Proposed Development whole building operational energy sits at x kWh/m2/year (NIA). Performance against Building Regulations Part L 2021 sits at an x% reduction at 'Be Green' stage, supported by the installation of x m2 of PV panels at roof level.

The existing poor-quality cluttered roof space is replaced with a new high-performance roof systems and terraces at L04, which facilitates accessible terraces, extensive urban greening (see Section 11.10) and space for plant equipment and photovoltaic panels. Blue roof systems cover the majority of the new roof spaces, as described in Section 11.5.2.

In summary, the following sustainability metrics are proposed at the time of this application, based on calculations and design information provided as part of this submission:

Currently Achieved (Planning Stage)

- Building Regulations Part L 2021 site-wide carbon emissions reductions of **29%** at 'Be Green' stage of the Energy Hierarchy.
- Building Regulations Part L 2021 site-wide carbon emissions reductions of **22%** at 'Be Lean' stage of the Energy Hierarchy.
- **73%** (by volume) of existing structure retained, and **69%** of façade retained (by façade surface area) or 60.4% by mass.
- A baseline upfront embodied carbon of **619 $kgCO_2e/m^2$ GIA A1-A5** (split as 536 $kgCO_2e/m^2$ GIA A1-A5 for base build and 83 $kgCO_2e/m^2$ GIA A1-A5 for Cat A installations), with reported values including early-stage contingency of +62 $kgCO_2e/m^2$ GIA A1-A5 (reported within previous value).
- **967 m^2 of blue roof**, with combined areas of blue and green roof systems, achieving a reduction in the total surface runoff rate from the existing site of **92.4%**.
- **100% electric HVAC** building services solution with **all refrigerant GWP <700** and **utilising PV installation** at roof level.

- Base-build operational Energy Use Intensity (EUI) of **68.9 kWh/m²/year (NIA)** and whole-building EUI of 151.2 kWh/m²/year (NIA).
- Extensive and intensive green roof systems resulting in a Biodiversity Net Gain (BNG) expected to be **well in excess of 10%.** Please refer to Section 11.4 of the DAS for the Urban Greening Factor (UGF result).
- Target of **BREEAM Excellent** with a current target score of **79.97%.**
- **Greywater harvesting systems** included within the design.
- **Significant improvements to sustainable transport facilities** with cycle spaces and showers meeting current policy.

Aspirational Targets (to be verified by future information)

- Aspirational Upfront Embodied Carbon target at Practical Completion of >475 kgCO_2e/m² GIA A1-A5.
- Target 98% diversion from landfill for demolition and construction waste.
- Target 20% of new materials with high recycled content.
- Deploy and maintain targets and methodology within Construction Management Plan.
- Explore opportunities for reuse of demolition materials.
- Review opportunities to improve operational Energy Use Intensity (EUI)

11.2. Sustainability Certifications

The BREEAM assessment is a key component of the Proposed Development Sustainability Strategy, aligning specific credits with the project's energy and sustainability objectives. It provides a framework for sustainable development and a comprehensive evaluation of overall sustainability performance. With a focus on design intent, BREEAM can also act as a timeline management tool, establishing deadlines for design information in accordance with the RIBA Plan of Works and prioritizing early actions before the end of RIBA Stage 2 to ensure the timely integration of sustainable practices.

The Proposed Development involves renovating existing structures into flexible office spaces on the upper floors, along with basement amenities, a new ground floor reception on Alfred Place, and a series of retail units located on both the ground floor and basement. A partial roof extension is proposed for L04, featuring photovoltaic panels and a green roof.

To facilitate this development, the following interventions are proposed:

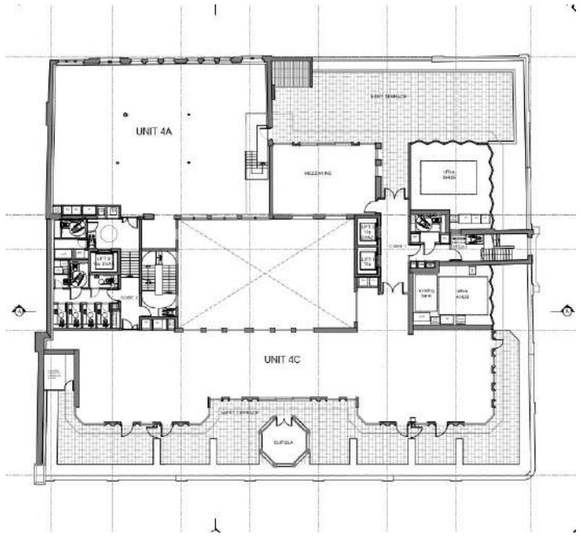
- Demolition and replacement of the existing roof, except for the section over Building A1.
- Demolition of Building A2, to be rebuilt as part of the new construction, infilling the gap in the Alfred Place elevation.
- Addition of a new roof extension and plant enclosures.
- Reconfigured circulation core, including stairs and a lift, in the northern link of Building D1.
- Replacement of existing lift shafts and pits to accommodate larger lifts.
- Reconfiguration of the basement, including localized slab lowering for new lift pits and a UKPN substation.
- Installation of a new atrium roof.

The existing site comprises four primary buildings with courtyard infill links. The proposed development aims to reconfigure these into a single structure while preserving and repairing the existing building fabric where necessary. The entire building will be assessed under the most suitable BREEAM refurbishment and fit-out scheme (2014).

The BRE has confirmed that a single RFO assessment can be completed, as the original building exceeds 2,500 m² and the new extension does not exceed 500 m² NIA (BREEAM Technical Manual SD216 2020). Despite an uplift in Gross Internal Area (GIA) of 988 m², the total extension space, as indicated in the drawings, remains below 500 m² NIA. The changes in area result from the reconfiguration and demolition of existing slabs, lifts, stair areas, and walls, much of which occurs on lower floors and to partial sections of floorplates. The existing pitched roofs on Buildings B and C will be removed and replaced with new structures to accommodate the new level, while the roof structure on Building A, which will not have a vertical extension, will be retained. The façade at L04 at 5-7 Alfred Place (where the retained Building A sits and 'Unit 4A' is located in the Proposed Development) is retained at L04, unlike the other façade systems at L04 along Tottenham Court Road and Store Street – see elevation drawing TCB-EMR-ZZZ-ZZZ-DR-A-05101 included in the drawing pack for the submission. Given this, and the infill modifications on lower floors to parts of floorplates that make up a significant portion of the new area, there is no clear-cut 'extension' to the building over 500 m² (i.e., this is not a proposal where there is an entirely new construction extension floor) where it would be practical or meaningful to apply a New Construction BREEAM assessment.

Figure 11.2.1: demolition drawing showing Building A retained at L04 (2311-EMR-Z00-004-DR-A-70206) and L04 of the Proposed Development (TCB-EMR-Z00-004-DR-A-02106) demonstrating minimal new office space construction.

(EMRYS: 2311-EMR-Z00-004-DR-A-70206 Level 4 Demolition Breakdown)



(EMRYS: TCB-EMR-Z00-004-DR-A-02106 Level 4 proposed GA for Planning)

A minimum of BREEAM 'Excellent' has been targeted for the scheme, in accordance with CC2 of the Camden Local Plan (2017) and CC10 of the Draft New Camden Local Plan (2024). The appended BREEAM Pre-assessment Tracker (Appendix C) indicates a targeted score of 79.97%, exceeding the minimum requirement for 'Excellent' by just under 10%, with a potential future score of 89.86%. Prior to the application, the scheme has already achieved 10.86% of the targeted credits.

Chapter 11 of the Camden Energy Efficiency & Adaptability CPG (EEA CPG) mandates that the proposed development achieves 60% of the Energy and Water Credits, as well as 40% of the Material Credits. The proposed development exceeds these requirements with:

- 66.6% of Energy credits targeted for the Office;
- 77.7% of Water credits targeted for the Office;
- 84.6% of Material credits targeted for the Office;

The targeted Energy credits include ENE04 and the BREEAM Low and Zero Carbon Feasibility Report, as highlighted in Section 5.5 of the EEA CPG. Additionally, the proposed development aims to achieve a minimum of 3 credits under WAT01, exceeding the minimum standard for Excellent as described in Section 5.55 of the Camden Local Plan (2017) and required by Policy CC9 of the Draft New Camden Local Plan (2024). Furthermore, the proposed development targets the maximum credits available in the Management, Transport, and Ecology sections.

The retail assessment is targeting 62.65% a 'Very Good' rating (score of ≥55%) under a shell only scope (which is most suitable for the Proposed Development retail units) and will provide one single assessment/certification covering all of the retail units. This is an allowable strategy as per the BRE's Guidance Note 10 (GN10). Due to the Shell only nature of the assessments with these assessments are often capped as they fail to meet the minimum standard for ENE01 to achieve the 'Excellent' rating. The shell only Ene01 section relies on heating and cooling demand only to award credits, typically due to the key fabric design elements for retails units to meet other key marketability and tenant requirements (extensive facade glazing, clear glass units, low g-values etc.) being in conflict with how the BRE approach this credit section, and a lack of ability to use building services to improve performance under a shell only scope. Without the 4 no. required credits for the shell only retail units, it is not possible to achieve the minimum standard required to secure an 'Excellent' rating, therefore Sweco believe that 'Very Good' is the correct target rating for retail assessment.

11.3. Energy & Operational CO_2 Emissions

The operational energy and associated CO_2 emissions information can be observed within the Energy Strategy and in particular within the following sections of this report and its appendices:

- **Section 1:** summary of Part L 2021 site-wide performance.
- **Section 5:** passive and active design measures and performance (particularly important given the context of façade retention for the Proposed Development).
- **Section 9:** EUI performance for base build, tenant and whole-building.
- **Section 10:** energy strategy summary.
- **Appendix E:** B6 emissions and energy within the Whole Life Carbon Assessment.

Further detailed studies and reviews of the operational energy performance of the building will take place at RIBA Stages 3 and 4 of the design process, points at which we have not yet reached. The results within this application document represent high-level modelling using the rules of key industry methodologies to estimate energy consumption using the limited detail available at the time of submission.

11.4. Operational Water Consumption

Minimising water consumption is an important aspect of sustainable design. Application of BREEAM plays an important role in steering the project towards low operational water consumption, and therefore credits have been selected accordingly to support this approach. This section covers the 'water conservation part of the Table provided in EEA CPG Chapter 10 Paragraph 10.30 (efficient use of water and reuse of water).

A minimum of 3 no. credits have been targeted for the office BREEAM assessment for the Proposed Development (note that this credit is n/a for the shell only retail uses). This is typically achievable using

low-flow and water efficient sanitaryware. Sweco would advise that the table below sets out the minimum performance requirements for each relevant item to achieve the 3-credit mark.

The table below shows the minimum requirements for water efficiency of sanitary components (focus on the office sanitaryware at this stage).

Table 11.4.1: table to show the Proposed Development target water efficiency for installed sanitaryware and water consuming equipment for potable water.

Water Fittings	Target Capacity/Flow Rate	Units
WCs	2.95	Effective flush (litres)
Wash Hand Basin Taps	4.5	Litres/min
Showers	6.0	Litres/min
Urinals	0.5	Litres/bowl/hour
Urinal (1 urinal only)	1.0	Litres/bowl/hour
Kitchen Tap (kitchenette)	4.5	Litres/min
Cleaners sink taps	5	Litres/min

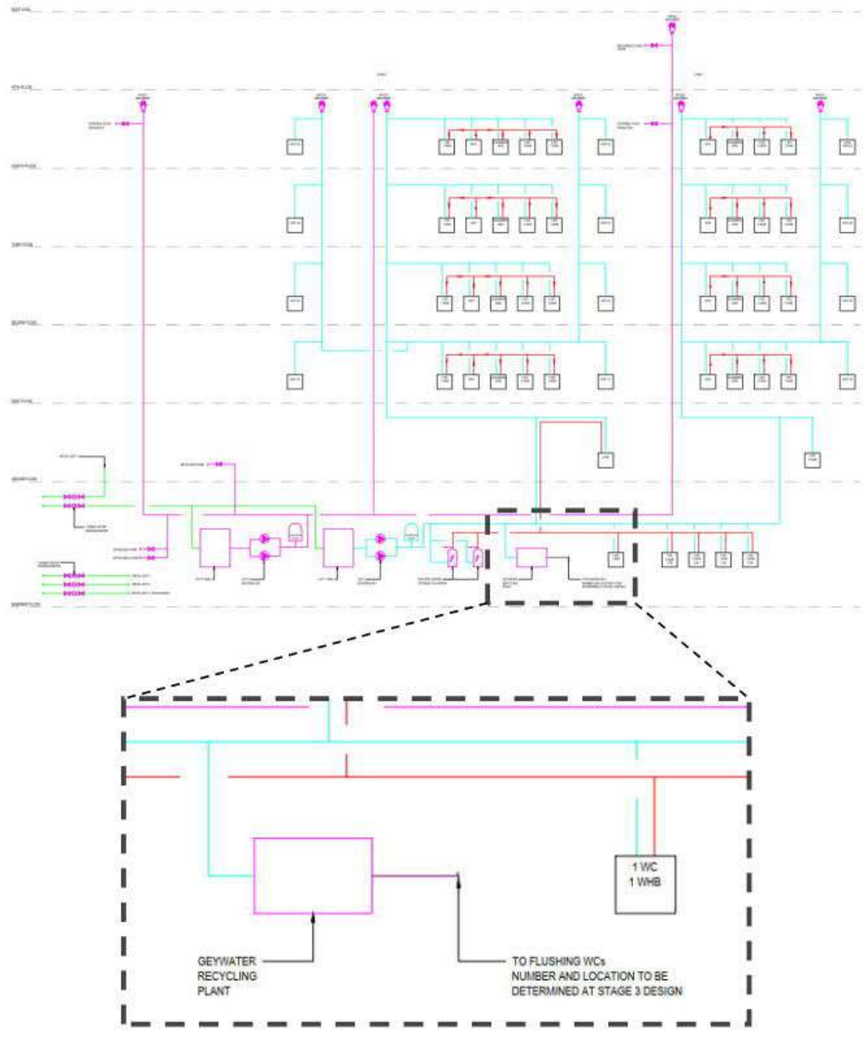
The following will also be included within the design & construction of the Proposed Development, supported by the BREEAM credit targets:

- Compliant metering and monitoring systems in line with BREEAM Wat02 requirements.
- Water leak detection, alarmed and connected to BMS.
- Sanitary shut-off devices to WC areas on office floors.
- Management of unregulated water consumption including management of irrigation systems for planting at L04 and L05, including controlled, sub-surface drip-fed irrigation systems that have a means of controlling water consumption and are reactive to weather conditions.

In addition to the last point listed above, planting for roofs and terraces will be selected for drought-resistant properties and climate resiliency to further negate the need for excessive use of water for irrigation and long-term maintenance of the proposed planting (see Section 10.11).

In addition, a greywater harvesting system is proposed for the development, located close to the proposed area for showers. This is demonstrably provisioned for within the current MEPH design information, as shown in Figure 11.4.1 opposite.

Figure 11.4.1: Sweco domestic water services schematic (RIBA Stage 2) showing the provision of the greywater harvesting system within the current design.



11.5.Flood Risk, Water Management & Drainage

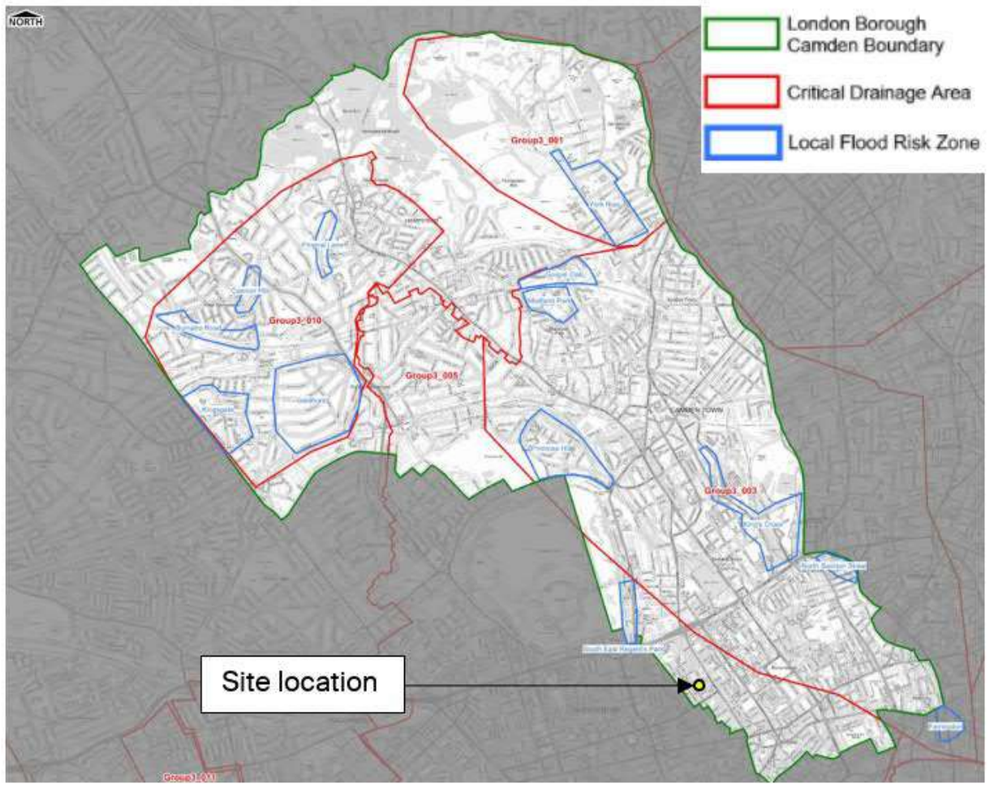
11.5.1.Flood Risk Assessment

This section provides a summary of the flood risk assessment included as part of the wider planning application documentation. Please refer to the Sustainable Drainage Strategy Section 5 for further details on this item.

The risk of flooding from all sources in considered to be low (fluvial and tidal, surface water, groundwater flooding). The Site sits within Flood Zone 1, approx. 1.3 km away from higher risk flood zones (2 & 3).

The local flood risk has also been reviewed using London Borough of Camden's SFRA. The assessment demonstrates that the site does not sit within a local flood risk zone (see Figure 11.5.1.1 below).

Figure 11.5.1.1: Local flood risk zone map from London Borough of Camden SFRA with the Site overlaid demonstrating that the Site does not sit within a local flood risk zone.



11.5.2.Sustainable Drainage Systems (SuDS)

This section provides a summary of the sustainable drainage strategy and solutions, with the full detail included as part of the wider planning application documentation. Please refer to the Sustainable Drainage Strategy for further details on this item.

As assessment of applicability of Sustainable Drainage Systems (SuDS) has been completed as peart of the submission for the Proposed Development, following the drainage hierarchy. Table 11.5.2.1 below sets out the key considerations of the drainage hierarchy and what has been defined as appropriate for the site.

Table 11.5.2.1: SuDS evaluation for the Proposed Development following the Drainage Hierarchy.

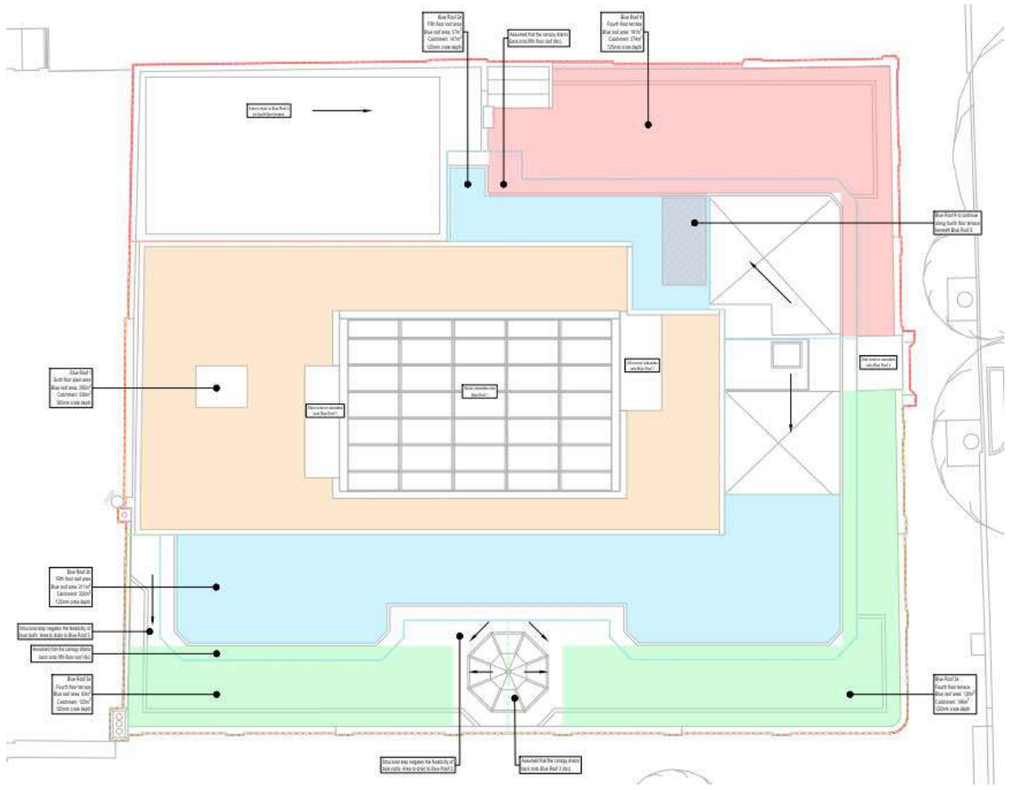
SuDS Technique	Proposed?	Comment
Rainwater reuse	N	Rainwater reuse has not been proposed for the Site as it is not considered feasible nor sustainable to install a rainwater system alongside blue roofs on an existing building due to services occupying existing risers; there is very limited space for the distribution of these systems within existing riser constraints. Additionally, there is only limited space at roof level given the other wider scheme benefits employed which makes accommodating this system
Infiltration devices	N	The proposed building footprint (including basement) occupies the full site area which precludes the use of infiltration devices.
Attenuation in green infrastructure	Y	There are a number of areas of soft landscaping across the terraces and roof spaces. Green roofs increase the time of entry for surface water and can reduce the volume of rainfall discharged off site. Please also refer to Section 11.10.
Attenuation in tanks or sealed water infrastructure	Y	A blue roof system is proposed at roof levels where feasible. The blue roof will reduce the peak flow of the surface water runoff.
Rainwater discharge direct to a watercourse	N	There are no watercourses located within the vicinity of the development.
Controlled rainwater discharge to a surface water sewer or drain	N	There are no surface water sewers located in the vicinity of the development.
Controlled rainwater discharge to a combined sewer	Y	It is proposed to discharge surface water to the existing combined sewer network

A detailed drawing of the blue roof systems is included within Appendix F of the Sustainable Drainage Strategy; please refer to that document for a full-scale version of the proposed blue roof systems. The system is made up of a variety of different depths:

- **L04 terrace:** 125mm depth system
- **L05 (roof):** 125mm system depth combined with sedum roof (non-plant areas)
- **L05 (roof):** 165mm system depth (plant areas)

The top (orange) area has deeper crates due to its larger catchment area compared to the blue roof section. Greater crate depths on the blue roof will help further reduce the flow rate, and this should be installed maximising this where feasible. The lower roof areas have tie-in details and plant space constraints, which limit the available depth for the blue roof (red, orange and green areas).

Figure 11.5.2.1: Proposed Extent of Blue roof systems for the Proposed Development with 125mm depth systems (blue, red and green) and 165mm depth systems (orange) across the various roof and terraces spaces.



The total coverage of the blue roof is 967 m^2, with a total catchment area of 1,658 m^2. Therefore, 58% of the total applicable site surface area is covered with blue roof systems as part of the sustainable drainage strategy.

The white area marked on the roof/terrace plan in Figure 11.5.2.1 above is part of the existing building and beyond thermal improvements will not include additional interventions, and therefore a blue roof is not proposed to be installed here. However, this area has been designed to drain into the 'red' blue roof zone, which will be attenuated, thus preventing discharge at an unrestricted rate.

The total calculated surface water runoff rate for the Proposed Development is 4.73 l/s. In the 100-in-100 year event + 40% for climate change, this reduces the total surface runoff rate from the existing site by 92.4%, down from 62.2 l/s.

Refer also to Section 11.1 of the DAS for further information.

11.6. Materials

The Applicant has provided a full Whole Life Carbon Assessment (WLCA) for the Proposed Development, in line with the GLA Whole Life-Cycle Carbon Assessments (2022) guidance. The full report in included in Appendix E, and this section therefore summarises the outcomes of that assessment rather than repeating all of this information. The GLA reporting template has also been included with this submission for completeness.

LBC Local Plan (2017) Policy CC1 states:

"All developments involving five or more dwellings and/or more than 500 sqm gross internal floor space are encouraged to assess the embodied carbon emissions associated with the development within the energy and sustainability statement".

The inclusion of WLCA reporting within this submission therefore supports the intent of Policy CC1. As described previously within this report, the Proposed Development takes significant steps to reduce embodied carbon by using less material in the first instance, retaining 73% (by volume) of the existing structure and 69% of existing facades (by façade surface area), although the retention of the facades has consequential impacts on operational performance due to its existing condition and interfaces (see also Condition & Feasibility Study in Appendix D), as described within the energy strategy. This retention has a positive impact on upfront embodied carbon (Modules A1-A5), which is critical as this is the carbon that occurs up to practical completion and is therefore the most immediate emission related to these proposals. See also Section 2, which described the extent of demolition, interventions and newly installed materials in more detail for the purposes of this report.

The planning-stage WLCA included in Appendix E includes the following key headline performance metrics for the Proposed Development, summarised in table format.

Table 11.6.1: Proposed Development WLCA results at application stage in $kgCO_2e/m^2$ GIA, with separate column showing the additional contingency margin included in the reported value.

WLCA Modules	Reported Result (Application Stage)	Includes contingency of…
Upfront Carbon $kgCO_2e/m^2$ GIA A1-A5	619	+62
Life Cycle Embodied $kgCO_2e/m^2$ GIA A-C	1,265	+150
Whole Life Carbon $kgCO_2e/m^2$ GIA A-C inc. B6 & B7	2,600	+150

At an early stage of design, and thus limited certainty in material quantities and procurement, it is sensible to include a contingency margin within all reported results. The WLCA in Appendix E confirms how this was applied for the model included with this application submission. In addition, at this stage

detailed material specifications are unknown, and therefore baseline material selections have been made for key materials in the absence of specific details or selections.

Even with the above noted, the Proposed development still demonstrates strong performance at Application stage. The upfront embodied carbon is 35% lower than the GLA Benchmark for offices, and only 7% higher than the GLA Aspirational target. It is reasonable to assume that with improving future certainty on material inputs, reducing contingency and the potential inclusion of reasonable specification-level reduction measures as outlined in the WLCA report, the Proposed Development may be able to achieve the GLA Aspirational Performance. It should be noted that without contingency the reported values for upfront embodied carbon are lower than the GLA Aspirational Benchmark (see Table 5.1.4.1 in the WLCA in Appendix E).

It is worth noting that this building is currently modelled as a flexible office space, and not as a Grade A commercial office with commercial tenants taking multiple floors. This makes benchmarking against the GLA targets problematic, as they make an assumption of a Cat A fit for the commercial benchmarks. It would be more practical to submit this either as a shell & core WLCA or as a fully fitted WLCA, however neither of which would result in a carbon value that is comparable with the benchmark. Therefore, this submission has been made with shell & core + a notional Cat A fit out aligned with the base build office design from RIBA Stage 2 and BCO Cat A, to ensure that it is comparable with the GLA benchmarks.

The project will include a requirement in specifications at RIBA 3 for Environmental Product Declarations (EPDs). These documents provide third-party verified environmental performance data for materials and products used on a development and are the basis of the LCA modelling exercises. Some product groups are more likely to have EPD information than others due to market competitiveness. It is important that the product groups are identified at RIBA 3 and agreements are made for reflecting their requirement in specification. The credit is marked as potential as Sweco currently understand that there is not a great availability of EPDs for construction products, so do not want to knowingly limit procurement decisions, but this should be reviewed at the next stage.

A requirement should be set on the project for giving preference to locally sourced materials and has been fed back to the team. Sweco also wish to establish the minimum requirements for responsible sourcing certifications for key material groups at Stage 2. The below table is based on Sweco experience and market feedback on available certifications for each group and is the proposed target for key materials. Please note that the timber requirement is mandatory; no BREEAM certificate can be provided if this is not upheld. The table below describes the minimum proposed responsible sourcing certification requirements for key material groups for the Proposed Development, to be reflected in consultant specifications.

Table 11.6.2: table to show the targeted responsible sourcing certification for key material and product groups to uphold responsible sourcing targets.

Key Material/Product Group	Minimum Certification Level
Concrete/cement	BES 6001 (Very Good)
Steel (reinforcement)	CARES/BES 6001 (Very Good)
Steel (structural)	BES 6001 (Very Good)
Timber (mandatory)	FSC, PEFC
Metals	ISO 14001 Key Process + Supply Chain
Gypsum/Plasterboard	Gypsum/Plasterboard BES 6001 (Very Good)
Stone	BES 6001 (pavers), ISO 14001 Key Process + Supply Chain
Insulation	BES 6001 (Very Good) preferred, ISO 14001 Key Process + Supply Chain as a minimum
Glass	14001 Key Process + Supply Chain

Within the submitted BREEAM assessment for the office areas, 84.6% of available credits are targeted for Materials, in line with the requirements of EEA CPG Chapter 11 (paragraph 11.3).

11.7. Waste & The Circular Economy

11.7.1. Introduction

The Proposed Development embraces a holistic circular design strategy based on the principles of the circular economy, which seeks to move away from the linear model of take-make-dispose, towards a more sustainable approach of reduce-reuse-recycle.

To ensure a holistic circular process, three phases are identified: existing development, design and construction, and operation. The Proposals intend to maximise retention and refurbishment of the existing development to reduce material manufacture, transport, and construction, thereby enabling carbon savings and waste prevention. Materials to be stripped out and removed will maximise material recovery and reuse, adhering to circular economy principles. This involves careful deconstruction to salvage valuable materials, minimising waste and environmental impact. The design and construction of the Proposed Development takes circularity into consideration for the entire lifecycle of a building, aiming to minimise waste, maximise resource efficiency, and promote sustainability. In operation, the Development's circularity focuses on sustainable practices that enhance resource efficiency and reduce environmental impact.

The following headlines can be drawn from the Circular Economy Strategy:

- 73% (by volume) of existing structure is retained.
- 69% (by façade surface area) of existing facades are retained.
- Target 98% diversion of demolition & construction waste from landfill.
- Target 20% of new materials with high recycled content.
- Design facilitates future flexibility & adaptability (see Section 11.7.4).
- Operational waste facilities recycling in line with regional and local policy.

11.7.2. The Existing Building

Please refer to the Condition & Feasibility Study for an in-depth review of the existing building, which is included in Appendix D.

The current proposals are designed to retain 73% (by volume) of the existing structure and 69% of the existing facades (by measured façade surface area), emphasising a commitment to sustainability and resource efficiency for this site. By preserving the majority of the structure and facade, the project seeks to minimise waste associated with demolition and new construction, thereby reducing the overall environmental impact.

The retained portions will undergo careful assessment to ensure they meet current safety and performance standards while maintaining their original character. This strategy enables the development to balance the old with the new, creating a cohesive environment that serves both existing and future occupants. By focusing on retention, the proposals also aim to foster community engagement by enhancing the building's street-level presence and commercial offerings, ultimately contributing to the revitalisation of the surrounding area.

It is understood that prior to ownership the floors were stripped out of the MEP equipment and FF&E materials. Therefore, the scope for onsite reuse is very limited however it is expected that during the later stages the larger elements for demolition will be evaluated for recycling. Refer also to the images shown within the Condition & Feasibility Study in Appendix D, which demonstrates the current state of the existing building when the Applicant took ownership.

11.7.3. Pre Demolition Audit

A pre-demolition audit has been conducted by Elliott Wood. This report covers the limited quantities of materials that will be stripped out and demolished to facilitate the Proposed Development. It is important to note again here that the Applicant has limited ability for reuse of finishes, fittings and MEP as the majority of these materials have been stripped our already prior to the Applicant taking ownership of the building, and thus these products have already left site before we have had any ability to assess and control their end of life treatment.

The pre-demolition audit notes the following materials represent the most significant waste streams arising from demolition:

- **Masonry:** 776 tonnes
- **Concrete:** 680 tonnes
- **Timber:** 70 tonnes
- **Metals:** 2,522 tonnes
- **Glass:** 9.6 tonnes
- **Stone:** 18 tonnes

Opportunities for reuse (in the first instance) and recycling of these materials will be prioritised given the extent of the quantities. Aspirational targets have been set for the end of life treatment of these key material groups within the pre-demolition audit, as set out below in Table 11.7.3.1.

Table 11.7.3.1: aspirational targets for reuse and recycling of the major demolition material groups (as set out in the Pre-Demolition Audit Section 8.2 In Appendix F).

Material	% reuse on site	% Recycled/Diverted from Landfill
Concrete	<5	95
Metal	25	75
Masonry	50	50
Stone	50	50
Plasterboard	0	100
Timber	25	75

These targets are strictly aspirational and further investigation into the viability of their achievement will be undertaken at the next project Stage, prior to any strip or demolition occurring. Targets will be set for contractors to ensure that further reuse is prioritised, and that recycling where reuse is not possible is maximised. This is further to the current intent of the project, which is already to retain and reuse 73% (by volume) of existing structure and 69% of facades (by façade surface area), which already demonstrates a significant intent to maximise reuse of the existing building insitu prior to any demolition.

The Pre-Demolition Audit is included in Appendix F.

11.7.4. Proposed Development

The circular economy principles selected for the Proposed Development focus on creating sustainable products and systems by emphasising several key aspects: designing for longevity ensures that items are built to last, while designing for adaptability allows products to be modified for different uses over time. Flexibility in design accommodates various needs and changes in function, and designing for disassembly facilitates easy separation of components for repair or recycling. Additionally, recoverability and reusability are crucial, as they promote the return of materials to the production cycle, and designing out waste aims to eliminate unnecessary materials and by-products in the design process.

Designing for Longevity

Extending the lifespan of the existing Courtyard Building structures and facades through retention and upgrades involves a thoughtful approach that focuses on preserving and enhancing the original elements while improving their performance and functionality. By prioritising the retention of the original materials and features, this strategy minimises waste and the necessity for new materials. This holistic approach not only prolongs the useful life of the building but also contributes to a more sustainable built environment by promoting resource efficiency and reducing carbon footprints.

Designing for Flexibility and Adaptability

The design of the cores allows for efficiency and flexibility, which are essential for contemporary multi-tenant buildings, given the diverse needs of occupants. This design strategy not only addresses the current requirements of different tenants but also anticipates the future growth and changes in tenant demographics and market demands. Such foresight in design ensures that the Proposed Development remains functional and relevant throughout its lifespan. The floor plates provide opens spaces within the Proposed Development, where feasible with the existing structure. This design greatly improves the adaptability and versatility of the interior environment, enabling future tenants to customise the layout to suit their specific requirements. Whether they need an open-plan office, individual workstations separated by temporary partitions, collaborative areas, or a mix of these, the minimisation of fixed walls allows for easy reconfiguration as needs evolve over time.

Designing for Disassembly for Recovery and Reuse

The lightweight pavilion on the top floor has potential to be designed with modular components and easy-to-remove connections the pavilion can be dismantled without damaging the existing structure. This approach not only facilitates future renovations or repurposing but also aligns with sustainable practices by allowing materials to be reused or recycled.

The lightweight nature of the pavilion means that it imposes minimal load on the existing building, making disassembly safer and more manageable. By incorporating prefabricated elements, the pavilion can be constructed off-site and easily assembled on-site, further enhancing its disassembly potential. This design ensures that when the pavilion's purpose changes or when it reaches the end of its life cycle, it can be efficiently taken apart, with components preserved for future use, contributing to a circular economy and reducing overall waste.

Designing Out Waste

Retention is essential for minimising waste, and the approach for the Proposed Development emphasises preserving and upgrading the existing façade. Although the ground floor will be heavily modified, the majority of the façade will be maintained. Upgrading the current windows will also help reduce energy loss, enhancing the building's overall efficiency.

Furthermore, the new partial extension and roof construction can utilise standardized, prefabricated elements. This choice aligns with the commitment to minimising waste throughout the building's lifecycle, from production and transportation to installation and eventual disposal. By incorporating prefabrication, the Proposed Development can significantly decrease waste commonly associated with traditional construction methods.

Preserving the existing structure is an effective strategy for waste prevention. By retaining and reusing elements such as the foundation, walls, and structural framework, the proposals can avoid unnecessary demolition and construction waste. It’s important to note that further investigations and surveys will be undertaken in the next phase to evaluate the structure's suitability for retention. This comprehensive assessment will ensure that the retained elements meet the necessary safety and functionality standards for the Proposed Development.

Proposed Development Construction & Demolition Waste Targets

The Proposed Development has the following set targets for waste management from design and construction:

- 98% of demolition/strip out and construction waste to be diverted from landfill.
- Of the above, for demolition waste and additional target of >85% of this waste to be reused or recycled is set.
- Target 2 no. credits under BREEAM Wst01 for construction resource efficiency, with a waste rate of ≤1.2 tonnes of construction waste generated per 100 m^2 GIA.

11.7.5. Waste in Operation

Caneparo have produced the Delivery, Servicing and Waste Management Plan for the Proposed Development, which is included in the wider application submission documents. The summary for the operational waste proposals is outlined below:

The waste storage requirements for the office have been established according to British Standards, allowing for two collections per week and ensuring that at least 70% of the waste is recyclable. With the office covering approximately 4,404 sqm NIA and accommodating around 440 employees, the total forecasted waste generation is 22,020 litres. This can be halved with increased collection frequency. To manage this, a cardboard baler and a wheeled bin press compactor are proposed.

Waste storage calculations include: 2,753 litres of general waste (25%) in two 1,100-liter Eurobins, 4,404 litres of paper and cardboard (40%) in three 1,100-liter Eurobins with a baler, 3,303 litres of dry mixed recyclables (30%) in three Eurobins, and 551 litres of food waste (5%) in three 240-liter bins.

Additionally, a 660-liter bin will be designated for WEEE, along with separate containers for light bulbs and batteries. For the café and retail spaces, Unit 3 will have an internal store, while the shared café/retail store for Units 1 and 2 will total approximately 838 sqm NIA, equating to 8,380 litres of waste, which can also be halved with twice-weekly collection. This includes 1,048 litres of general waste (25%) in two 660-litre bins, 1,676 litres of paper and cardboard (40%) in three bins, 1,257 litres of dry mixed recycling (30%) in two bins, and 210 litres of food waste (5%) in one 240-liter bin. The restaurant unit will also have its own internal waste store, consistent with the communal waste storage setup.

11.8.Air Quality & Pollution

11.8.1.External Air Quality

A qualitative air quality assessment (AQA) has been undertaken for the Site. The aim of the assessment was to evaluate the suitability of the site for its intended use, assess whether there is the potential for the Proposed Development to impact on local air quality and determine whether the development will be Air Quality Neutral.

A baseline review of existing air quality conditions at and within the vicinity of the Site has been undertaken, utilising data available from LBC and Defra. Whilst the Site is located within the Camden AQMA and there have been exceedances of the NO_2 annual mean objective at the kerbside of Tottenham Court Road, levels of NO_2, PM_{10}, and $PM_{2.5}$ at the Site are expected to be well below the respective annual and short-term averaging period air quality objectives.

Based on the baseline review, the Site is suitable for the proposed end uses included as part of the Proposed Development, such that future occupants and users will not be exposed to poor air quality.

An assessment of the potential impacts on local air quality from construction phase activities has been completed for the Proposed Development with reference to IAQM guidance. This identified that there is a risk of dust impacts associated with demolition and construction activities. Through good site practice and the implementation of appropriate mitigation measures, the impacts of dust and particulate matter releases on local air quality will be negligible, corresponding to no significant effect.

In terms of the operation phase, there is expected to a very small net decrease in daily vehicle movements associated with the Proposed Development relative to the existing site use. Therefore, the change in traffic on the local road network would be well below relevant IAQM/EPUK guidance thresholds, such that further air quality assessment of vehicle emissions is not required. Given the outcomes of the baseline review, the net reduction in traffic associated with the Proposed Development is likely to have a negligible impact on local air quality, resulting in no significant effect.

The Proposed Development will benefit from a 100% electric heating, ventilation and air conditioning (HVAC) system. This will replace the existing gas-fired central heating, resulting in a net reduction in building emissions. The Proposed Development will include provision for a life-safety back-up generator, which will only be used in emergency situations and for the minimum amount of testing required by safety standards (i.e. not at risk of causing an exceedance of short-term air quality objectives).

On this basis, the Proposed Development was also assessed to be, at least, Air Quality Neutral within the guidelines set by the London Plan with respect to traffic and building emissions. Therefore, with a net reduction in road traffic emissions and building plant emissions, the Proposed Development will have a negligible impact on local air quality, resulting in no significant effect.

The AQA submitted with this application demonstrates that the Proposed Development complies with relevant national and local air quality policy, with no air quality constraints identified with respect to progressing the Proposed Development planning application.

The AQA is deemed to be in compliance with Local Plan (2017) Policy CC4.

11.8.2.Maintaining Internal Air Quality

When considering air quality performance, it is important to consider mitigation of internal air quality impacts for the building occupants as well as the external air quality concerns raised in the policy documentation. Development that promotes health is a key element of Local Plan (2017) Policy D1. The Proposed Development is designed to ensure that optimal indoor air quality is maintained for the building occupants and uses the best-practice methodologies set out in BREEAM, and WELL to help establish this.

An indoor air quality plan (IAQP) has been produced by Sweco's air quality team in accordance with the BREEAM Hea02 methodology. This set out a strategy for avoidance of and high-VOC internal fixings, and finishes, and propose a strategy for specification, and determination of low-impact materials. This will be further underwritten by the engagement with BREEAM approaches to this subject, which provide supporting information, and set targets for VOC, and internal air pollutant compliance. In support of the VOC credits targeted.

In addition, the proposed Development promotes health by:

- Providing cycle parking and facilities for building occupiers in accordance with the requirements of the London Plan & Camden guidance (see Section 11.11).
- Providing accessible outdoor space for building occupants via L04 terraces.
- Ground-floor facilities provision including café.
- Extensive urban greening across roof and terraces (519.6 m2 total).
- Maintaining compliant internal acoustic performance.
- Ensuring comprehensive safety and security of the site.

11.8.3.Noise Pollution

A Noise Planning report has been provided with this application by Acoustic Specialists Sandy Brown; please refer to that report for a full accounting of the actions proposed to mitigate noise pollution for the Proposed Development.

An environmental noise survey has been carried out in two locations to determine the existing sound levels in the area. The noise survey was performed between 12:40 on 25 June 2024 and 10:50 on 2 July 2024.

Analysis of the survey data has determined that the representative background sound levels measured during the survey were:

- $L_{A90,15min}$ 53 dB during the day and $L_{A90,15min}$ 45 dB at night at location 1 (east)
- $L_{A90,15min}$ 62 dB during the day and $L_{A90,15min}$ 57 dB at night at location 2 (west).

Based on the requirements of LBC and on the results of the noise survey, all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed:

- $L_{Aeq,15min}$ 43 dB during the day and $L_{Aeq,15min}$ 35 dB during the night at noise sensitive properties located to the east of the building in proximity to Alfred Place
- $L_{Aeq,15min}$ 52 dB during the day and $L_{Aeq,15min}$ 47 dB during the night at noise sensitive properties located to the west of the building along Tottenham Court Road.

These limits are cumulative and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

Based on LBC's noise policy for emergency plant, the noise egress from such systems must achieve:

- L_{Aeq} 63 dB at premises in proximity to location 1
- L_{Aeq} 72 dB at premises in proximity to location 2.

A back-up life-safety generator is proposed on the roof of the building. Calculations have been undertaken to determine that a cumulative generator sound pressure limit of L_{Aeq} 85 dB at a distance of 1 m from the generator enclosure, would be commensurate with meeting the LBC noise egress criteria for emergency equipment.

All other building services plant will be designed to achieve the noise limits for normally operating plant. At this stage, no information is available on the schedule, location and associated noise output of the proposed building services systems. Attenuation measures commensurate with achieving LBC's adopted noise policy will be incorporated into the design as the project progresses.

11.9. Biodiversity & Green Infrastructure

The intervention & extension measures set out for the Proposed Development in this report allow for the establishment of a significant improvement in urban greening across the site. The greening manifests itself specifically as intensive green roof at L04 within the new terrace systems created through the roof replacement, and in an extensive green roof at L04 roof over the new areas created. These systems and their locations are shown on the drawings below, and also included as part of the drawing submission for this application.

Figure 11.9.1: intensive green roof intent at L04 terraces for the Proposed Development.

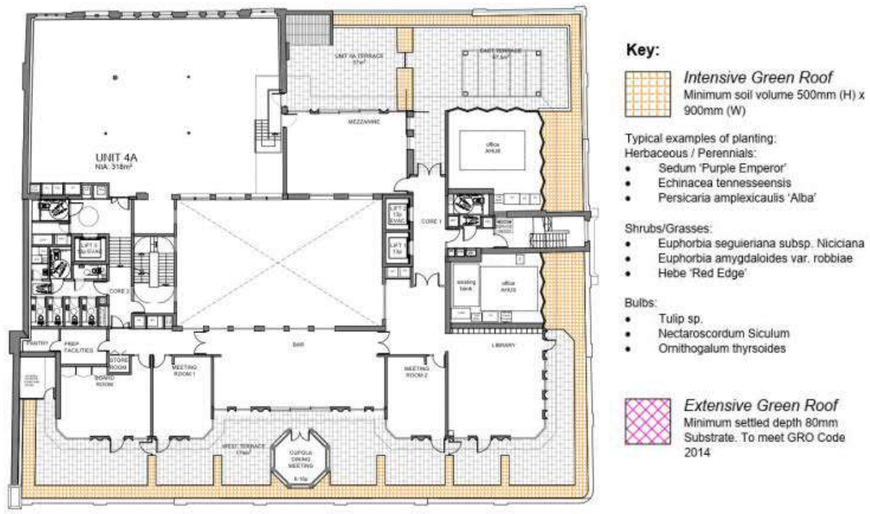
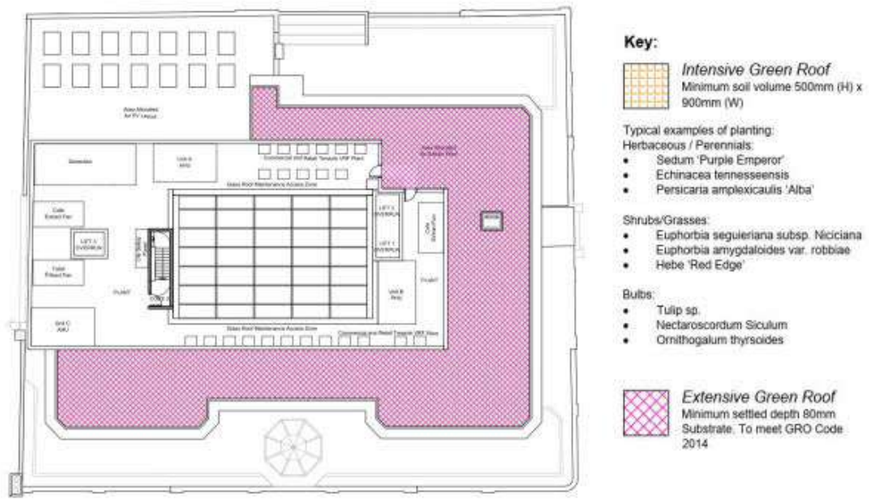


Figure 11.9.2: extensive green roof at L05 on top of the new extension elements (i.e. a new roof systems) and combined with the blue roof at these locations.



In total the Proposed Development provides 139 m^2 of intensive green roof and 380.6 m^2 od extensive green roof, for a total of 519.6 m^2 of planted roof space. This is a significant uplift from the existing building, which does not accommodate any urban greening within its site footprint currently.

Both roofs combine with blue roof systems as per Figure 11.5.2.1, and thus provide a dual benefit, with the planted roof systems helping to slow infiltration and thus assist the drainage strategy in peak storm conditions. This is a specific item of LBC Local Plan (2017) Policy CC2 item C, where combination green and blue roofs are preferred.

Greening has not been allocated to the uppermost plant areas (as seen in Figure 11.9.2 as this area will be accessed frequently for maintenance of the mechanical and electrical plant in this location, thus any roof system here would likely be damaged by regular footfall. No green (or blue) roof has been added to the retained building along Alfred Place (top left part of Figure 10.11.2) as this building, including its roof, is retained in full (thermally upgraded), and the weight of new blue and green roofs on this existing roof structure (which are often very heavy, especially when saturated) is not viable to accommodate in this location. PV panels have been placed here instead, so as not to clash with the blue and green roof systems and for better maintenance access of the PV panels during their service life (see also Section 8).

Urban Greening Factor (UGF)

Please refer to Section 11.4 of the Design and Access Statement (DAS) for confirmation on the UGF score achieved for the Proposed Development.

Biodiversity Net Gain

The habitats on site include building and hardstanding, with a single immature apple tree and two small, introduced shrub planters. The apple tree's diameter at chest height is 65cm, meaning that it does not meet the 'small tree' class definition with The Statutory Biodiversity Metric. As a result, this habitat has been excluded from the site's baseline calculation. The two shrub planters are no more than 2m2 in size each.

As per The Statutory Biodiversity Metric guidelines, the building and hardstanding habitats have a condition score of 0 and the introduced shrub planters have a condition score of 1. None of the habitats on site are priority habitats.

The Biodiversity Gain Requirements (Exemptions) Regulations (2024) states the following.

"The biodiversity gain planning condition does not apply in relation to planning permission for development which meets the first and second conditions.

(2) The first condition is that the development does not impact an onsite priority habitat.

(3) The second condition is that the development impacts—

(a)less than 25 square metres of onsite habitat that has biodiversity value(1) greater than zero; and

(b)less than 5 metres in length of onsite linear habitat."

The works will not impact any priority habitats, as there are none on site, and the works will impact less than 25 square meters of non-priority habitat on site that has a biodiversity value greater than zero.

As the site meets both conditions detailed above, the works are therefore subject to the de minimis exemption for biodiversity net gain under paragraph 4 of the Biodiversity Gain Requirements (Exemptions) Regulations 2024. As such, the requirement to deliver biodiversity net gain under the Environment Act (2021) does not apply to this scheme.

As the baseline for the site is zero, all planting and measures that contribute to post-development Biodiversity Net Gain (BNG) score is infinitely better that what currently exists on site, and therefore the BNG calculator cannot compute this (states "cannot calculate and increase from 0"). Therefore, it is reasonable conclude that the site BNG is significantly higher than the >10% target set initially for the Proposed Development.

11.10. Sustainable Transport

In accordance with Policy T1 of the Camden Local Plan (2017) and Policy T2 of the Draft New Camden Local Plan (2024), the proposed development prioritizes a safe and accessible environment for both cyclists and pedestrians. The Site location achieves a PTAL rating of 6b from Transport for London's WebCAT tool, the highest possible rating for an urban location, demonstrating its outstanding accessibility from public transport.

Situated in a highly accessible Central London location near various rail, underground, and bus services, the Proposed Development includes an enhanced cycle storage facility. This will feature a diverse range of cycle spaces, including accessible stands, lockers, showers, changing rooms, and a bicycle repair station, in line with LCDS guidance.

The current office plans include a long-stay cycle store with a total of 66 cycle spaces, comprising:

- 44 two-tier spaces (22 racks, 66.7%)
- 12 Sheffield spaces (6 stands, 18.2%)
- 6 foldable bike lockers (9.1%)
- 4 accessible/larger spaces (6.1%)

Additionally, the facility will include a bike maintenance/repair unit, 76 lockers, 8 showers (including 1 accessible shower), and changing facilities, all in accordance with LCDS guidance.

A transport statement, draft travel plan, and waste and delivery servicing plan have been prepared by Caneparo (October 2024), confirming that the site can achieve a maximum of 7 out of 7 BREEAM credits.

11.11. Sustainable Construction

Sustainability and environmental considerations must be managed throughout the construction phase of the development. A Site Waste Management Plan (SWMP) will be required as part of the BREEAM strategy, outlining waste management targets that include:

- Management of non-hazardous construction waste
- Accurate records of waste generation and disposal routes
- Proper handling of any hazardous waste on site

The principal contractor will be responsible for implementing sustainable practices during construction. They must possess an Environmental Management Scheme (EMS), such as ISO 14001, and adhere to best practice pollution prevention guidelines (PPG6).

During construction, the principal contractor will also need to meet BREEAM criteria related to construction management, including monitoring site water and energy use, waste production, and material deliveries. Additionally, a Site Environmental Management Plan (SEMP) will be developed in alignment with ecological recommendations to ensure site protection and enhancement, in accordance with A1 and A3 the Camden Local Plan (2017)

A Draft Construction Management Plan (CMP) has also been produced by Caneparo Associates and is included as part of this application submission, in compliance with the relevant Camden policies related to this item and underpinning aspects of this Sustainability Statement, such as pollution and air quality during construction.

12. Summary & Conclusions

This Energy & Sustainability Strategy has been prepared on behalf of Knighton Estates Limited (the 'Applicant') by Sweco UK for the refurbishment and extension of The Courtyard Building, 1 Alfred Place, WC1E 7EB (the Proposed Development) in the London Borough of Camden (LBC). The development is described as follows:

"Refurbishment and extension of the building to provide commercial, business and service use (Class E) including infill extension, roof extension and replacement facades to Alfred Place, reconfiguration of entrances and servicing arrangements, rooftop plant equipment, PV panels, new landscaping, provision of cycle parking and other ancillary works."

The Proposed Development will need to conform to the requirements set out in Approved Document **Part L Volume 2 (Conservation of Fuel, and Power) of the Building Regulations 2021**, and thus submit an energy assessment for the purposes of the planning application. 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).

Following the energy and carbon evaluation, it is proposed that practical energy efficiency measures along with low, and zero carbon (LZC) applications are incorporated into the design for the Proposed Development. These measures are undertaken in the context of the need to retain the heritage value of the existing building, particularly the street-facing facades, balanced against an intent to improve operational energy performance. The Sustainability Statement in Section 11 provides details of the overall sustainability strategy for the Proposed Development and the key features to support LBC policy requirements. The overall Energy & Sustainability Strategy achieves or aspires to achieve the following:

Currently Achieved (Application Stage)

- Building Regulations Part L 2021 site-wide carbon emissions reductions of **29%** at 'Be Green' stage of the Energy Hierarchy.
- Building Regulations Part L 2021 site-wide carbon emissions reductions of **22%** at 'Be Lean' stage of the Energy Hierarchy.
- **73%** (by volume) of existing structure retained, and **69%** of façade retained (by façade surface area) or 60.4% by mass.
- A baseline upfront embodied carbon of **619 kgCO_2e/m² GIA A1-A5** (split as 536 kgCO_2e/m² GIA A1-A5 for base build and 83 kgCO_2e/m² GIA A1-A5 for Cat A installations), with reported values including early-stage contingency of +62 kgCO_2e/m² GIA A1-A5 (reported within previous value).
- **967 m² of blue roof**, with combined areas of blue and green roof systems, achieving a reduction in the total surface runoff rate from the existing site of **92.4%**.
- **100% electric HVAC** building services solution with **all refrigerant GWP <700** and **utilising PV installation** at roof level.
- Base-build operational Energy Use Intensity (EUI) of **68.9 kWh/m²/year (NIA)** and whole-building EUI of 151.2 kWh/m²/year (NIA).
- Extensive and intensive green roof systems resulting in a Biodiversity Net Gain (BNG) expected to be **well in excess of 10%.** Please refer to Section 11.4 of the DAS for the Urban Greening Factor (UGF result).
- Target of **BREEAM Excellent** with a current target score of **79.97%.**
- **Greywater harvesting systems** included within the design.
- **Significant improvements to sustainable transport facilities** with cycle spaces and showers meeting current policy.

Aspirational Targets (to be verified by future information)

- Aspirational Upfront Embodied Carbon target at Practical Completion of >475 kgCO_2e/m² GIA A1-A5.
- Target 98% diversion from landfill for demolition and construction waste.
- Target 20% of new materials with high recycled content.
- Deploy and maintain targets and methodology within Construction Management Plan.
- Explore opportunities for reuse of demolition materials.
- Review opportunities to improve operational Energy Use Intensity (EUI)

Appendix A

BRUKL Reports (BR Part L 2021 Output Files)

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

The Courtyard Building Existing Baseline — As designed

Date: Mon Oct 14 22:02:12 2024

Administrative information

Building Details

Address: 1 Alfred Place, London, WC1E 7EB

Certifier details

Name: Kartik Amrania

Telephone number:

Address: 1 Bath Road, Maidenhead, SL6 4AQ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 989.5

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

The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	5.72	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	7.74	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	62.87	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	84.05	
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	0.55	0.55	00000007:Surf[0]
Floors	0.18	0.25	0.25	02000045:Surf[4]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	00000004:Surf[0]
Windows** and roof windows	1.6	1.4	1.4	00000001:Surf[0]
Rooflights***	2.2	2.1	2.1	02000045:Surf[2]
Personnel doors^	1.6	-	-	No personnel doors in building
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/(m²K)] — $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

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	25

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- Retail/Cafe/Restaurant VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	12.44	0	2.6	0.7
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- Reception VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	12.44	0	2.6	0.7
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.

3- Office VRF (Copy-fan coil)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.5	12.44	0	2.6	0.7
Standard value	2.5*	N/A	N/A	1.5^	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.

4- Shower Direct electric

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	0.7
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

"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
02_Office_02C_Peri S	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02B_Peri S	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02B_Peri SE	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02C_Peri SW	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02B_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02A_Peri NE	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
04_Meeting	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02C_Peri S	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02B_Peri S	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02B_Peri SE	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02C_Peri SW	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02B_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02A_Peri NE	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02C_Peri S	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02B_Peri S	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02B_Peri SE	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02C_Peri SW	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02B_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02A_Peri NE	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower circ	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower circ	-	-	-	0.7	-	-	-	-	-	-	N/A
03_Office_02A_Peri NE	-	-	-	-	-	-	-	0.5	-	-	N/A
04_Office_04A_Inner	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02C_Inner01	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02C_Inner02	-	-	-	-	-	-	-	0.5	-	-	N/A
02_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02C_Inner01	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02C_Inner02	-	-	-	-	-	-	-	0.5	-	-	N/A
03_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02C_Inner01	-	-	-	-	-	-	-	0.5	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
01_Office_02C_Inner02	-	-	-	-	-	-	-	0.5	-	-	N/A
01_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.5	-	-	N/A

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
00_Cafe_Inner	60	80	1.875
00_Cafe_Peri	60	80	1.875
00_Reception_Peri	60	80	1.688
00_Reception_Inner	60	80	1.687
00_Restaurant	60	80	1.875
00_Retail_02_Inner	60	80	1.875
00_Retail_01_Inner	60	80	1.875
00_Retail_03_Inner	60	80	1.875
00_Retail_03_Peri	60	80	1.875
00_Retail_01_Peri	60	80	1.875
00_Retail_02_Peri	60	80	1.875
00_Circ_01	60	-	-
00_Circ_02	60	-	-
00_Circ_03	60	-	-
00_Refuse Store	60	-	-
00_BOH	60	-	-
00_Circ_04	60	-	-
00_Circ_05	60	-	-
00_Circ_06	60	-	-
00_WC_01	60	-	-
00_WC_02	60	-	-
00_WC_Circ	60	-	-
00_Reception_Inner02	60	80	1.688
00_Stair_01	60	-	-
00_Circ_07	60	-	-
02_Office_02C_Peri S	60	-	-
02_Office_02B_Peri S	60	-	-
02_Office_02B_Peri SE	60	-	-
02_Office_02C_Peri SW	60	-	-
02_Office_02B_Inner	60	-	-
02_Office_02A_Inner	60	-	-
02_Office_02A_Peri NE	60	-	-
02_WC_Circ	60	-	-
02_WC_Circ	60	-	-
02_WC_01	60	-	-
02_WC_02	60	-	-
02_Circ_01	60	-	-

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
02_Circ_02	60	-	-
02_Stair_01	60	-	-
02_Stair_02	60	-	-
02_WC_03	60	-	-
02_WC_04	60	-	-
02_WC_05	60	-	-
02_WC_06	60	-	-
02_Office_02A_Inner	60	-	-
00_Post room	60	-	-
04_Stair_03	60	-	-
04_Meeting	60	-	-
03_Office_02C_Peri S	60	-	-
03_Office_02B_Peri S	60	-	-
03_Office_02B_Peri SE	60	-	-
03_Office_02C_Peri SW	60	-	-
03_Office_02B_Inner	60	-	-
03_Office_02A_Inner	60	-	-
03_Office_02A_Peri NE	60	-	-
03_WC_Circ	60	-	-
03_WC_Circ	60	-	-
03_WC_01	60	-	-
03_WC_02	60	-	-
03_Circ_01	60	-	-
03_Circ_02	60	-	-
03_Stair_01	60	-	-
03_Stair_02	60	-	-
03_WC_03	60	-	-
03_WC_04	60	-	-
03_WC_05	60	-	-
03_WC_06	60	-	-
03_Office_02A_Inner	60	-	-
03_Circ	60	-	-
01_Office_02C_Peri S	60	-	-
01_Office_02B_Peri S	60	-	-
01_Office_02B_Peri SE	60	-	-
01_Office_02C_Peri SW	60	-	-
01_Office_02B_Inner	60	-	-
01_WC_Circ	60	-	-
01_WC_Circ	60	-	-
01_WC_01	60	-	-
01_WC_02	60	-	-
01_Circ_01	60	-	-
01_Circ_02	60	-	-

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
01_Stair_01	60	-	-
01_Stair_02	60	-	-
01_WC_03	60	-	-
01_WC_04	60	-	-
01_WC_05	60	-	-
01_WC_06	60	-	-
01_Office_02A_Inner	60	-	-
01_Office_02A_Peri NE	60	-	-
01_Office_02A_Inner	60	-	-
B_Retail_01	60	80	1.875
B_Retail_02	60	80	1.875
B_Plant 01	60	-	-
B_Amenity	60	-	-
B_Water store	60	-	-
B_Circ_01	60	-	-
B_Circ_02	60	-	-
B_Bike store	60	-	-
B_Shower	60	-	-
B_WC	60	-	-
B_Shower	60	-	-
B_Shower	60	-	-
B_Shower	60	-	-
B_Shower	60	-	-
B_Shower	60	-	-
B_Shower	60	-	-
B_WC	60	-	-
B_WC	60	-	-
B_Stair	60	-	-
B_Plant	60	-	-
B_Plant	60	-	-
B_Plant	60	-	-
B_Bin store	60	-	-
B_Plant	60	-	-
B_Clean store	60	-	-
B_Plant	60	-	-
B_Restaurant	60	80	1.875
B_Drying	60	-	-
B_Drying	60	-	-
B_Shower circ	60	-	-
B_Shower circ	60	-	-
B_Drying	60	-	-
B_Circ_01	60	-	-
B_Circ_01	60	-	-

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
B_Circ_01	60	-	-
B_Bike store	60	-	-
B_Circ_01	60	-	-
B_Plant	60	-	-
B_Adj	60	-	-
B_Circ_01	60	-	-
B_Circ_01	60	-	-
B_store	60	-	-
B_store	60	-	-
B_Circ_01	60	-	-
03_Office_02A_Peri NE	60	-	-
04_Office_04A_Inner	60	-	-
02_Office_02C_Inner01	60	-	-
02_Office_02C_Inner02	60	-	-
02_Office_02C_InnerPeri	60	-	-
03_Office_02C_Inner01	60	-	-
03_Office_02C_Inner02	60	-	-
03_Office_02C_InnerPeri	60	-	-
01_Office_02C_Inner01	60	-	-
01_Office_02C_Inner02	60	-	-
01_Office_02C_InnerPeri	60	-	-

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?
00_Cafe_Inner	NO (-43.5%)	NO
00_Cafe_Peri	NO (-2.9%)	NO
00_Reception_Peri	NO (-13.3%)	NO
00_Reception_Inner	NO (-82%)	NO
00_Restaurant	YES (+81.3%)	NO
00_Retail_02_Inner	NO (-60.7%)	NO
00_Retail_01_Inner	NO (-37.5%)	NO
00_Retail_03_Inner	NO (-66.1%)	NO
00_Retail_03_Peri	YES (+78.1%)	NO
00_Retail_01_Peri	YES (+9.5%)	NO
00_Retail_02_Peri	YES (+65.3%)	NO
00_Reception_Inner02	N/A	N/A
02_Office_02C_Peri S	NO (-13.9%)	NO
02_Office_02B_Peri S	NO (-28.6%)	NO
02_Office_02B_Peri SE	NO (-39.8%)	NO
02_Office_02C_Peri SW	NO (-31.5%)	NO
02_Office_02B_Inner	NO (-68.7%)	NO
02_Office_02A_Inner	NO (-42.6%)	NO
02_Office_02A_Peri NE	NO (-59.2%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Office_02A_Inner	N/A	N/A
04_Meeting	YES (+7.7%)	NO
03_Office_02C_Peri S	NO (-20.9%)	NO
03_Office_02B_Peri S	NO (-32%)	NO
03_Office_02B_Peri SE	NO (-38.9%)	NO
03_Office_02C_Peri SW	NO (-36.8%)	NO
03_Office_02B_Inner	NO (-72.8%)	NO
03_Office_02A_Inner	NO (-46.3%)	NO
03_Office_02A_Peri NE	NO (-59.6%)	NO
03_Office_02A_Inner	N/A	N/A
01_Office_02C_Peri S	YES (+71.8%)	NO
01_Office_02B_Peri S	YES (+56%)	NO
01_Office_02B_Peri SE	YES (+6%)	NO
01_Office_02C_Peri SW	YES (+33.6%)	NO
01_Office_02B_Inner	NO (-35.8%)	NO
01_Office_02A_Inner	N/A	N/A
01_Office_02A_Peri NE	NO (-46.6%)	NO
01_Office_02A_Inner	NO (-19.3%)	NO
B_Retail_01	N/A	N/A
B_Retail_02	N/A	N/A
B_Restaurant	N/A	N/A
03_Office_02A_Peri NE	NO (-63.4%)	NO
04_Office_04A_Inner	NO (-62.6%)	NO
02_Office_02C_Inner01	NO (-53.5%)	NO
02_Office_02C_Inner02	NO (-65.2%)	NO
02_Office_02C_InnerPeri	NO (-61%)	NO
03_Office_02C_Inner01	NO (-59.4%)	NO
03_Office_02C_Inner02	NO (-69.4%)	NO
03_Office_02C_InnerPeri	NO (-66.4%)	NO
01_Office_02C_Inner01	YES (+4.7%)	NO
01_Office_02C_Inner02	NO (-21.1%)	NO
01_Office_02C_InnerPeri	NO (-21.7%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	7567.4	7567.4
External area [m²]	6800.9	6800.9
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	3966.94	2373.47
Average U-value [W/m²K]	0.58	0.35
Alpha value* [%]	22.51	10

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

Building Use

% Area	Building Type
17	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
83	**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	3.96	0.5
Cooling	1.83	5.26
Auxiliary	9.63	7.04
Lighting	20.34	12.55
Hot water	19.69	17.6
Equipment*	45.32	45.32
TOTAL**	**55.44**	**42.96**

* 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	0.17
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0.17*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	114.62	92.73
Primary energy [kWh_{PE}/m²]	84.05	62.87
Total emissions [kg/m²]	7.74	5.72

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	48.9	107.5	5.3	2.4	6.9	2.58	12.44	2.5	12.44
	Notional	1.6	141.2	0.2	8.5	8.5	2.78	4.63	----	----
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	30.2	130.9	3.2	2.9	3.4	2.58	12.44	2.5	12.44
	Notional	0.3	184.2	0	11	4.9	2.78	4.63	----	----
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	79.2	0	23.4	0	6.3	0.94	0	1	0
	Notional	1.6	0	0.3	0	4	1.41	0	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	42.5	112.2	4.9	2.5	15.8	2.4	12.44	2.5	12.44
	Notional	9.1	108.2	0.9	6.5	10	2.78	4.63	----	----
[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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

The Courtyard Building Existing Lean

As designed

Date: Wed Oct 16 07:08:25 2024

Administrative information

Building Details

Address: 1 Alfred Place, London, WC1E 7EB

Certifier details

Name: Kartik Amrania

Telephone number:

Address: 1 Bath Road, Maidenhead, SL6 4AQ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 989.5

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

The building does not comply with England Building Regulations Part L 2021

Target CO_2 emission rate (TER), $kgCO_2/m^2$.annum	5.75	
Building CO_2 emission rate (BER), $kgCO_2/m^2$.annum	5.96	
Target primary energy rate (TPER), kWh_{PE}/m^2.annum	63.13	
Building primary energy rate (BPER), kWh_{PE}/m^2.annum	64.66	
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	0.38	0.39	00000007:Surf[0]
Floors	0.18	0.22	0.22	02000045:Surf[4]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	00000004:Surf[0]
Windows** and roof windows	1.6	2.36	4.65	02000048:Surf[0]
Rooflights***	2.2	2.21	2.21	02000045:Surf[2]
Personnel doors^	1.6	-	-	No personnel doors in building
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/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

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	25

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	>0.95

1- Retail/Cafe/Restaurant VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	12.44	0	1.32	0.94
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- Reception VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	12.44	0	1.32	0.94
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.

3- Office VRF (Copy-fan coil)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	12.44	0	1.32	0.94
Standard value	2.5*	N/A	N/A	1.5^	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.

4- Shower Direct electric

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	0.94
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

"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
00_Retail_02_Inner	-	-	0.3	-	-	-	-	-	-	-	N/A
00_Retail_01_Inner	-	-	0.3	-	-	-	-	-	-	-	N/A
00_Retail_03_Inner	-	-	0.3	-	-	-	-	-	-	-	N/A
02_Office_02C_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02B_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02B_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02B_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
04_Meeting	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02B_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02B_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02B_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02B_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02B_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02B_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
B_Retail_01	-	-	0.3	-	-	-	-	-	-	-	N/A
B_Retail_02	-	-	0.3	-	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower circ	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower circ	-	-	-	0.7	-	-	-	-	-	-	N/A
03_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
04_Office_04A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02C_Inner01	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02C_Inner02	-	-	-	-	-	-	-	0.3	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
02_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Inner01	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Inner02	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Inner01	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Inner02	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.3	-	-	N/A

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
00_Cafe_Inner	95	80	1.875
00_Cafe_Peri	95	80	1.875
00_Reception_Peri	95	80	1.688
00_Reception_Inner	95	80	1.687
00_Restaurant	95	80	1.875
00_Retail_02_Inner	111	80	1.875
00_Retail_01_Inner	112	80	1.875
00_Retail_03_Inner	120	80	1.875
00_Retail_03_Peri	125	80	1.875
00_Retail_01_Peri	115	80	1.875
00_Retail_02_Peri	114	80	1.875
00_Circ_01	95	-	-
00_Circ_02	95	-	-
00_Circ_03	95	-	-
00_Refuse Store	95	-	-
00_BOH	95	-	-
00_Circ_04	95	-	-
00_Circ_05	95	-	-
00_Circ_06	95	-	-
00_WC_01	246	-	-
00_WC_02	271	-	-
00_WC_Circ	95	-	-
00_Reception_Inner02	95	80	1.688
00_Stair_01	95	-	-
00_Circ_07	95	-	-
02_Office_02C_Peri S	110	-	-
02_Office_02B_Peri S	110	-	-
02_Office_02B_Peri SE	110	-	-
02_Office_02C_Peri SW	110	-	-
02_Office_02B_Inner	110	-	-
02_Office_02A_Inner	110	-	-
02_Office_02A_Peri NE	110	-	-

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
02_WC_Circ	95	-	-
02_WC_Circ	95	-	-
02_WC_01	136	-	-
02_WC_02	178	-	-
02_Circ_01	95	-	-
02_Circ_02	95	-	-
02_Stair_01	95	-	-
02_Stair_02	95	-	-
02_WC_03	140	-	-
02_WC_04	152	-	-
02_WC_05	144	-	-
02_WC_06	171	-	-
02_Office_02A_Inner	110	-	-
00_Post room	95	-	-
04_Stair_03	95	-	-
04_Meeting	110	-	-
03_Office_02C_Peri S	110	-	-
03_Office_02B_Peri S	110	-	-
03_Office_02B_Peri SE	110	-	-
03_Office_02C_Peri SW	110	-	-
03_Office_02B_Inner	110	-	-
03_Office_02A_Inner	110	-	-
03_Office_02A_Peri NE	110	-	-
03_WC_Circ	95	-	-
03_WC_Circ	95	-	-
03_WC_01	130	-	-
03_WC_02	168	-	-
03_Circ_01	95	-	-
03_Circ_02	95	-	-
03_Stair_01	95	-	-
03_Stair_02	95	-	-
03_WC_03	134	-	-
03_WC_04	145	-	-
03_WC_05	138	-	-
03_WC_06	161	-	-
03_Office_02A_Inner	110	-	-
03_Circ	95	-	-
01_Office_02C_Peri S	110	-	-
01_Office_02B_Peri S	110	-	-
01_Office_02B_Peri SE	110	-	-
01_Office_02C_Peri SW	110	-	-
01_Office_02B_Inner	110	-	-
01_WC_Circ	95	-	-

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
01_WC_Circ	95	-	-
01_WC_01	155	-	-
01_WC_02	213	-	-
01_Circ_01	95	-	-
01_Circ_02	95	-	-
01_Stair_01	95	-	-
01_Stair_02	95	-	-
01_WC_03	160	-	-
01_WC_04	176	-	-
01_WC_05	166	-	-
01_WC_06	203	-	-
01_Office_02A_Inner	110	-	-
01_Office_02A_Peri NE	110	-	-
01_Office_02A_Inner	110	-	-
B_Retail_01	110	80	1.875
B_Retail_02	109	80	1.875
B_Plant 01	95	-	-
B_Amenity	95	-	-
B_Water store	95	-	-
B_Circ_01	95	-	-
B_Circ_02	95	-	-
B_Bike store	95	-	-
B_Shower	95	-	-
B_WC	271	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_WC	259	-	-
B_WC	271	-	-
B_Stair	95	-	-
B_Plant	95	-	-
B_Plant	95	-	-
B_Plant	95	-	-
B_Bin store	95	-	-
B_Plant	95	-	-
B_Clean store	95	-	-
B_Plant	95	-	-
B_Restaurant	95	80	1.875
B_Drying	95	-	-
B_Drying	95	-	-

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
B_Shower circ	95	-	-
B_Shower circ	95	-	-
B_Drying	95	-	-
B_Circ_01	95	-	-
B_Circ_01	95	-	-
B_Circ_01	95	-	-
B_Bike store	95	-	-
B_Circ_01	95	-	-
B_Plant	95	-	-
B_Adj	95	-	-
B_Circ_01	95	-	-
B_Circ_01	95	-	-
B_store	95	-	-
B_store	95	-	-
B_Circ_01	95	-	-
03_Office_02A_Peri NE	110	-	-
04_Office_04A_Inner	110	-	-
02_Office_02C_Inner01	110	-	-
02_Office_02C_Inner02	110	-	-
02_Office_02C_InnerPeri	110	-	-
03_Office_02C_Inner01	110	-	-
03_Office_02C_Inner02	110	-	-
03_Office_02C_InnerPeri	110	-	-
01_Office_02C_Inner01	110	-	-
01_Office_02C_Inner02	110	-	-
01_Office_02C_InnerPeri	110	-	-

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?
00_Cafe_Inner	NO (-67.8%)	NO
00_Cafe_Peri	NO (-38.4%)	NO
00_Reception_Peri	NO (-44.9%)	NO
00_Reception_Inner	NO (-89.7%)	NO
00_Restaurant	YES (+13.1%)	NO
00_Retail_02_Inner	NO (-77.9%)	NO
00_Retail_01_Inner	NO (-64.8%)	NO
00_Retail_03_Inner	NO (-80.9%)	NO
00_Retail_03_Peri	YES (+11.6%)	NO
00_Retail_01_Peri	NO (-31.1%)	NO
00_Retail_02_Peri	YES (+4.1%)	NO
00_Reception_Inner02	N/A	N/A
02_Office_02C_Peri S	YES (+13%)	NO
02_Office_02B_Peri S	NO (-15.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Office_02B_Peri SE	NO (-52%)	NO
02_Office_02C_Peri SW	NO (-14.8%)	NO
02_Office_02B_Inner	NO (-68.2%)	NO
02_Office_02A_Inner	NO (-19.6%)	NO
02_Office_02A_Peri NE	NO (-44.9%)	NO
02_Office_02A_Inner	N/A	N/A
04_Meeting	NO (-48.9%)	NO
03_Office_02C_Peri S	YES (+3.4%)	NO
03_Office_02B_Peri S	NO (-19.1%)	NO
03_Office_02B_Peri SE	NO (-50.9%)	NO
03_Office_02C_Peri SW	NO (-22.2%)	NO
03_Office_02B_Inner	NO (-72.1%)	NO
03_Office_02A_Inner	NO (-27.2%)	NO
03_Office_02A_Peri NE	NO (-45.5%)	NO
03_Office_02A_Inner	N/A	N/A
01_Office_02C_Peri S	YES (+49.2%)	NO
01_Office_02B_Peri S	YES (+46.7%)	NO
01_Office_02B_Peri SE	NO (-35.3%)	NO
01_Office_02C_Peri SW	YES (+20.2%)	NO
01_Office_02B_Inner	NO (-74.1%)	NO
01_Office_02A_Inner	N/A	N/A
01_Office_02A_Peri NE	NO (-26.2%)	NO
01_Office_02A_Inner	YES (+15.3%)	NO
B_Retail_01	N/A	N/A
B_Retail_02	N/A	N/A
B_Restaurant	N/A	N/A
03_Office_02A_Peri NE	NO (-47%)	NO
04_Office_04A_Inner	NO (-46.3%)	NO
02_Office_02C_Inner01	NO (-30.9%)	NO
02_Office_02C_Inner02	NO (-47.7%)	NO
02_Office_02C_InnerPeri	NO (-47.8%)	NO
03_Office_02C_Inner01	NO (-40.4%)	NO
03_Office_02C_Inner02	NO (-54.5%)	NO
03_Office_02C_InnerPeri	NO (-55.2%)	NO
01_Office_02C_Inner01	NO (-74.4%)	NO
01_Office_02C_Inner02	NO (-79.5%)	NO
01_Office_02C_InnerPeri	NO (-70.2%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	7569.7	7569.7
External area [m²]	6800.9	6800.9
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	4629.18	2374.01
Average U-value [W/m²K]	0.68	0.35
Alpha value* [%]	10.39	10

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

Building Use

% Area	Building Type
17	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
83	**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	4.52	0.5
Cooling	1.39	5.26
Auxiliary	6.14	7.15
Lighting	11.99	12.55
Hot water	19.68	17.6
Equipment*	45.32	45.32
TOTAL**	**43.71**	**43.07**

* 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	0.11
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0.11*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	103.37	92.74
Primary energy [kWh_{PE}/m²]	64.66	63.13
Total emissions [kg/m²]	5.96	5.75

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	30.5	86.3	3.2	1.9	3.9	2.64	12.44	2.64	12.44
	Notional	1.6	141.2	0.2	8.5	9.1	2.78	4.63	----	----
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	18.6	112.4	2	2.5	1.7	2.64	12.44	2.64	12.44
	Notional	0.3	184.2	0	11	4.9	2.78	4.63	----	----
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	60.6	0	16.8	0	6.3	1	0	1	0
	Notional	1.6	0	0.3	0	4	1.41	0	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	66.6	82.6	7	1.8	10.1	2.64	12.44	2.64	12.44
	Notional	9.1	108.1	0.9	6.5	10	2.78	4.63	----	----
[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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

The Courtyard Building Existing Green

As designed

Date: Wed Oct 16 06:58:20 2024

Administrative information

Building Details

Address: 1 Alfred Place, London, WC1E 7EB

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Certifier details

Name: Kartik Amrania

Telephone number:

Address: 1 Bath Road, Maidenhead, SL6 4AQ

Foundation area [m²]: 989.5

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

Target CO_2 emission rate (TER), $kgCO_2/m^2.annum$	5.75	
Building CO_2 emission rate (BER), $kgCO_2/m^2.annum$	5.46	
Target primary energy rate (TPER), $kWh_{PE}/m^2.annum$	63.13	
Building primary energy rate (BPER), $kWh_{PE}/m^2.annum$	59.5	
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	0.38	0.39	00000007:Surf[0]
Floors	0.18	0.22	0.22	02000045:Surf[4]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	00000004:Surf[0]
Windows** and roof windows	1.6	2.36	4.65	02000048:Surf[0]
Rooflights***	2.2	2.21	2.21	02000045:Surf[2]
Personnel doors^	1.6	-	-	No personnel doors in building
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/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

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	25

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	>0.95

1- Retail/Cafe/Restaurant VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	7.8	12.44	0	1.32	0.94
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- Reception VRF

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	7.8	12.44	0	1.32	0.94
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.

3- Office VRF (Copy-fan coil)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	7.8	12.44	0	1.32	0.94
Standard value	2.5*	N/A	N/A	1.5^	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.

4- Shower Direct electric

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	1	-	0.2	-	0.94
Standard value	N/A	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					YES

"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
00_Retail_02_Inner	-	-	0.3	-	-	-	-	-	-	-	N/A
00_Retail_01_Inner	-	-	0.3	-	-	-	-	-	-	-	N/A
00_Retail_03_Inner	-	-	0.3	-	-	-	-	-	-	-	N/A
02_Office_02C_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02B_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02B_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02B_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
04_Meeting	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02B_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02B_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02B_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02B_Peri S	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02B_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02B_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
B_Retail_01	-	-	0.3	-	-	-	-	-	-	-	N/A
B_Retail_02	-	-	0.3	-	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower circ	-	-	-	0.7	-	-	-	-	-	-	N/A
B_Shower circ	-	-	-	0.7	-	-	-	-	-	-	N/A
03_Office_02A_Peri NE	-	-	-	-	-	-	-	0.3	-	-	N/A
04_Office_04A_Inner	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02C_Inner01	-	-	-	-	-	-	-	0.3	-	-	N/A
02_Office_02C_Inner02	-	-	-	-	-	-	-	0.3	-	-	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
02_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Inner01	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_Inner02	-	-	-	-	-	-	-	0.3	-	-	N/A
03_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Inner01	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_Inner02	-	-	-	-	-	-	-	0.3	-	-	N/A
01_Office_02C_InnerPeri	-	-	-	-	-	-	-	0.3	-	-	N/A

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
00_Cafe_Inner	95	80	1.875
00_Cafe_Peri	95	80	1.875
00_Reception_Peri	95	80	1.688
00_Reception_Inner	95	80	1.687
00_Restaurant	95	80	1.875
00_Retail_02_Inner	111	80	1.875
00_Retail_01_Inner	112	80	1.875
00_Retail_03_Inner	120	80	1.875
00_Retail_03_Peri	125	80	1.875
00_Retail_01_Peri	115	80	1.875
00_Retail_02_Peri	114	80	1.875
00_Circ_01	95	-	-
00_Circ_02	95	-	-
00_Circ_03	95	-	-
00_Refuse Store	95	-	-
00_BOH	95	-	-
00_Circ_04	95	-	-
00_Circ_05	95	-	-
00_Circ_06	95	-	-
00_WC_01	246	-	-
00_WC_02	271	-	-
00_WC_Circ	95	-	-
00_Reception_Inner02	95	80	1.688
00_Stair_01	95	-	-
00_Circ_07	95	-	-
02_Office_02C_Peri S	110	-	-
02_Office_02B_Peri S	110	-	-
02_Office_02B_Peri SE	110	-	-
02_Office_02C_Peri SW	110	-	-
02_Office_02B_Inner	110	-	-
02_Office_02A_Inner	110	-	-
02_Office_02A_Peri NE	110	-	-

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
02_WC_Circ	95	-	-
02_WC_Circ	95	-	-
02_WC_01	136	-	-
02_WC_02	178	-	-
02_Circ_01	95	-	-
02_Circ_02	95	-	-
02_Stair_01	95	-	-
02_Stair_02	95	-	-
02_WC_03	140	-	-
02_WC_04	152	-	-
02_WC_05	144	-	-
02_WC_06	171	-	-
02_Office_02A_Inner	110	-	-
00_Post room	95	-	-
04_Stair_03	95	-	-
04_Meeting	110	-	-
03_Office_02C_Peri S	110	-	-
03_Office_02B_Peri S	110	-	-
03_Office_02B_Peri SE	110	-	-
03_Office_02C_Peri SW	110	-	-
03_Office_02B_Inner	110	-	-
03_Office_02A_Inner	110	-	-
03_Office_02A_Peri NE	110	-	-
03_WC_Circ	95	-	-
03_WC_Circ	95	-	-
03_WC_01	130	-	-
03_WC_02	168	-	-
03_Circ_01	95	-	-
03_Circ_02	95	-	-
03_Stair_01	95	-	-
03_Stair_02	95	-	-
03_WC_03	134	-	-
03_WC_04	145	-	-
03_WC_05	138	-	-
03_WC_06	161	-	-
03_Office_02A_Inner	110	-	-
03_Circ	95	-	-
01_Office_02C_Peri S	110	-	-
01_Office_02B_Peri S	110	-	-
01_Office_02B_Peri SE	110	-	-
01_Office_02C_Peri SW	110	-	-
01_Office_02B_Inner	110	-	-
01_WC_Circ	95	-	-

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
01_WC_Circ	95	-	-
01_WC_01	155	-	-
01_WC_02	213	-	-
01_Circ_01	95	-	-
01_Circ_02	95	-	-
01_Stair_01	95	-	-
01_Stair_02	95	-	-
01_WC_03	160	-	-
01_WC_04	176	-	-
01_WC_05	166	-	-
01_WC_06	203	-	-
01_Office_02A_Inner	110	-	-
01_Office_02A_Peri NE	110	-	-
01_Office_02A_Inner	110	-	-
B_Retail_01	110	80	1.875
B_Retail_02	109	80	1.875
B_Plant 01	95	-	-
B_Amenity	95	-	-
B_Water store	95	-	-
B_Circ_01	95	-	-
B_Circ_02	95	-	-
B_Bike store	95	-	-
B_Shower	95	-	-
B_WC	271	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_Shower	95	-	-
B_WC	259	-	-
B_WC	271	-	-
B_Stair	95	-	-
B_Plant	95	-	-
B_Plant	95	-	-
B_Plant	95	-	-
B_Bin store	95	-	-
B_Plant	95	-	-
B_Clean store	95	-	-
B_Plant	95	-	-
B_Restaurant	95	80	1.875
B_Drying	95	-	-
B_Drying	95	-	-

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
B_Shower circ	95	-	-
B_Shower circ	95	-	-
B_Drying	95	-	-
B_Circ_01	95	-	-
B_Circ_01	95	-	-
B_Circ_01	95	-	-
B_Bike store	95	-	-
B_Circ_01	95	-	-
B_Plant	95	-	-
B_Adj	95	-	-
B_Circ_01	95	-	-
B_Circ_01	95	-	-
B_store	95	-	-
B_store	95	-	-
B_Circ_01	95	-	-
03_Office_02A_Peri NE	110	-	-
04_Office_04A_Inner	110	-	-
02_Office_02C_Inner01	110	-	-
02_Office_02C_Inner02	110	-	-
02_Office_02C_InnerPeri	110	-	-
03_Office_02C_Inner01	110	-	-
03_Office_02C_Inner02	110	-	-
03_Office_02C_InnerPeri	110	-	-
01_Office_02C_Inner01	110	-	-
01_Office_02C_Inner02	110	-	-
01_Office_02C_InnerPeri	110	-	-

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?
00_Cafe_Inner	NO (-67.8%)	NO
00_Cafe_Peri	NO (-38.4%)	NO
00_Reception_Peri	NO (-44.9%)	NO
00_Reception_Inner	NO (-89.7%)	NO
00_Restaurant	YES (+13.1%)	NO
00_Retail_02_Inner	NO (-77.9%)	NO
00_Retail_01_Inner	NO (-64.8%)	NO
00_Retail_03_Inner	NO (-80.9%)	NO
00_Retail_03_Peri	YES (+11.6%)	NO
00_Retail_01_Peri	NO (-31.1%)	NO
00_Retail_02_Peri	YES (+4.1%)	NO
00_Reception_Inner02	N/A	N/A
02_Office_02C_Peri S	YES (+13%)	NO
02_Office_02B_Peri S	NO (-15.4%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
02_Office_02B_Peri SE	NO (-52%)	NO
02_Office_02C_Peri SW	NO (-14.8%)	NO
02_Office_02B_Inner	NO (-68.2%)	NO
02_Office_02A_Inner	NO (-19.6%)	NO
02_Office_02A_Peri NE	NO (-44.9%)	NO
02_Office_02A_Inner	N/A	N/A
04_Meeting	NO (-48.9%)	NO
03_Office_02C_Peri S	YES (+3.4%)	NO
03_Office_02B_Peri S	NO (-19.1%)	NO
03_Office_02B_Peri SE	NO (-50.9%)	NO
03_Office_02C_Peri SW	NO (-22.2%)	NO
03_Office_02B_Inner	NO (-72.1%)	NO
03_Office_02A_Inner	NO (-27.2%)	NO
03_Office_02A_Peri NE	NO (-45.5%)	NO
03_Office_02A_Inner	N/A	N/A
01_Office_02C_Peri S	YES (+49.2%)	NO
01_Office_02B_Peri S	YES (+46.7%)	NO
01_Office_02B_Peri SE	NO (-35.3%)	NO
01_Office_02C_Peri SW	YES (+20.2%)	NO
01_Office_02B_Inner	NO (-74.1%)	NO
01_Office_02A_Inner	N/A	N/A
01_Office_02A_Peri NE	NO (-26.2%)	NO
01_Office_02A_Inner	YES (+15.3%)	NO
B_Retail_01	N/A	N/A
B_Retail_02	N/A	N/A
B_Restaurant	N/A	N/A
03_Office_02A_Peri NE	NO (-47%)	NO
04_Office_04A_Inner	NO (-46.3%)	NO
02_Office_02C_Inner01	NO (-30.9%)	NO
02_Office_02C_Inner02	NO (-47.7%)	NO
02_Office_02C_InnerPeri	NO (-47.8%)	NO
03_Office_02C_Inner01	NO (-40.4%)	NO
03_Office_02C_Inner02	NO (-54.5%)	NO
03_Office_02C_InnerPeri	NO (-55.2%)	NO
01_Office_02C_Inner01	NO (-74.4%)	NO
01_Office_02C_Inner02	NO (-79.5%)	NO
01_Office_02C_InnerPeri	NO (-70.2%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	7569.7	7569.7
External area [m²]	6800.9	6800.9
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	25	3
Average conductance [W/K]	4629.18	2374.01
Average U-value [W/m²K]	0.68	0.35
Alpha value* [%]	10.39	10

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

Building Use

% Area	Building Type
17	**Retail/Financial and Professional Services**
	Restaurants and Cafes/Drinking Establishments/Takeaways
83	**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	1.72	0.5
Cooling	1.39	5.26
Auxiliary	6.14	7.15
Lighting	11.99	12.55
Hot water	19.68	17.6
Equipment*	45.32	45.32
TOTAL**	**40.91**	**43.07**

* 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	0.58	0.11
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0.58*	*0.11*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	103.37	92.74
Primary energy [kWh_{PE}/m²]	59.5	63.13
Total emissions [kg/m²]	5.46	5.75

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] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	30.5	86.3	1.1	1.9	3.9	7.8	12.44	7.8	12.44
	Notional	1.6	141.2	0.2	8.5	9.1	2.78	4.63	----	----
[ST] Variable refrigerant flow, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	18.6	112.4	0.7	2.5	1.7	7.8	12.44	7.8	12.44
	Notional	0.3	184.2	0	11	4.9	2.78	4.63	----	----
[ST] Central heating using water: radiators, [HS] Direct or storage electric heater, [HFT] Electricity, [CFT] Electricity										
	Actual	60.6	0	16.8	0	6.3	1	0	1	0
	Notional	1.6	0	0.3	0	4	1.41	0	----	----
[ST] Fan coil systems, [HS] ASHP, [HFT] Electricity, [CFT] Electricity										
	Actual	66.6	82.6	2.4	1.8	10.1	7.8	12.44	7.8	12.44
	Notional	9.1	108.1	0.9	6.5	10	2.78	4.63	----	----
[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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

The Courtyard Building Extension Lean

As designed

Date: Wed Oct 16 07:43:02 2024

Administrative information

Building Details

Address: 1 Alfred Place, London, WC1E 7EB

Certifier details

Name: Kartik Amrania

Telephone number:

Address: 1 Bath Road, Maidenhead, SL6 4AQ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 377.38

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	2.53	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	2.42	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	28.02	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	26.53	
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	0.15	0.15	04000000:Surf[7]
Floors	0.18	0.18	0.18	04000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	04000000:Surf[1]
Windows** and roof windows	1.6	1.01	1.01	04000000:Surf[2]
Rooflights***	2.2	2.2	2.2	02000045:Surf[2]
Personnel doors^	1.6	-	-	No personnel doors in building
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/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

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
m³/(h.m²) 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	>0.95

1- Office VRF (Copy-fan coil)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	12.44	0	1.32	0.94
Standard value	2.5*	N/A	N/A	1.5^	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.

"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
04_Office_04C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
04_Office_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A

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
04_Office_04C_Peri SW	110	-	-
04_Office_Peri SE	110	-	-
04_WC_Circ	95	-	-
04_Circ_01	95	-	-
04_WC_01	134	-	-
04_WC_02	174	-	-
04_WC_03	173	-	-
04_Circ_02	95	-	-
04_Stair_02	95	-	-
04_WC_04	136	-	-

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
04_Plant_01	95	-	-
04_Plant_02	95	-	-
04_Store	95	-	-
04_Plant	95	-	-
04_Circ	95	-	-
04_Circ	95	-	-
04_Circ	95	-	-

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?
04_Office_04C_Peri SW	NO (-4.7%)	NO
04_Office_Peri SE	NO (-61.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	913.1	913.1
External area [m²]	1673.2	1673.2
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	759.39	406.6
Average U-value [W/m²K]	0.45	0.24
Alpha value* [%]	6.61	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	0.53	0.05
Cooling	2.52	6.36
Auxiliary	4.43	4.55
Lighting	7.86	7.11
Hot water	2.72	1.09
Equipment*	110.15	110.15
TOTAL**	**18.05**	**19.16**

* 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]	117.88	106.43
Primary energy [kWh_{PE}/m²]	26.53	28.02
Total emissions [kg/m²]	2.42	2.53

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	12.6	282.8	1.3	6.3	10.8	2.64	12.44	2.64	12.44
	Notional	1.2	265.5	0.1	15.9	10.8	2.78	4.63	----	----
[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

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

The Courtyard Building Extension Green

As designed

Date: Wed Oct 16 07:33:50 2024

Administrative information

Building Details

Address: 1 Alfred Place, London, WC1E 7EB

Certifier details

Name: Kartik Amrania

Telephone number:

Address: 1 Bath Road, Maidenhead, SL6 4AQ

Certification tool

Calculation engine: Apache

Calculation engine version: 7.0.26

Interface to calculation engine: IES Virtual Environment

Interface to calculation engine version: 7.0.26

BRUKL compliance module version: v6.1.e.1

Foundation area [m²]: 377.38

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	2.53	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	2.29	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	28.02	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	25.21	
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	0.15	0.15	04000000:Surf[7]
Floors	0.18	0.18	0.18	04000000:Surf[0]
Pitched roofs	0.16	-	-	No pitched roofs in building
Flat roofs	0.18	0.18	0.18	04000000:Surf[1]
Windows** and roof windows	1.6	1.01	1.01	04000000:Surf[2]
Rooflights***	2.2	2.2	2.2	02000045:Surf[2]
Personnel doors^	1.6	-	-	No personnel doors in building
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/(m²K)] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [W/(m²K)]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [W/(m²K)]

* 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/m²K

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	>0.95

1- Office VRF (Copy-fan coil)

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	7.8	12.44	0	1.32	0.94
Standard value	2.5*	N/A	N/A	1.5^	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.

"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
04_Office_04C_Peri SW	-	-	-	-	-	-	-	0.3	-	-	N/A
04_Office_Peri SE	-	-	-	-	-	-	-	0.3	-	-	N/A

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
04_Office_04C_Peri SW	110	-	-
04_Office_Peri SE	110	-	-
04_WC_Circ	95	-	-
04_Circ_01	95	-	-
04_WC_01	134	-	-
04_WC_02	174	-	-
04_WC_03	173	-	-
04_Circ_02	95	-	-
04_Stair_02	95	-	-
04_WC_04	136	-	-

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
04_Plant_01	95	-	-
04_Plant_02	95	-	-
04_Store	95	-	-
04_Plant	95	-	-
04_Circ	95	-	-
04_Circ	95	-	-
04_Circ	95	-	-

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?
04_Office_04C_Peri SW	NO (-4.7%)	NO
04_Office_Peri SE	NO (-61.3%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	NO
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m²]	913.1	913.1
External area [m²]	1673.2	1673.2
Weather	LON	LON
Infiltration [m³/hm²@ 50Pa]	3	3
Average conductance [W/K]	759.39	406.6
Average U-value [W/m²K]	0.45	0.24
Alpha value* [%]	6.61	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	0.18	0.05
Cooling	2.52	6.36
Auxiliary	4.43	4.55
Lighting	7.86	7.11
Hot water	2.72	1.09
Equipment*	110.15	110.15
TOTAL**	**17.7**	**19.16**

* 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	0.54	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0.54*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m²]	117.88	106.43
Primary energy [kWh_{PE}/m²]	25.21	28.02
Total emissions [kg/m²]	2.3	2.53

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	12.6	282.8	0.5	6.3	10.8	7.8	12.44	7.8	12.44
	Notional	1.2	265.5	0.1	15.9	10.8	2.78	4.63	----	----
[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 Emissions Reporting Sheets

GLA Carbon Emission Reporting

Site-Wide

	Site-wide	Total regulated emissions (Tonnes CO_2/year)	CO_2 savings (Tonnes CO_2/year)	Percentage saving (%)
A	Part L 2021 baseline	61.0	-	-
B	Be lean	47.3	13.7	22%
C	Be clean	47.3	0.0	0%
D	Be green	43.4	3.9	6%
	Total cumilative savings	17.6	17.6	29%
		CO_2 savings off-set (Tonnes CO_2)		
	Off-set	43.40		

Commercial - Retained

	Energy Planning – Greater London Authority guidance on preparing energy assessment	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)	
		Regulated Energy	Unregulated Energy
A	Building Regulations 2013 Part L Compliant Development	58.6	227.2
B	After energy demand reduction	45.1	181.8
C	CLEAN - Same as Lean	45.1	181.8
D	After Renewable Energy	41.3	181.8

		Regulated Carbon Dioxide Savings	
		(Tonnes CO_2 per annum)	(%)
A - B	Savings from reduced energy demand	13.50	23.0%
B - C	Savings from Clean Tech	0.00	0.0%
C - D	Savings from renewable energy	3.80	6.5%
E	Total Cumulative Savings	17.30	**29.5%**
A	Total Target Savings - GLA's Target	58.60	**100%**
F	Regulated Annual Shortfall	41.30	

Commercial - New Elements

	Energy Planning – Greater London Authority guidance on preparing energy assessment	Carbon Dioxide Emissions (Tonnes CO_2 per Annum)	
		Regulated Energy	Unregulated Energy
A	Building Regulations 2013 Part L Compliant Development	2.4	552.2
B	After energy demand reduction	2.2	441.8
C	After CHP	2.2	441.8
D	After Renewable Energy	2.1	441.8

0.1

		Regulated Carbon Dioxide Savings	
		(Tonnes CO_2 per annum)	(%)
A - B	Savings from reduced energy demand	0.20	8.3%
B - C	Saving from CHP	0.00	0.0%
C - D	Savings from renewable energy	0.10	4.2%
E	Total Cumulative Savings	0.30	**12.5%**
A	Total Target Savings - GLA's Target	2.40	**100%**
F	Regulated Annual Surplus	2.10	

-

Energy Assessor : Kartik Amrania . BEng, MSc, CEng (MCIBSE), LCC, LCEA - 133950

Part L 2021 Performance

Residential

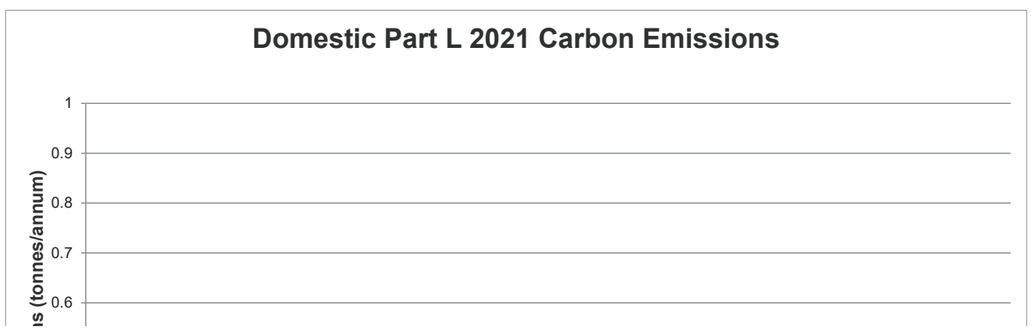
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	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

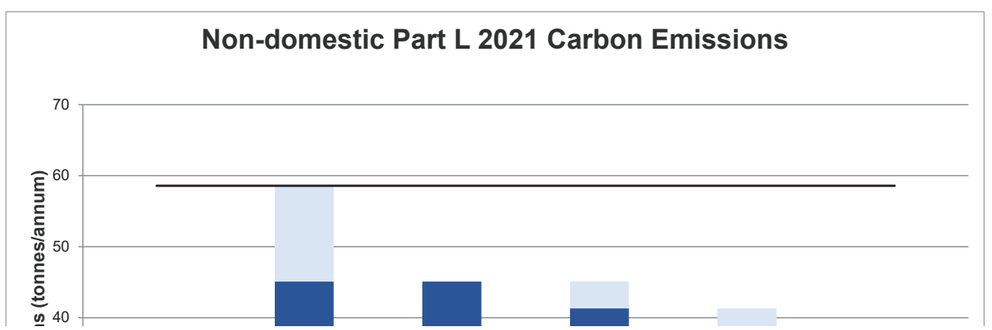
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

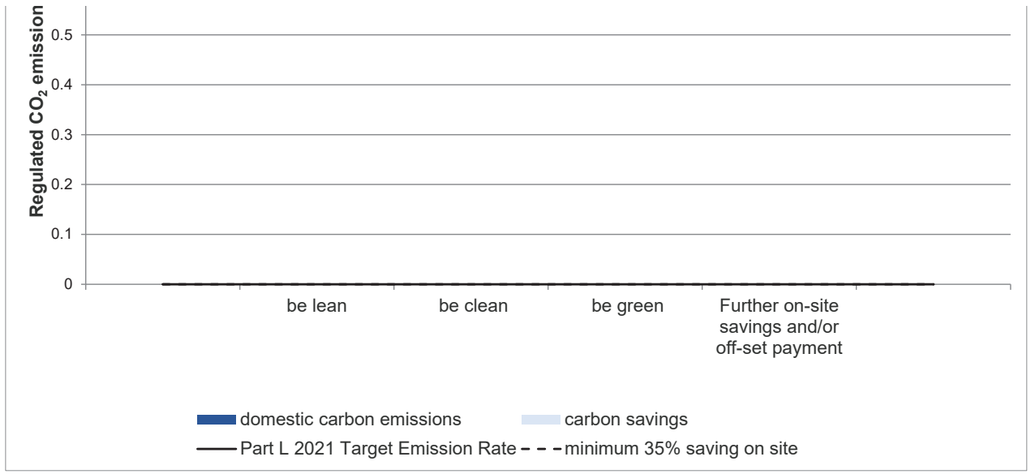
	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	58.6	227.2
After energy demand reduction (be lean)	45.1	181.8
After heat network connection (be clean)	45.1	181.8
After renewable energy (be green)	41.3	181.8

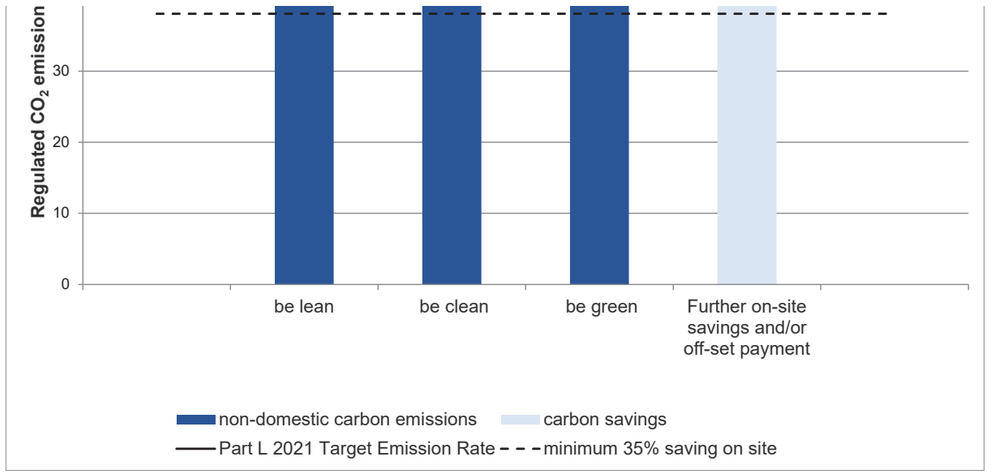
Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	13.5	23%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	3.8	6%
Total Cumulative Savings	**17.3**	**29%**
Annual savings from off-set payment	41.3	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**1,240**	-
Cash in-lieu contribution (£)	**117,756**	

*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	58.6		
Be lean	45.1	13.5	23%
Be clean	45.1	0.0	0%
Be green	41.3	3.8	6%
Total Savings	-	17.3	29%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**1,239.5**	-

	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	372.132	1873051.996
Notional	412.632	2076900.646

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

Part L 2021 Performance

Residential

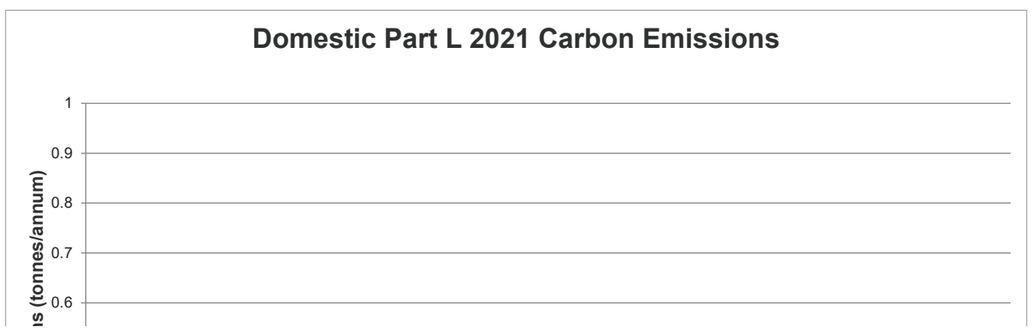
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential buildings

	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

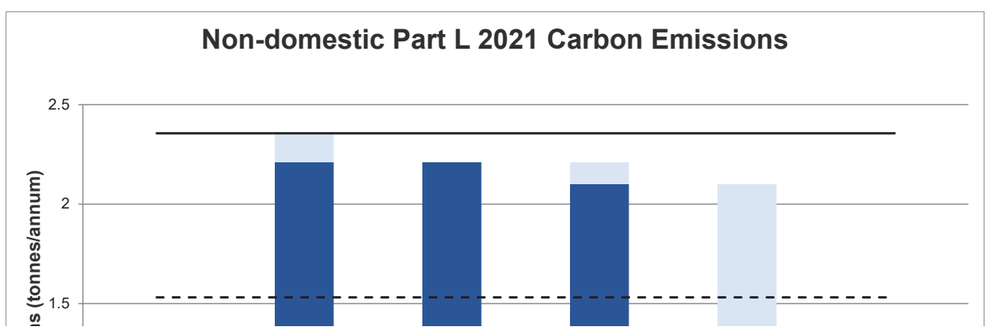
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential buildings

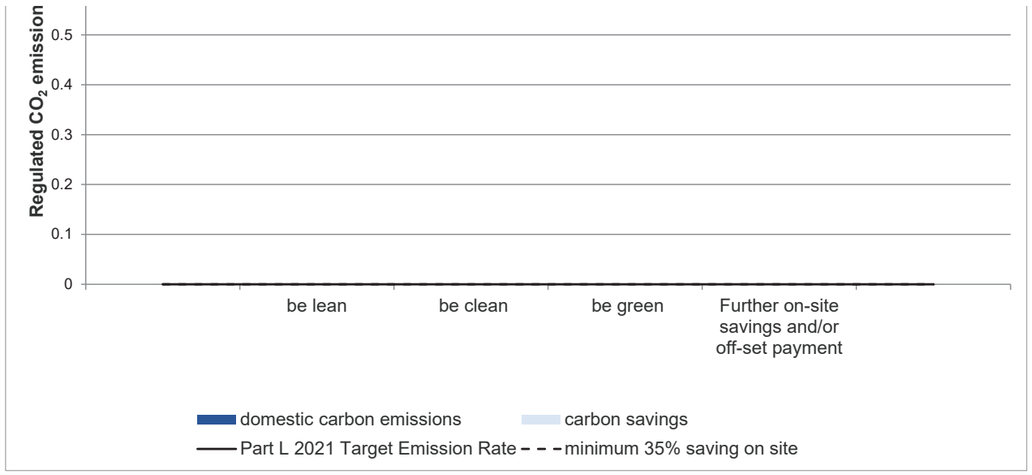
	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	2.4	552.2
After energy demand reduction (be lean)	2.2	441.8
After heat network connection (be clean)	2.2	441.8
After renewable energy (be green)	2.1	441.8

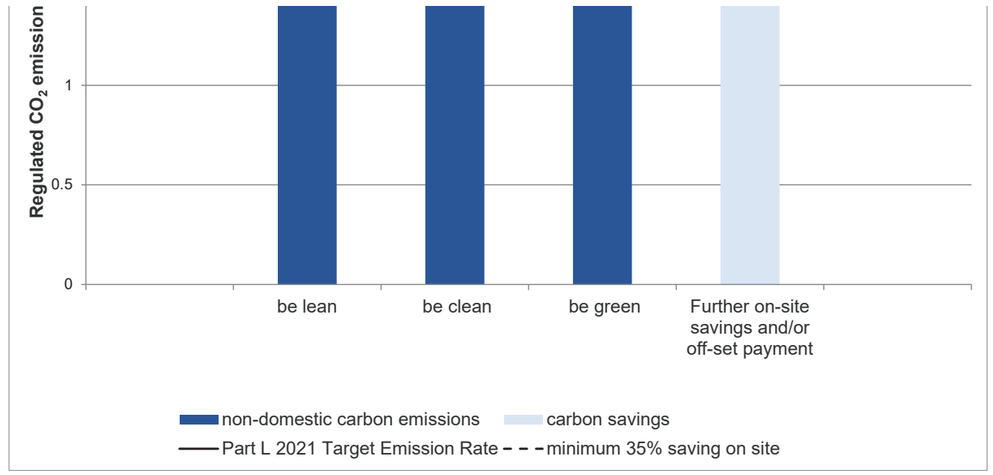
Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildings

	Regulated non-residential carbon dioxide savings	
	(Tonnes CO_2 per annum)	**(%)**
Be lean: savings from energy demand reduction	0.1	6%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.1	5%
Total Cumulative Savings	**0.3**	**11%**
Annual savings from off-set payment	2.1	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**63**	-
Cash in-lieu contribution (£)	**5,985**	

*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	2.4		
Be lean	2.2	0.1	6%
Be clean	2.2	0.0	0%
Be green	2.1	0.1	5%
Total Savings	-	0.3	11%
	-	**CO_2 savings off-set (Tonnes CO_2)**	-
Off-set	-	**63.0**	-

	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	12.888	64869.1704
Notional	16.992	85525.8336

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

Appendix C

BREEAM Pre-Assessment

BREEAM 2014 RFO (Non-Domestic)

Design & Procurement Assessment

The Courtyard Building

Issue	Date	Reason for Issue	Prepared		Checked		Approved	
1	21-Jun-24	Planning	NYO	21-Jun-24	KC	21-Jun-24	KC	21-Jun-24
2	10-Jun-24	Update	NYO	10-Jun-24	KC	10-Jun-24	KC	10-Jun-24

BREEAM 2014 RFO (Non-Domestic)

Revision2

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BREEAM 2014 RFO ASSESSMENT - DESIGN STAGE REPORT

Project Name	**The Courtyard Building**	Targeted BREEAM rating %	**79.97**	**Excellent**	Credit awarded
Building Type	**Office**	Potential BREEAM rating %	**89.86**	**Outstanding**	Credit not targeted
Project Type	**Shell and Core**	Achieved scoring %	**10.86**	**Unclassified**	Potential additional credit
					Further information required

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
MANAGEMENT	0.69% per credit								
Man 01	**Project brief and design**	Stakeholder Consultation (Project Delivery)	1	1		1	2		* A clear sustainability brief is developed prior to Stage 2 * Prior to completion of Stage 2 have met to identify and define their roles, responsibilities, and contributions for each of the key phases of project delivery. *The project team demonstrates how the project delivery stakeholder contributions and the outcomes of the consultation process have influenced or changed the Initial Project Brief, including if appropriate, the Project Execution Plan, Communication Strategy, and the Concept Design.
		Stakeholder Consultation (Third Party)	1	1		1	2		*All relevant third parties (planning consultation with local authority, local residents and any input from end user) been consulted.
		Sustainability Champion (Design)	1	1		1	1 - 2		*BREEAM AP is appointed prior to RIBA Stage 2 and BREEAM target formally agreed with the design team.
		Sustainability Champion (Monitoring Process)	1	1			4		*BREEAM AP is appointed to monitor progress against the target throughout the project up to the PC Stage.
Man 02	**Life cycle cost and service life planning**	Elemental Life Cycle Cost (LCC)	2	2			2		*An Elemental LCC analysis is required to be carried out at RIBA Stage 2 for 20, 30, 50 or 60 years LCC analysis. Appointment received awaiting final report.
		Component Level LCC Plan	1	1			4		* A component level LCC plan has been developed by the end of Process Stage 4 in line with PD 156865:2008 and includes the following component types: - Building envelope - Newly specified local and/or core service equipment, e.g. boiler, air-conditioning, air handling unit, and/or controls etc - Finishes, e.g. walls, partitions, floors and/or ceilings etc. - External spaces, e.g. alternative hard landscaping, boundary protection.
		Capital Cost Reporting	1	1			4		*Report the capital cost for the refurbishment/fit-out works in pounds per square metre (£k/m2) (GIA)
		Timber used on site to be responsibly sourced. *(Minimum Standard to achieve any BREEAM rating)*	.						*All timber and timber-based products used on the project is 'Legally harvested and traded timber'
		Environmental Management	1	1			4		*The principal contractor operates an environmental management system covering their main operations. The EMS must be either: - Third-party certified, to ISO 14001/EMAS or equivalent standard; or - Have a structure that is in compliance with BS 8555: 2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and has completed phase audits 1 to 4, as defined in BS 8555:2003. *The principal contractor implements best practice pollution prevention policies and procedures on-site in accordance with Pollution Prevention Guidelines, Working at construction and demolition-sites: PPG61.

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
Man 03	**Responsible construction practices**	Sustainability Champion (Construction)	1	1			4		* A Sustainability Champion is appointed to monitor the project to ensure ongoing compliance with the relevant sustainability performance/process criteria, and therefore BREEAM target(s), during Stages 5 and 6. *The defined BREEAM performance target forms a requirement of the principal contractor's contract
		Considerate Construction *(Minimum Standard: 1 credit for Excellent, 2 for Outstanding)*	2	2			4		*The principal contractor has used a 'compliant' organisational, local or national considerate construction scheme and their performance against the scheme has been confirmed by independent assessment and verification. *CCS score of >40 with at least 7 in each section to achieve 2+ exemplary BREEAM credits.
		Monitoring of Construction Site Impacts - Utility Consumption	1	1			4		*Monitor and record data of the site energy consumption in kWh (and where relevant, litres of fuel used) as a result of the use of construction *Report the total carbon dioxide emissions (total kgCO2/project value) from the construction process. *Monitor and record data on principal constructor's and subcontractors' potable water consumption (m3) arising from the use of construction plant, equipment (mobile and fixed) *Using the collated data report the total net water consumption (m3), i.e. consumption minus any recycled water use from the construction process
		Monitoring of Construction Site Impacts - Transport of Construction Materials & Waste	1	1			4		* Monitor and record data on transport movements and impacts resulting from delivery of the majority of refurbishment or fit-out materials to site and refurbishment, fit-out and demolition or strip-out waste from site
Man 04	**Commissioning & Handover**	Commissioning & Testing Schedule & Responsibilities	1	1			4		*There is a schedule of commissioning and testing that identifies appropriate commissioning required for the scope of works that includes a suitable timescale for commissioning and re-commissioning of all relevant works carried out. *The schedule will identify the appropriate standards that all commissioning activities will be conducted in accordance with, current Building Regulations, BSRIA and CIBSE guidelines *An appropriate project team member is appointed to monitor and programme pre-commissioning, commissioning, testing, and, where necessary, re-commissioning activities on behalf of the client. *The principal contractor accounts for the commissioning and testing programme, responsibilities and criteria within their budget and main programme of works, allowing for the required time to complete all commissioning and testing activities prior to handover.
		Commissioning Building Services	1	1			4		*A specialist commissioning manager who is appointed during the design stage (by either client or contractor) with responsibility for: - Undertaking design reviews and giving advice on suitability for ease of commissioning - Providing commissioning management input to construction programming and during installation stages -Management of commissioning, performance testing and handover/post handover stages.
		Testing and inspecting building fabric	1	1			4		*The integrity of the building fabric, including continuity of insulation, avoidance of thermal bridging and air leakage paths is quality assured through the completion of a thermographic survey as well as airtightness testing and visual inspection at appropriate times during the refurbishment. The survey/testing is undertaken by a Suitably Qualified Professional. *Any defects identified in the site inspection, thermographic survey and the airtightness testing reports are rectified prior to building handover and close out.
		Building User Guide *(Minimum Standard for Excellent and for Outstanding)*					4		*A Building User Guide (BUG) is developed prior to handover for distribution to the building occupiers and premises managers with a draft copy developed and discussed with users first to ensure the guide is most appropriate and useful to potential users.
		Handover	1	1			4		A training schedule is prepared for building occupiers/premises managers, timed appropriately around handover
Man		**TOTAL:**	**18**	**18**	**0**	**3**			
		% of total score:	**12.38%**	**12.38%**	**0.00%**	**2.06%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
HEALTH & WELLBEING 0.82% per credit									
Hea 01	**Visual comfort**	Daylighting	3		1		3		*Up to three credits are awarded on a sliding scale depending on the percentage of relevant building areas that comply with good practice daylight factor and average and minimum point daylight illuminance criteria. .
		View Out	2	1	1		4		*95% of the floor area in 95% of spaces for each relevant building area is within 7 m of an external wall. *The window or opening must be ≥ 20% of the surrounding wall area. Or compliance is sought via BS 8206: part 2
		Internal & External Lighting Levels, Zoning & Controls	1	1			4		*Internal lighting in all relevant areas of the building is designed to provide illuminance (lux) levels and colouring rendering index in accordance with the SLL Code for Lighting 2012 and areas with PC CIBSE LG7. *External lighting in compliance with BS5489 and BS12464. *All internal zoned to allow for occupant control.
Hea 02	**Indoor air quality**	Indoor Air Quality Plan	1	1		1	3		*An indoor air quality plan has been produced and implemented, with the objective of facilitating a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during the design, construction and occupation of the building.
		Minimising Sources of Air Pollution - Ventilation	1	1			4		*Provide fresh air into the building in accordance with the criteria of the relevant standard for ventilation. *Design ventilation pathways to minimise the build-up of air pollutants in the building *HVAC systems must incorporate suitable filtration to minimise external air pollution. *Areas of the building subject to large and unpredictable or variable occupancy patterns have carbon dioxide (CO2) or air quality sensors specified
		Minimise VOC Emissions by specification	1	1			4		*Specification or letter confirming the relevant products will meet the testing standards set out in Table - 20 of BREEAM Manual.
Hea 04	**Thermal comfort**	Thermal modelling	1	1			3		*Thermal modelling has been carried out using software in accordance with CIBSE AM111 Building Energy and Environmental Modelling.
		Adaptability - for a projected climate change scenario	1	1			3		*The thermal modelling demonstrates that the relevant requirements set out above are achieved for a projected climate change environment
		Thermal zoning and controls	1	1			4		*Temperature control strategy for the building is designed in line with thermal model.
Hea 05	**Acoustic performance**	Acoustic performance standards	3	2	1		3-4		*Suitably qualified acoustician to produce an acoustic report confirming the building meets the appropriate acoustic performance standards and testing requirements for: -Sound insulation -Indoor ambient noise level -Reverberation times.
Hea 06	**Safety & Security**	Security of Site & Building	1	1			4		*Install recommendations or solutions set out by the Suitably Qualified Security Specialist (SQSS). These recommendations or solutions must aim to ensure that the design of the building, public and private car parks, and public or amenity spaces are planned, designed, and specified to address the issues identified in the preceding Security Needs Assessment (SNA) which has been recieved.
Hea		**TOTAL:**	**19**	**11**	**3**	**1**			
		% of total score:	**15.59%**	**9.03%**	**2.46%**	**0.82%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
ENERGY 0.69% per credit									
Ene 01	**Reduction of Emissions**	Reduction of Emissions *(Minimum standard: 8 credits for Excellent and 10 credits for Outstanding)*	12	6	4		3		*Credits achieved through IES Modelling Tool and reduction in regulated CO_2 emissions, in accordance wiith Part L of 2013 building regulations.
Ene 02	**Energy Monitoring**	Sub-Metering of Major Energy Consuming Systems	1	1			3		* Energy metering systems are installed that enable at least 90% of the estimated annual energy consumption of each fuel to be assigned to the various end-use categories of energy-consuming systems
		Sub-Metering of High Energy Load & Tenancy Areas	1	1			3		*Sub-metering on a floor by floor basis and tenancy areas.
Ene 03	**External Lighting**	External Lighting	1	1			4		*Average initial luminous efficacy of not less than 70 luminaire lumens per circuit Watt. *Automatic control to prevent operation during daylight hours and presence detection in areas of intermittent pedestrian traffic.
Ene 04	**Low Carbon Design**	Passive Design Analysis	1	1		1	2		*Implement passive design measures to reduce the total heating, cooling, mechanical ventilation, lighting loads, and energy consumption in line with the passive design analysis findings.
		Low Zero Carbon Feasibility Study	1	1		1	2		*LZC Study to establish the most appropriate low or zero-carbon energy sources and report the reduction of regulated CO_2 emissions.
Ene 06	**Energy Efficient Transportation Systems**	Energy Consumption	1	1		1	2		*Lift analysis to determine transportation demand and usage patterns in compliance with BS EN ISO 25745 Part 2 and 3.
		Energy Efficient Features	2	2		2	4		*Energy-efficient features offering the greatest potential energy savings will be part of the system i.e. a standby condition for off-peak periods.
Ene		**TOTAL:**	**21**	**14**	**4**	**5**			
		% of total score:	**16.63%**	**11.09%**	**3.17%**	**3.96%**			
TRANSPORT 0.80% per credit									
Tra 01	**Public Transport Accessibility**	Accessibility Index / Dedicated Bus Service	3	3		3	2		*The public transport Accessibility Index (AI) for the assessed building is calculated and BREEAM credits are awarded according to the building type
Tra 02	**Proximity to Amenities**	Proximity to Local Amenities	1	1		1	2		*Assess and detail the number of amenities within 500m of the site.
Tra 03	**Cyclist Facilities**	Cycle Storage & Facilities	2	2			4		*Based on NIA and BREEAM default occupancy, number of required cycle spaces is calculated. *Cycle stands, showers, changing facilities, lockers/drying spaces are provided for building users
Tra 05	**Travel Plan**	Travel Plan	1	1		1	2		*A travel plan has been developed as part of the feasibility and design stages *A site-specific travel assessment/statement has been undertaken to ensure the travel plan is structured to meet the needs of the particular site
Tra		**TOTAL:**	**7**	**7**	**0**	**5**			
		% of total score:	**5.62%**	**5.62%**	**0.00%**	**4.01%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
WATER 0.80% per credit									
Wat 01	**Water Consumption**	Water Consumption *(Minimum standard: 1 credit for Excellent and 2 credits for Outstanding)*	5	3	1		3		*To reduce the consumption of potable water for sanitary use in new buildings through the use of water efficient components and water recycling systems.
Wat 02	**Water Monitoring**	Water Monitoring *(Minimum standard: Criterion 1 only - water meter on mains, for Excellent and Outstanding)*	1	1			3		Install water meters *On the mains water supply *On water-consuming plant or building areas consuming 10% or more of the building's total water demand. Each water meter is *Installed with a pulsed or other open protocol communication output and *Connected to BMS
Wat 03	**Water Leak Detection**	Leak Detection System	1	1			4		Install a leak detection system *On the utility water supply within the buildings, to detect any major leaks within the building and *Between the buildings and the utilities water supply, to detect any major leaks between the utilities supply and the buildings under assessment
		Flow Control Devices	1	1			4		*Install sanitary supply shut-off valves specified for each toilet area.
Wat 04	**Water efficient equipment**	Large water consuming systems are designed to minimise unregulated consumption	1	1			4		Mitigate 'unregulated water usage' (water consumption for uses not assessed under Wat 01) *Swimming pools *Recreational hot tubs and hydrotherapy pools *Equipment used for irrigation *Vehicle wash equipment *Project-specific industrial processes *Water filtration and treatment processes *Building services (e.g. cooling towers and humidification systems)
Wat		**TOTAL:**	**9**	**7**	**1**	**0**			
		% of total score:	**7.22%**	**5.62%**	**0.80%**	**0.00%**			
MATERIALS 1.16% per credit									
Mat 01	**Life Cycle Impacts**	Life Cycle Impacts	6	6			3		*Carry out a building LCA on of the superstructure design using either the BREEAM Simplified Building LCA tool or an IMPACT Compliant LCA tool *Identify opportunities for reducing environmental impact
Mat 03	**Responsible Sourcing of Materials**	Pre-requisite: Legal and sustainable timber *(Minimum Standard to achieve any BREEAM rating)*							*All timber and timber-based products used on the project is 'Legally harvested and traded timber'
		Sustainable Procurement Plan	1	1			4		*A sustainable procurement plan is to be issued (before concept design) and used by the design team to guide specification towards sustainable construction products.
		Responsible Sourcing of Materials	3	1	1		3		*Materials specified and procured from manufacturers who can provide EMS Certification (ISO 14001 etc.)
Mat 04	**Insulation**	Embodied Impact	1	1			4		*All insulation provided within the building needs to be "Green Guide A rated" and sourced from EMS Certified Suppliers.
Mat 05	**Designing for Durability & Resilience**	Designing for Durability & Resilience	1	1			3		*Protecting vulnerable parts of the building from damage and exposed parts of the building from material degradation.
Mat 06	**Material Efficiency**	Material Efficiency	1	1			1-6		*Set targets and report on opportunities and methods to optimize the use of materials for each of the project stages. *Develop and record the implementation of material efficiency during developed design, technical design, and construction. *Report the targets and actual material efficiencies achieved.
Mat		**TOTAL:**	**13**	**11**	**1**	**0**			
		% of total score:	**15.04%**	**12.73%**	**1.16%**	**0.00%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
WASTE 0.75% per credit									
Wst 01	**Construction Waste Management**	Pre-refurbishment audit	1	1			4		*Pre-refurbishment audit of all existing buildings, structures or hard surfaces within the scope of the refurbishment or fit-out zone is completed prior to strip-out or demolition works and by the end of RIBA Stage 2.
		Reuse and direct recycling of materials	2	2			4		*Materials detailed in Table 64 of BREEAM manual are either directly re-used on-site or off-site or is sent back to the manufacturer for closed-loop recycling *50% of the total available points for the waste material types should be achieved
		Construction Resource Efficiency	3	2	1		4		*Develop and implement a compliant resource management plan covering the waste arisings from the refurbishment or fit-out project with the aim of minimising waste. *2 credits: ≤ 1.2 tonnes of construction waste generated per 100m² (gross internal floor area) 3 credits: ≤ 0.4 tonnes of construction waste generated per 100m² (gross internal floor area)
		Diversion of Resources from Landfill	1	1			4		*90% (tonnes) of demolition and 80% of non-demolition waste to be diverted from landfill.
Wst 02	**Recycled Aggregates**	Recycled Aggregates	1	0	1		3		The percentage of high grade aggregate that is recycled or secondary aggregate, specified in each application (present) must meet the minimum % levels (by weight or volume) stated at BREEAM manual
Wst 03	**Operational Waste**	Operational Waste *(Minimum Standard for Excellent and Outstanding)*	1	1			3		*Waste and servicing strategy *Provision of space for general waste, recycling and organic waste to be provided in accordance with the findings of this report.
Wst 04	**Speculative Floor and Ceiling Finishes**	Speculative Floor and Ceiling Finishes	1	1			3		*To install floor and ceiling finishes selected by the known occupant or if the occupant is not known in the show area only.
Wst 05	**Adaptation to Climate Change**	Adaptation to Climate Change - Structural & Fabric Resilience	1	1			4		*Conduct a climate change adaptation strategy of new & and existing fabric and its durability to deal with extremes in weather conditions. *Develop recommendations/ solutions at RIBA Stage 2. *Provide an update at RIBA Stage 4.
Wst 06	**Functional Adaptability**	Functional Adaptability	1	1			4		*Conduct a study by the end of RIBA Stage 2 and develop recommendations prior to RIBA Stage 2. (i.e. alternative building uses, functions, major plant replacement, ventilation strategy to adapt to future building occupant needs, adaptability to changes of in-use, etc. *Confirm these have been picked up at Stage 4. Omissions have been justified in writing to the assessor.
Wst		**TOTAL:**	**12**	**10**	**2**	**0**			
		% of total score:	**8.27%**	**6.89%**	**1.38%**	**0.00%**			
LAND USE & ECOLOGY 2.41% per credit									
Le 02	**Ecological Value of Site & Protection of Ecological Features**	Protection of Ecological Features	1	1			4		*All existing features of ecological value within and surrounding the refurbishment or fit-out zone and site boundary area are adequately protected from damage during clearance, site preparation, and refurbishment or fit-out activities in line with BS42020: 2013 *The principal contractor is required to construct ecological protection recommended by the Suitably Qualified Ecologist (SQE)
Le 04	**Enhancing Site Ecology**	Ecologist's Report & Recommendations	1	1			4		*Ecologist (SQE) appointed at RIBA Stage 1 to advise on enhancing the ecology. *The ecology report based on a site visit/survey produced at RIBA Stage 2 has appropriate recommendations for the enhancement of the site's ecology. *Recommendations of the Ecology Report for the enhancement of site ecology have been or will be, implemented in the refurbishment or fit-out.
Le 05	**Long Term Impact on Biodiversity**	Long Term Impact on Biodiversity	2	2			4		*Landscape and ecology management plan,or similar, is developed in accordance with BS 42020:2013 covering as a minimum the first five years after project completion.
LE		**TOTAL:**	**4**	**4**	**0**	**0**			
		% of total score:	**7.22%**	**7.22%**	**0.00%**	**0.00%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
POLLUTION 0.93% per credit									
Pol 01	**Impact of Refrigerants**	Pre-Requisite: systems with electric compressors							*All systems with electric compressors comply with the requirements of BS EN 378:2016 (parts 2 and 3). *Refrigeration systems containing ammonia comply with the Institute of Refrigeration Ammonia Refrigeration Systems code of practice.
		Impact of Refrigerants	2	1	1		4		*Refrigerant's Direct Effect Life Cycle CO2 equivalent emissions (DELC CO2e) of ≤ 1000 kgCO2e/kW cooling/heating capacity.
		Leak Detection	1	1			4		*All systems are hermetically sealed or only use environmentally benign refrigerants or a permanent automated refrigerant leak detection system is required.
Pol 03	**Surface Water Run Off**	Flood Resilience	2	2			3		*Site-specific Flood Risk Assessment prepared by a specialist to confirm whether the site has a low, medium, or high probability of flooding.
		Neutral Impact on Surface Water and Reducing Run Off	2	2	0		3		*An appropriate consultant designs SUDS strategy. * If there is no increase in the impermeable surfaces as a result of the refurbishment works, 2 credits are awarded *Where an increase in the impermeable surfaces on-site, SuDS to allow full infiltration of the additional volume
Pol 04	**Reduction of Night Time Light Pollution**	Reduction of Night Time Light Pollution	1	1			4		*External lighting design is in line with ILP guidance of obtrusive light and can be automatically switched off. *Illuminated advertisements are designed in compliance with ILP PLG05 The Brightness of Illuminated Advertisements.
Pol 05	**Reduction of Noise Pollution**	Reduction of Noise Pollution	1	1			3		*A BS 4142:2014 compliant noise impact assessment to be carried out by Acoustician.
Pol			**13**	**8**	**1**	**0**			
		% of total score:	**12.03%**	**7.40%**	**0.93%**	**0.00%**			
INNOVATION 1.00% per credit									
Inn 01	**Man 03**	Considerate Construction	1	1			4		*With reference to the considerate construction criterion 7, in addition to meeting the criteria for two credits, the contractor achieves a score of 40+ with 7 in each section
Inn 07	**Mat 01**	Life Cycle Impacts	1	1			4		More than 85% of BREEAM Mat 01 calculator points achieved
Inn		**TOTAL:**	**10**	**2**	**0**	**0**			
		% of total score:	**10.00%**	**2.00%**	**0.00%**	**0.00%**			
Final BREEAM Score		**Overall Credits**	**126**	**92**	**12**	**14**			
		Final BREEAM score:	**110.00%**	**79.97%**	**9.89%**	**10.86%**			

BREEAM 2014 RFO (Non-Domestic)

Design & Procurement Assessment

The Courtyard Building Retail Units

Issue	Date	Reason for Issue	Prepared		Checked		Approved	
1	21-Jun-24	Planning	NYO	21-Jun-24	KC	21-Jun-24	KC	21-Jun-24
2	10-Jun-24	Update	NYO	10-Jun-24	KC	10-Jun-24	KC	10-Jun-24

BREEAM 2014 RFO (Non-Domestic)

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BREEAM 2014 RFO ASSESSMENT - DESIGN STAGE REPORT

Project Name	**The Courtyard Building**	Targeted BREEAM rating %	**62.65**	**Very Good**
Building Type	**Retail**	Potential BREEAM rating %	**67.47**	**Very Good**
Project Type	**Shell Only**	Achieved scoring %	**12.99**	**Unclassified**

Credit awarded
Credit not targeted
Potential additional credit
Further information required

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
MANAGEMENT	0.69% per credit								
Man 01	**Project brief and design**	Stakeholder Consultation (Project Delivery)	1	1		1	2		* A clear sustainability brief is developed prior to Stage 2 * Prior to completion of Stage 2 have met to identify and define their roles, responsibilities, and contributions for each of the key phases of project delivery. *The project team demonstrates how the project delivery stakeholder contributions and the outcomes of the consultation process have influenced or changed the Initial Project Brief, including if appropriate, the Project Execution Plan, Communication Strategy, and the Concept Design.
		Stakeholder Consultation (Third Party)	1	1		1	2		*All relevant third parties (planning consultation with local authority, local residents and any input from end user) been consulted.
		Sustainability Champion (Design)	1	1		1	1 - 2		*BREEAM AP is appointed prior to RIBA Stage 2 and BREEAM target formally agreed with the design team.
		Sustainability Champion (Monitoring Process)	1	1			4		*BREEAM AP is appointed to monitor progress against the target throughout the project up to the PC Stage.
Man 02	**Life cycle cost and service life planning**	Capital Cost Reporting	1	1			4		*Report the capital cost for the refurbishment/fit-out works in pounds per square metre (£k/m2) (GIA)
Man 03	**Responsible construction practices**	Timber used on site to be responsibly sourced. *(Minimum Standard to achieve any BREEAM rating)*	.						*All timber and timber-based products used on the project is 'Legally harvested and traded timber'
		Environmental Management	1	1			4		*The principal contractor operates an environmental management system covering their main operations. The EMS must be either: - Third-party certified, to ISO 14001/EMAS or equivalent standard; or - Have a structure that is in compliance with BS 8555: 2003 and has reached phase four of the implementation stage, 'implementation and operation of the environmental management system', and has completed phase audits 1 to 4, as defined in BS 8555:2003. *The principal contractor implements best practice pollution prevention policies and procedures on-site in accordance with Pollution Prevention Guidelines, Working at construction and demolition-sites: PPG61.
		Sustainability Champion (Construction)	1	1			4		* A Sustainability Champion is appointed to monitor the project to ensure ongoing compliance with the relevant sustainability performance/process criteria, and therefore BREEAM target(s), during Stages 5 and 6. *The defined BREEAM performance target forms a requirement of the principal contractor's contract
		Considerate Construction *(Minimum Standard: 1 credit for Excellent, 2 for Outstanding)*	2	2			4		*The principal contractor has used a 'compliant' organisational, local or national considerate construction scheme and their performance against the scheme has been confirmed by independent assessment and verification. *CCS score of >40 with at least 7 in each section to achieve 2+ exemplary BREEAM credits.
		Monitoring of Construction Site Impacts - Utility Consumption	1	1			4		*Monitor and record data of the site energy consumption in kWh (and where relevant, litres of fuel used) as a result of the use of construction *Report the total carbon dioxide emissions (total kgCO2/project value) from the construction process. *Monitor and record data on principal constructor's and subcontractors' potable water consumption (m3) arising from the use of construction plant, equipment (mobile and fixed) *Using the collated data report the total net water consumption (m3), i.e. consumption minus any recycled water use from the construction process
		Monitoring of Construction Site Impacts - Transport of Construction Materials & Waste	1	1			4		* Monitor and record data on transport movements and impacts resulting from delivery of the majority of refurbishment or fit-out materials to site and refurbishment, fit-out and demolition or strip-out waste from site
Man		**TOTAL:**	**17**	**11**	**0**	**3**			
		% of total score:	**15.18%**	**9.82%**	**0.00%**	**2.68%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
HEALTH & WELLBEING 0.82% per credit									
Hea 01	**Visual comfort**	View Out	2	1	1		4		*95% of the floor area in 95% of spaces for each relevant building area is within 7 m of an external wall. *The window or opening must be ≥ 20% of the surrounding wall area. Or compliance is sought via BS 8206: part 2
Hea 02	**Indoor air quality**	Indoor Air Quality Plan	1	1		1	3		*An indoor air quality plan has been produced and implemented, with the objective of facilitating a process that leads to design, specification and installation decisions and actions that minimise indoor air pollution during the design, construction and occupation of the building.
Hea 05	**Acoustic performance**	Acoustic performance standards	2	1			3-4		*Suitably qualified acoustician to produce an acoustic report confirming the building meets the appropriate acoustic performance standards and testing requirements for: -Sound insulation -Indoor ambient noise level -Reverberation times.
Hea 06	**Safety & Security**	Security of Site & Building	1	1			4		*Provide a copy of the recommendations or solutions set out by the Suitably Qualified Security Specialist (SQSS). These recommendations or solutions must aim to ensure that the design of the building, public and private car parks, and public or amenity spaces are planned, designed, and specified to address the issues identified in the recieved Security Needs Assessment (SNA).
Hea		**TOTAL:**	**12**	**4**	**1**	**1**			
		% of total score:	**12.79%**	**4.26%**	**1.07%**	**1.07%**			
ENERGY 0.69% per credit									
Ene 01	**Reduction of Emissions**	Reduction of Emissions *(Minimum standard: 8 credits for Excellent and 10 credits for Outstanding)*	15		2		3		*Credits achieved through IES Modelling Tool and reduction in regulated CO_2 emissions, in accordance wiith Part L of 2021building regulations.
Ene		**TOTAL:**	**17**	**0**	**2**	**0**			
		% of total score:	**15.30%**	**0.00%**	**1.80%**	**0.00%**			
TRANSPORT 0.80% per credit									
Tra 01	**Public Transport Accessibility**	Accessibility Index / Dedicated Bus Service	5	5		5	2		*The public transport Accessibility Index (AI) for the assessed building is calculated and BREEAM credits are awarded according to the building type
Tra 02	**Proximity to Amenities**	Proximity to Local Amenities	1	1		1	2		*Assess and detail the number of amenities within 500m of the site.
Tra 03	**Cyclist Facilities**	Cycle Storage & Facilities	2	2			4		*Based on NIA and BREEAM default occupancy, number of required cycle spaces is calculated. *Cycle stands, showers, changing facilities, lockers/drying spaces are provided for building users
Tra 05	**Travel Plan**	Travel Plan	1	1		1	2		*A travel plan has been developed as part of the feasibility and design stages *A site-specific travel assessment/statement has been undertaken to ensure the travel plan is structured to meet the needs of the particular site
Tra		**TOTAL:**	**9**	**9**	**0**	**7**			
		% of total score:	**9.38%**	**9.38%**	**0.00%**	**7.30%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
WATER 0.80% per credit									
Wat 04	**Water efficient equipment**	Large water consuming systems are designed to minimise unregulated consumption	1	1			4		Mitigate 'unregulated water usage' (water consumption for uses not assessed under Wat 01) *Swimming pools *Recreational hot tubs and hydrotherapy pools *Equipment used for irrigation *Vehicle wash equipment *Project-specific industrial processes *Water filtration and treatment processes *Building services (e.g. cooling towers and humidification systems)
Wat		**TOTAL:**	**1**	**1**	**0**	**0**			
		% of total score:	**1.04%**	**1.04%**	**0.00%**	**0.00%**			
MATERIALS 1.16% per credit									
Mat 01	**Life Cycle Impacts**	Life Cycle Impacts	6	4			3		During stage 2 (before planning submission): *Carry out a building LCA on of the superstructure design using either the BREEAM Simplified Building LCA tool or an IMPACT Compliant LCA tool *Identify opportunities for reducing environmental impact
Mat 03	**Responsible Sourcing of Materials**	Pre-requisite: Legal and sustainable timber *(Minimum Standard to achieve any BREEAM rating)*	.						*All timber and timber-based products used on the project is 'Legally harvested and traded timber'
		Sustainable Procurement Plan	1	1			4		*A sustainable procurement plan is to be issued (before concept design) and used by the design team to guide specification towards sustainable construction products.
		Responsible Sourcing of Materials	3	1			3		*Materials specified and procured from manufacturers who can provide EMS Certification (ISO 14001 etc.)
Mat 05	**Designing for Durability & Resilience**	Designing for Durability & Resilience	1	1			3		*Protecting vulnerable parts of the building from damage and exposed parts of the building from material degradation.
Mat 06	**Material Efficiency**	Material Efficiency	1	1			1-6		*Set targets and report on opportunities and methods to optimize the use of materials for each of the project stages. *Develop and record the implementation of material efficiency during developed design, technical design, and construction. *Report the targets and actual material efficiencies achieved.
Mat		**TOTAL:**	**12**	**8**	**0**	**0**			
		% of total score:	**18.03%**	**12.02%**	**0.00%**	**0.00%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
WASTE 0.75% per credit									
Wst 01	**Construction Waste Management**	Pre-refurbishment audit	1	1			4		*Pre-refurbishment audit of all existing buildings, structures or hard surfaces within the scope of the refurbishment or fit-out zone is completed prior to strip-out or demolition works and by the end of RIBA Stage 2.
		Reuse and direct recycling of materials	2	1	1		4		*Materials detailed in Table 64 of BREEAM manual are either directly re-used on-site or off-site or is sent back to the manufacturer for closed-loop recycling *50% of the total available points for the waste material types should be achieved
		Construction Resource Efficiency	3	2	1		4		*Develop and implement a compliant resource management plan covering the waste arisings from the refurbishment or fit-out project with the aim of minimising waste. *2 credits: ≤ 1.2 tonnes of construction waste generated per 100m² (gross internal floor area) 3 credits: ≤ 0.4 tonnes of construction waste generated per 100m² (gross internal floor area)
		Diversion of Resources from Landfill	1	1			4		*90% (tonnes) of demolition and 80% of non-demolition waste to be diverted from landfill.
Wst 03	**Operational Waste**	Operational Waste *(Minimum Standard for Excellent and Outstanding)*	1	1			3		*Waste and servicing strategy *Provision of space for general waste, recycling and organic waste to be provided in accordance with the findings of this report.
Wst 05	**Adaptation to Climate Change**	Adaptation to Climate Change - Structural & Fabric Resilience	1	1		1	2		*Conduct a climate change adaptation strategy of new & and existing fabric and its durability to deal with extremes in weather conditions. *Develop recommendations/ solutions at RIBA Stage 2. *Provide an update at RIBA Stage 4.
Wst 06	**Functional Adaptability**	Functional Adaptability	1	1		1	2		*Conduct a study by the end of RIBA Stage 2 and develop recommendations prior to RIBA Stage 2. (i.e. alternative building uses, functions, major plant replacement, ventilation strategy to adapt to future building occupant needs, adaptability to changes of in-use, etc. *Confirm these have been picked up at Stage 4. Omissions have been justified in writing to the assessor.
Wst		**TOTAL:**	**10**	**8**	**2**	**2**			
		% of total score:	**9.77%**	**7.82%**	**1.95%**	**1.95%**			
LAND USE & ECOLOGY 2.41% per credit									
Le 02	**Ecological Value of Site & Protection of Ecological Features**	Protection of Ecological Features	1	1			4		*All existing features of ecological value within and surrounding the refurbishment or fit-out zone and site boundary area are adequately protected from damage during clearance, site preparation, and refurbishment or fit-out activities in line with BS42020: 2013 *The principal contractor is required to construct ecological protection recommended by the Suitably Qualified Ecologist (SQE)
Le 04	**Enhancing Site Ecology**	Increase in Ecological Value	1	1			4		*Ecologist (SQE) appointed at RIBA Stage 1 to advise on enhancing the ecology. *The ecology report based on a site visit/survey produced at RIBA Stage 2 has appropriate recommendations for the enhancement of the site's ecology. *Recommendations of the Ecology Report for the enhancement of site ecology have been or will be, implemented in the refurbishment or fit-out.
Le 05	**Long Term Impact on Biodiversity**	Long Term Impact on Biodiversity	2	2			4		*Landscape and ecology management plan,or similar, is developed in accordance with BS 42020:2013 covering as a minimum the first five years after project completion.
LE		**TOTAL:**	**4**	**4**	**0**	**0**			
		% of total score:	**12.50%**	**12.50%**	**0.00%**	**0.00%**			

Credit Ref.	Credit Title	Credit Name	Credits Available	Credits Targeted	Potential Additional	Credits Achieved	RIBA Stage	Status	Credit Requirements
POLLUTION 0.93% per credit									
Pol 03	**Surface Water Run Off**	Flood Resilience	2	2			3		*Site-specific Flood Risk Assessment prepared by a specialist to confirm whether the site has a low, medium, or high probability of flooding.
		Neutral Impact on Surface Water and Reducing Run Off	2	2	0		3		*An appropriate consultant designs SUDS strategy. * If there is no increase in the impermeable surfaces as a result of the refurbishment works, 2 credits are awarded *Where an increase in the impermeable surfaces on-site, SuDS to allow full infiltration of the additional volume
Pol			**5**	**4**	**0**	**0**			
		% of total score:	**6.01%**	**4.81%**	**0.00%**	**0.00%**			
INNOVATION 1.00% per credit									
Inn 01	**Man 03**	Considerate Construction	1	1			4		*With reference to the considerate construction criterion 7, in addition to meeting the criteria for two credits, the contractor achieves a score of 40+ with 7 in each section
Inn		**TOTAL:**	**10**	**1**	**0**	**0**			
		% of total score:	**10.00%**	**1.00%**	**0.00%**	**0.00%**			
Final BREEAM Score		**Overall Credits**	**97**	**50**	**5**	**13**			
		Final BREEAM score:	**110.00%**	**62.65%**	**4.82%**	**12.99%**			

Appendix D

Condition & Feasibility Study

SWECO

Condition & Feasibility Study

The Courtyard Building

Planning Application

October 2024

Contents

Revisions & Author Details

Revision no.	Date	Author	Checked/Approved By	Date Approved
01	10/09/2024	Matthew Mapp	n/a	n/a

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Executive Summary

1.1 Executive Summary

This report has set out the findings of the Condition & Feasibility Study conducted by Sweco UK for The Courtyard Building, focusing on the operation, materiality and performance of the existing building. The content of this report has been set out to align with the requirement of London Borough of Camden's Energy Efficiency & Adaptability (EEA) CPG Chapter 9. The report has been informed by survey data, observations from the Applicant's professional team and existing building information that has been gathered and reviewed as part of this study to provide as in-depth a review of the insitu building as possible at this time.

The key findings of this report can be summarised as follows:

- **Functional operation:** significantly different floor levels in a number of locations, mixed structural systems with a number of issues, underwhelming entrance spaces and dated appearance. The building has been vacant for a number of years and a large extent of the floorplates have been stripped out under previous ownership.

- **Legislation:** the current EPC has expired in 2019. The existing building requires fairly significant interventions to comply with current regulations and regional policies including fire, access and transport facilities (i.e. cycle storage and associated facilities).

- **Servicing**: most of the on-floor services have been stripped out, and very little on-floor equipment remains. Some plant evident at roof level (AHUs, condenser units etc.) reflective of an electric heating and cooling system when the buildings were functionally operational. Some equipment at basement, mostly electrical equipment. Equipment deemed to be at the end of its service life, with some of the basement electrical equipment assumed to be many decades old based on visual inspections.

- **Structure:** mixed structure across the site and the existing buildings, with a range of load-bearing masonry, steel frames, timber floors, concrete infills and metal deck systems. Independent surveys raised a number of issues with interfaces and current condition, but in general the structure is not condemned and potential for reuse and refurbishment is evident in a number of locations. The extent of strip has facilitated a more detailed interrogation of existing structures at an early stage.

- **Facades & Fabric:** Fabric performance is poor, and a number of key issues have been raised due to interface between structure and facades, window condition/performance and risks such as condensation if walls were to be upgraded thermally. However, this need to be carefully balanced against the heritage value of the original façade design and systems as a 'positive contributor' within the Bloomsbury Conservation Area, and sensitive and informed upgrades will need to be made as a result. The roof is in very poor condition and requires replacement.

- **Energy:** energy performance is expected to be poor given the information found within this report and the current understanding of the importance of building fabric in determining low-energy performance. Interventions are required to improve this. Given the lack of existing occupiers for many years no meter readings from an operational year could be found. The EPC, expired in 2019, does not provide any detail such as primary energy on which to base an assumption, and only covers a small area of the existing buildings.

- **Site capacity:** the site offers excellent opportunities to increase capacity, with a PTAL rating of 6B indicating excellent public transport links and opportunities for sustainable transport, particularly due to the proximity to the Tottenham Court Road station with its recent addition of Crossrail.

The site therefore offers opportunity for reuse and refurbishment of the existing structure, subject to the interventions required to facilitate compliance with regulatory and regional/local policy requirements and management of the issues raised within the professional and independent surveys. This should be explored in any proposed intervention to the site. Management of the facades is more problematic; while the current performance arguably requires fairly significant interventions to move towards modern fabric performance requirements, the heritage value of the existing systems within the Conservation Area should also be maintained as far as possible. Therefore, interventions to facades should be sensitive and decisions made within the context of these wider considerations.

Replacement of the poor-performance roof presents opportunities to enhance other sustainability attributes of any refurbishment or redevelopment, including allowing for accessible terrace space for occupant health and wellbeing, deployment of surface water management strategies such as blue roofs, enhancing urban greening and biodiversity of the site and the potential for renewable energy systems such as PV panels.

Building services systems are at the end of their service life and a comprehensive overhaul should be considered. Systems should be deployed that meet the current best-practice standards of performance against regulatory and industry guidance, and this should be balanced against any decision to intervene in the existing facades.

While it is recognised that the building is already stripped out to a considerable degree, any intervention is likely to result in removal of products and materials from the existing building. Audits of these materials leaving the site should be undertaken, to ensure that their end of life treatment is undertaken in the most sustainable way, with alternative opportunities for reuse also explored where possible.

Overall, the existing buildings present viable opportunities for insitu reuse of structure and facades, subject to the management and mitigation of the risks that have been set out within this report. Sensitive remodelling and refurbishment of the existing building to achieve a good level of long-term sustainable performance is deemed possible without having to resort to full demolition of the existing building.